



NCUR 2026 Proceedings

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The National Conference on Undergraduate Research (NCUR)

What is NCUR?

The National Conference on Undergraduate Research (NCUR) is the premier annual event celebrating undergraduate achievement across all disciplines. Each year, thousands of students from institutions across the country gather to present original research, scholarship, and creative work. Unlike other conferences, NCUR is dedicated to celebrating undergraduate scholars from all institutions of higher learning from all disciplines. NCUR offers a unique platform where students can share their work with peers, faculty, and professionals from a wide array of fields.

The NCUR experience offers more than visibility—it provides a transformative experience where students:

- Build confidence and communication skills.
- Receive meaningful feedback from peers, faculty, and professionals across disciplines.
- Engage in cross-disciplinary learning by attending sessions beyond their field.
- Expand their academic and professional networks with mentors, collaborators, and recruiters.
- Discover new pathways through the Future Fair.

NCUR also supports the growth of institutions by equipping faculty, staff, and administrators to:

- Celebrate and mentor the next generation of researchers.
- Connect with colleagues to exchange best practices in undergraduate research.
- Stay informed on emerging trends and innovations in student scholarship.

NCUR began in 1987 at the University of North Carolina at Asheville with more than 400 students in attendance. In 2010, NCUR officially merged with the Council on Undergraduate Research (CUR), joining forces to advance undergraduate research on a national scale. Since then, it has grown into the largest undergraduate research conference in the world, with more than 4,000 in attendance.

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About These Proceedings

This document features a comprehensive list of student presentations from this year's NCUR, organized by the primary presenter's last name. Each entry includes:

- Presenter's name
- Their institution (with state)
- Discipline of the presentation
- Additional authors (if applicable)
- Title of the presentation
- Abstract

This information was submitted by the student presenters during the NCUR application process.

Aayushi .

Discipline: Linguistics and World Languages

Authors:

#1 Aayushi .

Abstract Name: Code-Switching as a Tool for ESL Reading: A Pilot Study on Speed and Comprehension

As a global lingua franca in economic and educational contexts, English has become increasingly essential, leading to a growing demand for English as a Second Language (ESL) courses. This pilot study examines the education of ESL through a linguistic lens, aiming to investigate whether code-switching can be employed as a tool to enhance reading speed and comprehension among ESL learners. While code-switching (CS) has been used as a learning tool for natural language acquisition and conversational practice, the reading and comprehension aspect of language learning has often been overlooked in terms of leveraging the benefits of code-switching. In this study, a triangular method of analysis was used with eight participants who are Japanese L1 speakers learning English as a second language. Following a pre-task survey, where the participants self-reported their proficiency levels in English, a self-paced reading paradigm was used in which the participants read three types of texts: monolingual Japanese, monolingual English, and code-switched Japanese-English. Reaction times were recorded for each word. Results revealed a consistent trend: Code-switched texts were read faster than English-only texts, similar to the reading speed in their L1 (Japanese-only texts). The participants also reported higher levels of comprehension and comfort in the post-task survey. While the statistical differences were not significant, likely due to the small sample size, the pattern was clear across all participants. These findings suggest that CS may facilitate L2 processing by anchoring meaning in the learner's L1. With a larger and more linguistically diverse participant pool, future research may uncover statistically significant effects. This study supports the pedagogical potential of CS as a legitimate and effective tool in both ESL instruction and learning.

Hailey Abate

Discipline: Business

Authors:

Abstract Name: Connecticut Wine Tourism Amidst a Changing Climate: Opportunity or Threat?

This study investigates the impact of climate change on Connecticut's wine tourism industry, assessing how shifting environmental conditions influence vineyard operations, tourist behavior, and long-term industry viability. The research aims to determine whether climate change serves as a threat to existing practices or if it creates a competitive opening for long-term adaptation, sustainability, and growth. To address this question, a qualitative conceptual analysis was conducted using a literature review of academic sources, government publications, and industry reports. Findings were categorized using a fishbone diagram to trace cause-and-effect relationships, and a thematic matrix to synthesize recurring patterns across key environmental, agricultural, and economic variables affecting the industry. Results indicate that climate change presents the Connecticut wine industry with a complex combination of risks and opportunities. For example, warmer temperatures allow for longer growing seasons as well as more diversified grape production and varietal expansion, which may strengthen the industry's economic potential. Conversely, unpredictable weather patterns, increased pest pressures, and soil degradation pose significant challenges to long-term sustainability. Wineries are responding to these pressures through innovative forms of adaptation, including experimenting with climate-resilient grape hybrids, expanding renewable energy adoption, and leveraging state-level programs designed to reduce climate-related uncertainty. This study contributes to the underdeveloped

literature on climate impacts in small-scale, regional wine industries, particularly within the Northeastern U.S. (Connecticut), and offers a structured framework for assessing both climate-driven risk and resilience potential in the wine tourism sector using qualitative tools such as cause-and-effect analysis and thematic mapping. The study also highlights practical implications by illustrating how climate adaptation strategies can shape future industry competitiveness and support broader sustainability goals.

Azhari Abbas

Discipline: Engineering

Authors:

#1 Azhari Abbas

#2 Caleb Fakunle

Caleb Fakunle

Abstract Name: Navigating Enhanced Exploration Assistance (NEXA)

Navigating Enhanced Exploration Assistance (NEXA) is an artificial intelligence software platform developed to enhance residential security and property monitoring through seamless integration with autonomous drone systems. This research application of advanced AI in surveillance aims to create a standalone solution capable of real-time threat detection and intelligent alert management. By processing visual and sensory data, NEXA facilitates autonomous drone operation with minimal human intervention. Secure communication channels ensure that instant alerts are delivered to property owners and, potentially, law enforcement, improving response times in security incidents, search-and-rescue operations, and perimeter surveillance. Additionally, NEXA is capable of interfacing with commercially available drone platforms and presents a scalable and cost-effective approach to aerial monitoring.

Leslee Abbott

Discipline: Art History

Authors:

Abstract Name: A Shift in Print Culture from Edo Japan (1615 - 1868) to Meiji Japan (1868 - 1912)

This is an analysis of the cultural shift of woodblock printing as a practice of aesthetics and propaganda in the Edo and Meiji periods of Japan. While many scholars emphasize woodblock printing from the Edo and Meiji periods as reflections of Japanese culture and political climates, not many scholars address the transition of the content and context of woodblock prints throughout these time frames. First, the research will discuss the social and political dynamics at the end of the Tokugawa Shogunate to demonstrate the historical context of the production of the prints. Second, the research will provide a formal and critical analysis of the print 'Modern Versions of the twenty-four Paragons of Filial Piety: Guo Zhu' from the Edo period to emphasize the Edo period's connection to Confucianism. Third, a brief discussion of the rapid modernization and industrialization under the imperial rule of Emperor Meiji is provided, followed by a formal and cultural examination of "There Stands No Enemy Where We Go" from the Meiji period. Fourth, a comparative discussion of the cultural significance of the two prints will emphasize how the change in the cultural meaning of the prints reflected a change in social and political norms in the country. While the Edo woodblock prints were used to legitimize the feudal military system supported by Confucianism and reflected its urban culture, prints in the Meiji period served as a tool in the establishment of the nation-state, an element

of cross-cultural exchange, social commentary, and modernization policies. This research is critical to demonstrate how the social and political power structure influences the content and context of art.

Leslee Abbott

Discipline: Education

Authors:

Abstract Name: AI in Art Education

The purpose of this research is to present the positives and negatives of artificial intelligence (AI) in the art space, and through comparative discussion, it aims to highlight the importance of addressing and incorporating AI in the art classroom responsibly. While many researchers continue to concentrate on the negative effects of irresponsible use of AI, there is plenty of evidence supporting responsible ways to incorporate AI in the classroom. AI should not be used to demolish creativity and critical thinking. Students will continue to have access to AI and other technological resources; without proper instruction, the destruction of AI could be devastating. First, the research will give a brief background of contemporary AI artists and the strategies they are using to implement AI in the art world. Second, the research will critically review the current research on the implementation of AI into art classrooms. Third, a discussion of the benefits of using AI responsibly in the art classroom will be presented. Fourth, a comparative discussion of the pros and cons of AI in the art space will be discussed in order to understand the importance of AI in the future of art education. This research demonstrates why it is important to incorporate AI responsibly in the Art Education classroom. While many researchers present the cons of AI being implemented in the classroom, there is little research comparing the benefits and drawbacks. By critically reviewing and comparing literature on AI in the field of art education, the research will showcase how to incorporate AI responsibly while retaining integrity and respect in the art space.

Dalia Abdalla

Discipline: Environmental Science and Sustainability

Authors:

#1 Dalia Abdalla

#2 Nakeina Douglas-Glenn

Abstract Name: Socio-Environmental Spatial Observations of Data Centers in The Greater Richmond Region

In the past ten years, the United States' race to develop AI technology has led to an increase in data center construction. Data centers have caused negative environmental impacts due to their energy-intensive, water-intensive infrastructure. These environmental impacts are a social equity concern, as they'd prolong community exposure to dangerous air pollutants, subject nearby areas to light and noise pollution, intensify local water scarcity, and increase electricity bills without careful regulation. This project is an explorative analysis of the potential socio-environmental impacts of data centers in Greater Richmond, specifically in Richmond City, Henrico, Chesterfield, and Hanover. ArcGIS will be used to spatially observe the relationships between the CDC's social vulnerability index and population density in census tracts of Greater Richmond's proposed and current data centers. In addition, general environmental factors, land cover and night light, in proximity to data centers will be spatially explored. The early to mid-stages of county data center development are a critical time to develop regulations to protect local communities and reduce

environmental impacts. These spatial observations will provide a stronger understanding of the factors influencing data center development, which can be incorporated into upcoming regulations.

Nahim Abdallah

Discipline: Engineering

Authors:

Akshita Ramesh

Noah D'shouza

Abstract Name: Development of Remotely Operated Manufacturing System Using Brain and Muscle Activity

Most current industrial robotic systems rely on manual controllers, pre-programmed sequences, or stationary teleoperation. These can restrict flexibility and responsiveness within dynamic settings, which can affect productivity and efficiency. Many of these environments, such as within additive manufacturing, are also unsafe for long term human exposure due to elements such as toxic fumes or hazardous materials. Electroencephalography (EEG) and Electromyography (EMG) have been increasingly integrated within the field of robotic control, offering the ability to teleoperate robotic systems using neural and muscular activity. Using biosignals such as EEG and EMG allows implementation of intent-based processing, which can improve factors such as precision, accuracy, and adaptability across a variety of diverse tasks. By combining cognitive decision making with physical activation, this research focuses on integrating EEG and EMG technologies into an industrial robotic platform to enable intuitive, real-time control for additive manufacturing applications. The proposed system uses Steady-State Visually Evoked Potentials (SSVEP) extracted real-time from EEG signals to control a Clearpath Robotics Husky A200 base, while a wearable sleeve with embedded EMG electrodes will provide fine-grained control of a Kinova Gen3 robotic arm located atop the Husky. OpenBCI hardware will be used for EEG and EMG signal acquisition, with a custom pipeline developed for processing and classification of biosignals. Current progress includes establishing reliable EEG and EMG acquisition procedures, implementing the proper Robot Operating System (ROS) libraries required for platform control, and fabricating a custom EMG acquisition sleeve. By merging cognitive intent, muscular activation, and immersive feedback, this project aims to advance human-robot collaboration and introduce a more adaptive, safe, and intuitive approach to robotic control within additive manufacturing and beyond.

Anthony Abdelahad

Discipline: Economics

Authors:

#1 Anthony Abdelahad

Subhadra Ganguli

Abstract Name: Forecasting Stock Prices in The Age of AI--An Empirical Analysis

Forecasting stock prices is common especially for the financial services companies which are constantly in a flux with changes in regulation or state of the macroeconomy etc. Companies can be impacted by several macroeconomic factors influenced by Fed Reserve or government actions or by shocks in the system through external channels. Added to several challenges, there is the current wave of Artificial Intelligence which can rock the boat further with new outcomes, uncertain results, implications on employment, automation and much more. The research forecasts the stock prices of a few financial services companies after considering

the impact of changing regulatory landscape, macroeconomic policies, state of the economy, business cycles, business related factors affecting the companies and finally the impact of AI related actions by the companies on their future stock prices. There are several studies which discuss the impact of AI on the business performance of the companies. However, there is no empirical study of the impact of AI use and adoption on the future stock prices. This new angle of examining the impact of AI on future stock prices can be a step in the right direction for companies to consider how much of AI and what kind of AI to use and the potential impact of such use and influence for their future growth as companies.

Haidy Abdelfattah

Discipline: Business

Authors:

Abstract Name: Representation of Inflammatory Skin Conditions in American Cosmetic Marketing

Current cosmetic marketing in the United States continues to promote an ideal of flawless, poreless skin as the standard of beauty. This representation shapes not only aesthetic preferences but also public perceptions of health, confidence, and worth. While brands increasingly claim inclusivity and diversity, individuals with visible inflammatory skin conditions—such as acne, eczema, rosacea, and psoriasis—remain largely excluded from mainstream imagery. As a result, beauty marketing perpetuates narrow ideals that affect both consumer psychology and social belonging. This paper addresses the gap between the industry’s inclusive rhetoric and its continued visual exclusion. It examines how the absence of visible skin variation in advertising contributes to stigma and emotional distress among those with chronic dermatologic conditions. Using an interdisciplinary approach that integrates insights from psychology, dermatology, and marketing, the study analyzes the cultural, ethical, and emotional consequences of marketing practices that equate clear skin with beauty, success, and self-control. This paper argues that genuine inclusivity requires more than representation in language, as it demands transparency, authenticity, and evidence-based development. By evaluating advertising imagery, brand communication, and digital media trends, this research highlights how marketing can either reinforce harmful norms or transform them into sources of empathy and empowerment. These findings reveal that brands emphasizing authenticity and unfiltered representation are perceived as significantly more trustworthy and emotionally supportive by consumers, while campaigns that rely on airbrushed or idealized skin imagery correlate with higher reports of self-comparison and decreased self-esteem. Ultimately, this study demonstrates that inclusive marketing has the potential to improve both mental health and consumer trust. When brands portray real and diverse skin as beautiful, they redefine beauty as care rather than correction, visibility rather than concealment, and acceptance rather than aspiration.

Rawan Abdel-Ghaffar

Discipline: Chemistry

Authors:

#1 Rawan Abdel-Ghaffar

Abstract Name: How do different purification methods affect the yield and purity of ibuprofen isolated from over-the-counter analgesics marketed to teenagers, and what could this mean for dosing reliability during adolescence?

Adolescents commonly use ibuprofen to manage headaches, sports injuries, and menstrual pain during a period of continued physical and physiological development. Reliable dosing of over-the-counter analgesics

is important for balancing effective pain relief with the potential long-term risks of nonsteroidal anti-inflammatory drugs, such as gastrointestinal irritation and kidney stress. This project examines the purity and recovery of ibuprofen isolated from brand-name and generic tablet formulations marketed to teenagers, using undergraduate-level organic purification techniques, and considers the implications for dosing consistency in this age group. Crushed ibuprofen tablets will be dissolved in an organic solvent and subjected to acid–base extraction to separate the acidic active ingredient from inactive excipients. The ibuprofen will then be recovered by re-acidification, isolated by vacuum filtration, and further purified either by recrystallization from an ethanol–water mixture or, in a separate branch of the study, by column chromatography on silica gel. Purified samples will be analyzed using melting point determination and thin-layer chromatography to assess purity, and percent recovery was calculated at each purification step. Where available, spectra from pure ibuprofen standards were used to confirm product identity. The study compares yield and purity between brand and generic products, and between recrystallization-based and chromatography-based purification strategies. These results are interpreted in the context of adolescent human development, highlighting how formulation and purification efficiency relate to the accurate delivery of active drug to teen patients. By connecting hands-on purification of a common analgesic with developmental health considerations, this project illustrates how organic chemistry techniques can inform discussions about medication quality and safe pain management in teenagers.

Rattanna Abdellatif

Discipline: Communications

Authors:

#1 Rattanna Abdellatif

#2 Alexandra Porter

Alexandra Porter

Abstract Name: How TikTok Affects Young Adults' Mental Health and Self-Image

Social media has evolved dramatically over the years. According to Minamitani (2024), a major review of studies found that social networking sites are linked to higher risks of mental health issues, particularly in younger generations, leaving several experts concerned. Increased dependence on social media raises important questions that have yet to be answered about its psychological impact on users. TikTok has become particularly influential among young adults, who spend hours consuming content on the application. This study investigates how young adults aged 18–21 experience the effects of negatively framed content on TikTok in relation to their overall mental health and self-image. Based on existing studies, we anticipate that frequent exposure to negatively framed content on TikTok correlates with decreased self-esteem and distorted self-image among young adults. Additionally, TikTok's algorithm may intensify these effects by creating echo chambers that trap users in cycles of harmful content. This study uses the Differential Susceptibility to Media Effects Theory, purposive sampling, and in-depth interviews conducted in person at Wayne State University or on Zoom. This study can inform mental health professionals, Big Tech leaders, educators, parents, and even other young adults about how TikTok affects mental health and how to find healthier ways to use TikTok.

Dunya Abdelrahman

Discipline: Nursing and Public Health

Authors:

#1 Dunya Abdelrahman

Abstract Name: Artificial Intelligence in Smart Data Management: A Systematic Review

Despite the growing prevalence of Artificial Intelligence (AI), many institutions have yet to fully understand and utilize its potential. This systematic review further investigates the capabilities of AI, with the intention of uncovering and developing methods that support efficient retrieval, comprehension, and organization of data. A systematic literature search was conducted across multiple sources, including Google Scholar, MEDLINE via Ovid and PubMed, and the Cochrane Database of Systematic Reviews, in order to gather evidence relevant to smart data management. Retrieved studies were then screened against eligibility criteria to ensure they addressed the focus of the study. 22 studies were selected and compiled into a manuscript outline regarding the methods and applications of smart data management systems with the support of AI. The systematic review highlights four key domains of smart data management: data retrieval, interpretation, organization, and utilization. In data retrieval, AI automated the extraction of vital signs and electronic medical record (EMR) data and generated medical reports, while natural language processing (NLP) and retrieval-augmented generation enabled uniform, time-synchronized datasets. In data interpretation, deep neural networks predicted clinical outcomes and supported risk stratification, convolutional neural networks interpreted vital signs in real time, and GloVe embeddings analyzed EMR data to enhance pattern recognition and decision making. In data organization, NLP systems conducted automated cleaning of EMR and vital sign data into automated case report forms, and the integration of multimodal datasets that were standardized and prepared for downstream interpretation. Lastly, in efficient data utilization, AI systems streamline clinical decision support using large language models and augmented intelligence, which enhance patient management and optimize workflow. Although current data proves to be limited, and variability across studies prevents a full understanding, the evidence suggests that further research is needed to validate the effectiveness of AI and its impact on smart data management.

Nesteho Abdi

Discipline: Nursing and Public Health

Authors:

#1 Nesteho Abdi

#2 Maryam Irobe

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Maryam Irobe

Abstract Name: Facilitators and Barriers to Migrational Transitions and Its Impact on Type 2 Diabetes in Somali Elders Living in Minnesota

Objectives: People migrating to the United States often experience extreme lifestyle changes that may impact health and well-being. These significant transitions can impact health by altering food accessibility and challenges in understanding the complex healthcare system. This study examines how migration experiences influence type 2 diabetes (DM2) risk and management among Somali elders in Minnesota. **Methods:** Utilizing Photovoice methods—a process that allows populations to shift the narrative to capture and discuss their experiences through photos—the team trained and interviewed participants using prompts to take their photos. Demographic surveys were administered and analyzed using REDcap and Excel. Interview themes and subthemes were determined by a team of three researchers via qualitative analysis methods. **Results:** The total study population included 14 participants, with an average age of 64.5 +/- 9.6 years. Four themes emerged from the photos submitted by participants regarding their experiences: 1) dietary changes, including higher consumption of processed foods, 2) changes in the ability to engage in physical activity, 3) barriers to food access and services to help manage DM2, and 4) positive impacts of religion & hope. A common reason for reduction in physical activity included safety concerns and changes in weather. Other barriers to food and service access included low health literacy, limits to physical mobility, and inability to pay for services. **Conclusion:** Migration from Somalia to the U.S. impacts health, particularly in changes in food

availability & access, physical activity, environmental stressors from the migration process, and differences in healthcare systems. All of these factors can affect peoples' ability to manage DM2. However, immigrants did note some positive impacts of immigration that included hope for the future and the positive role of religion. These results indicate that increased support is needed in transitional services to help reduce the burden of diabetes on Somali immigrant populations.

Jamal Abdo

Discipline: Sociology

Authors:

#1 Tina Lee

#2 Courtney Juelich

Abstract Name: Analyzing safety associated with lighting in Menomonie

LED lights are used by many cities as a cost-saving measure due to their energy efficiency, as they tend to shine brighter than conventional lighting (Jones 2018). However, people are affected by light pollution, often with disruption of the circadian rhythm, and there is a positive association between light pollution and cancer, primarily breast cancer (Walker II et al., 2020). This project aims to understand 1) how exterior lighting decisions are made by UW-Stout and the surrounding city of Menomonie and 2) how Stout students perceive exterior lighting on campus and in Menomonie and how it affects them, including level of concern about light pollution, concern about safety, and the relationship between lighting and safety. I hypothesize that people's perceptions of safety affect their experiences, that there is a positive correlation between brighter lighting and higher perceived levels of safety, and that perceptions of safety related to lighting would impact people's habits at night. A survey of 263 undergraduate and graduate students at UW-Stout and two interviews, one with a member of the City of Menomonie's Public Works Department and the other with a member of the University of Wisconsin-Stout's Sustainability Committee, were used to address these questions. I found that there was indeed a perception that brighter exterior lighting brings more safety. Furthermore, while there was some concern about light pollution, it was not as major a concern for most respondents. Moreover, convenience was the biggest factor impacting where respondents would walk at night, with lighting as the second biggest. On average, most respondents stated that they walked at night 2-3 times a week and that they walked by themselves more often. These findings can be used to better inform policy decisions made about lighting that take into account community views.

Umniya Abdu

Discipline: Psychology

Authors:

#1 Kiara Brown

#2 Fantasy Lozada

#3 Terri Sullivan

Abstract Name: The Role of Racial Socialization on the relations between Racial Discrimination and Civic Engagement on African American Adolescents

Racial discrimination (RD), the differential treatment of people based on their race, is a common experience for Black youth (American Psychological Association, n.d.). About 90% of African American youth report experiencing RD by the time they are adolescents (Osborne et al., 2021). Civic engagement, the political and

prosocial contributions to community and society, is one way many people respond to injustices (Plummer et al., 2022). Research has shown that RD is associated with higher critical civic engagement among Black college students (Christophe et al., 2022). Racial socialization, the process through which caregivers teach youth about race, racism, and cultural pride, has been identified as a key sociocultural factor in Black adolescents' sociopolitical development (Anyiwo et al., 2018). However, little research has focused on how racial socialization influences the relations between RD and civic engagement among African American adolescents. This study aims to address the gap by examining whether African American youth who experience discrimination and receive racial socialization messages report higher levels of civic engagement. The sample included 237 African American adolescents (ages 12-17; 52% female), respectively living in three urban low-income communities. Regression analysis indicated that: (1) racial discrimination was not significantly associated with the civic engagement outcomes (i.e., civic engagement, political engagement, and sociopolitical discussions), and (2) racial socialization did not serve a protective role against racial discrimination and civic engagement outcomes. However, racial socialization measures illustrated promotive effects on civic engagement outcomes. For instance, racial pride messages were associated with greater civic engagement ($\beta = 0.32$, $SE = 0.10$, $p = .003$). Overall, these findings suggest that even when discrimination itself does not directly predict engagement, racial socialization in Black families can still play an important role in supporting African American adolescents' civic engagement.

Mohammed Abdulhadi

Discipline: Biology

Authors:

#1 Mohammed Abdulhadi

#2 Jenny Roe

#3 Iain Morgan

#4 Claire James

Abstract Name: The HPV16 E2 Protein Promotes Error-Prone DNA Repair Through Non-Homologous End Joining

High-risk human papillomavirus type 16 (HPV16) contributes to 90% of HPV positive oropharyngeal cancers (HPV+ OPCs), an anatomical subset of Head and Neck Squamous Cell Carcinomas (HNSCC). Previous studies have established that the viral E2 protein, a transcriptional regulator and replication factor, interacts with cellular double strand break (DSB) repair mechanisms. Mechanisms of repair include non-homologous end joining (NHEJ), an error prone process available during the whole cell cycle, and homologous recombination (HR), a precise method occurring during the S/G2 phases. The specific repair mechanism that HPV16+ cells utilize in the presence of E2 has not yet been identified. In this study we tested human foreskin keratinocytes immortalized with telomerase (N/Tert-1) exogenously expressing viral proteins to determine the repair mechanisms that are favored when E2 is expressed. We optimized a DNA damage response (DDR) reporter assay to express GFP and mCherry when NHEJ and HR are occurring, respectively, and analyzed the cells using flow cytometry. The result showed that E2 expression pushes the cell towards NHEJ as a repair mechanism, whereas parental N/Tert-1 (HPV16-/E2-) revealed less or unchanged quantity of NHEJ. This indicates E2 expression leads to error-prone DNA repair, which contributes to host genome instability, possibly contributing to worse outcomes for patients. As the HPV16 life cycle depends on epithelial differentiation, future work will focus on investigating DDR repair mechanisms in organotypic models recapitulating the viral life cycle, and in the context of the full viral genome.

Rusul Abdulrazzaq

Discipline: Health and Human Development

Authors:

#1 Ande Mitchell
#2 Blessing Nguyen
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#4 Sasanka Sreedevi-Naresh
#5 Hadeel Elyazori
#6 Kevin Lybarger
#7 Samuel Acuña
Stephanie Krafsig

Abstract Name: Capturing the Lived Experiences of Individuals with Chronic Pain through Motivational Interviewing

Chronic pain affects more than 51.6 million U.S. adults (20.9% of U.S. adult population) [1], creating a substantial personal and societal burden, leading to a diminished quality of life. For many, chronic pain persists without clear underlying pathology, limiting targeted treatment and leaving patients feeling misunderstood or dismissed. A critical yet often overlooked component of chronic pain assessment is understanding the patient's lived experience, including daily routines, workplace demands, social support, personal goals, and interactions with healthcare systems. Standard clinical assessments, intake forms, and patient-reported outcomes rarely capture these nuanced contextual factors in a systematic, patient-centered way. As a result, essential biopsychosocial information that could inform care remains fragmented or absent from clinical decision-making. To address this gap, we developed a structured Motivational Interviewing (MI) protocol designed to elicit rich, first-hand narratives of patients' experiences with chronic pain. This patient-centered approach provides a consistent framework for gathering nuanced qualitative data while preserving individuals' voices. In an ongoing study (N = 35), interviews conducted using this protocol are analyzed using Natural Language Processing (NLP) techniques to identify recurring themes related to pain experience, coping strategies, socioenvironmental influences, and barriers encountered in clinical care. By combining MI with NLP, this method enables efficient analysis of large sets of narrative data while preserving the depth and authenticity of patients' voices. The objective of this study is to demonstrate the feasibility of integrating MI and NLP to better understand the lived experiences of individuals with chronic pain. Our presentation will share the MI protocol, describe preliminary findings from the narrative data, and highlight how this approach can support more personalized, holistic, and patient-informed pain management strategies. We aim to provide a practical model that clinicians and researchers can adopt to better capture patient perspectives and enhance communication in chronic pain care.

Bree Abel

Discipline: Environmental Science and Sustainability

Authors:

#1 Fredrick Vogt

Abstract Name: Changes in Stomata Density Within a Model Plant, *Epipremnum aureum* (Pothos), When Provided With a Multivariable Environment to Simulate Impacts from Climate Change

Plants respond to climate change by changing stomata density and conductance. Stomata control gas exchange through pores (stoma) that are made up of two guard cells, which control the opening and closing of the stomata. Conductance is how much gas exchange is occurring through the stomata, which gives insight into the rate of photosynthesis and cellular respiration. Research shows that within the past ten years global CO₂ atmospheric concentrations have risen by 2.6ppm per year; plus, global temperature has increased by 1.25 degrees Celsius. Past research indicates that CO₂ and temperature impacts both stomata density and conductance, but this research was conducted using single variant experimentation. In contrast, this research

uses a multi-varied approach to study how different combinations of environmental variables impact the number of stomata and their conductance. Research using multiple variables is essential as it illustrates how plants could respond to climate change in the future. Variables tested in this study were CO₂, relative humidity, and temperature. This research used four experimental groups. The first experimental group had increased CO₂ levels as well as increased relative humidity. The second experimental group had CO₂ and temperature increased. Whereas the third experimental group had temperature and relative humidity increased. The last experimental group had all three environmental factors increased. Results showed that all experimental groups experienced an average increase of six stomata, although roughly 65% of the stomata were closed compared to the control, which had 5% closed.

Mya Abers

Discipline: Biology

Authors:

#1 Mya Abers

#2 Mia Rosati

Abstract Name: Thermal Effects on Metabolic mRNA Expression in Fish Hearts

Brook trout and other cold-water fishes are being challenged by the effects of climate change. Brook trout are active over a broad range of seasonal temperature variation. However, recently these temperatures have been increasing and are predicted to rise further in the coming decades. Maintaining physiological function across a range of temperatures is critical to survival of such fishes. The purpose of the current study is to investigate how the trout heart function varies across a range of temperatures reflecting the natural seasonal variation. We examined heart muscle physiology and gene expression for metabolically important genes in fish acclimated to 4°C, 10°C, and 20°C. We found that fish acclimated to elevated temperatures had physiologically slower muscle (when test temperature is controlled for) and expressed lower levels of both cytochrome oxidase and lactate dehydrogenase, which are crucial to aerobic processes. This suggests that increasing water temperatures can be detrimental to the health of cold-water fishes such as brook trout as they must alter physiological function to survive.

Colin Aberson

Discipline: Philosophy, Ethics, and Religious Studies

Authors:

Abstract Name: Pueblo Ways of Knowing Aristotelian and Platonist Metaphysics

My research provides an comprehensive analysis on the metaphysics of Pueblo peoples of the American Southwest. I will focus on significant features of Pueblo metaphysics and bring light to this understudied area. I argue that this understudied area deserves more scholarly concentration in contemporary studies when compared to more studied philosophies. I will begin by defining what and who is categorized as a Pueblo by going into the history of the group and what tribes are Pueblo. Next, I will define what metaphysics is and dissect the Pueblo's metaphysical framework. This analysis will use some of their stories surrounding human creation and world creation. I will also analyze their ideas of an afterlife and the role of the soul in society. This will include the role of divine patrons through exploration into the relationship that humans have with the patrons and what they need to do to keep their own sense of Pax deorum or "peace of the gods". To highlight the significance, I will compare the Pueblo metaphysics to other more well-known metaphysical

philosophies. Focusing on Ancient Greek Philosophy, specifically Aristotelian and Platonist metaphysics. This will consist of looking at how the Pueblos and the Greek schools answer metaphysical questions. I will conclude by discussing the significance of Pueblo metaphysics and its application contemporary culture. Reinforcing my argument that scholars should allocate more time to this understudied area.

Atharva Abhyankar

Discipline: Law and Legal Studies

Authors:

Abstract Name: Rhetoric and Judicial Legitimacy: Competing Visions of Moral Authority on the Supreme Court

Amid growing polarization and declining public trust in the U.S. Supreme Court, understanding how judicial authority is rhetorically constructed has become increasingly urgent. This paper analyzes *Roper v. Simmons* (2005) to show how judicial rhetoric reveals competing assumptions about the Court's legitimacy. Drawing on Stephen Toulmin's model of argumentation, particularly his concept of implicit backings, the analysis demonstrates how Justice Kennedy's majority opinion and Justice O'Connor's dissent rest on contrasting visions of judicial authority. Kennedy frames the Court as a moral guide, grounding its legitimacy in "evolving standards of decency," scientific research, and international norms. O'Connor instead underscores judicial restraint, precedent, and deference to democratic processes. By uncovering these implicit backings, the paper argues that the Court's power depends not only on strategic legal reasoning but also on rhetorical framing and moral positioning. Situating *Roper* within broader trends of judicial polarization, the paper illustrates how rhetorical strategies shape constitutional interpretation and public perceptions of the Court. This issue has become more urgent as public approval of the Court hits historic lows and cases like the Kavanaugh hearings and *Dobbs v. Jackson Women's Health Organization* (2022) fuel concerns about partisanship and declining judicial legitimacy (Gallup; Trautwein 2019; Dobbs 2022; Reuters 2018). Understanding these rhetorical foundations matters because the Court's words both decide law and shape how Americans see justice, authority, and the very legitimacy of their democracy.

Ameen Abohamda

Discipline: Biology

Authors:

#1 Clayton Carlson

Abstract Name: Investigating Elesclomol's Ability to Improve Copper Transport and Reduce Stress Responses in *cua-1* Mutant *C. elegans*

Wilson's disease is a serious, inherited disorder where the body cannot properly manage copper, an essential mineral. This typically results from a genetic defect that prevents cells from efficiently moving copper. To better understand how copper affects living organisms, this project uses *Caenorhabditis elegans*, focusing on mutant worms that carry a mutation in the *cua-1* gene that makes it difficult for them to transport copper. The main goal of this project was to test whether elesclomol, a compound known to bind and carry copper, could help these worms grow and improve their brood size. To do this, mutant worms and wild-type N2 worms were compared under four conditions: no treatment, added copper, elesclomol alone, and copper combined with elesclomol. As expected, mutant worms struggled when given copper alone, showing very poor reproduction and signs of oxidative stress from copper deficiency. However, when the mutant worms were

given copper and elesclomol, they showed an increase in their brood size and reduced oxidative stress compared to the copper-alone group. This result suggests that elesclomol successfully helped deliver the necessary copper into the cells, improving the worms' reproductive capacity. Wild-type N2 worms showed normal growth across all conditions, indicating that the chemical treatments themselves were not harmful at the concentrations tested. These results support the idea that elesclomol can help compensate for the defective copper-transport pathway in the mutant worms. To understand the mechanism of elesclomol, the next stage of the project involves RNA extraction followed by cDNA synthesis and measurement of oxidative stress response gene expression. This will help determine whether elesclomol improves copper availability without creating harmful oxidative stress.

Ayidana Aboraah

Discipline: Engineering

Authors:

#1 Ayidana Aboraah

#2 Daphina Cannon

#3 Carrie Peterson

Daphina Cannon

Abstract Name: Wheelchair Propulsion Muscle Activation Stratified by Age of Spinal Cord Injury Onset

Manual wheelchair (MWC) propulsion imposes significant mechanical demands on the shoulders, contributing to a high prevalence of pain and injury among individuals with spinal cord injury and disease (SCI/D). Differences in propulsion biomechanics between pediatric-onset and adult-onset SCI users suggest that motor control strategies influence injury risk. Electromyography (EMG) provides a useful tool for quantifying muscle activation patterns during propulsion, yet its application in pediatric MWC users remains limited. This study examines EMG characteristics across pediatric, pediatric-onset adult, and adult-onset adult MWC users. Participants were divided into groups according to their current age, and the age at which they sustained their SCI: children (ages 7–17; n = 5; 2 females, 3 males; mean age = 15.19 years), adults with pediatric onset (injury occurring before age 18; n = 6; 3 females, 3 males; mean age = 34.27 years), and adults with adult onset (n = 2; 2 males; mean age = 27.61 years). Nine surface EMG electrodes were placed on the biceps brachii (BB), long head of triceps brachii (TB), sternocostal head of the pectoralis major (PM), and the anterior, medial, and posterior heads of the deltoid (AD, MD, PD), as well as the upper trapezius (UT), latissimus dorsi (LD), and infraspinatus (IS). Handrim kinetics (SmartWheel) were used to identify individual cycles. Preliminary analysis of peak EMG amplitude across propulsion cycles varied across the three groups for the AD, MD, PD, BB, PM, and IS. Pediatric-onset users exhibited the highest average activation during propulsion for the AD, MD, BB, and IS. In contrast, the adult-onset users demonstrated the lowest average muscle activation for the BB, PM, and IS. Notably, the pediatric group showed the highest activation for the PM, suggesting differences in propulsion strategies and muscle development. Both adult groups demonstrated increased reliance on the anterior and middle deltoid, consistent with prior research.

Maya Abousaab

Discipline: Nursing and Public Health

Authors:

Abstract Name: Exploring Respiratory Health Among Syrian Refugees in Za'atari and Azraq Camps

Since the onset of the Syrian conflict in 2011, millions have been displaced and forced into overcrowded settlements with poor sanitation and limited access to healthcare. Respiratory illnesses have been a consistent concern among Syrian refugees living in the Za'atari and Azraq refugee camps in northern Jordan. Za'atari rapidly became the world's largest Syrian refugee camp, reaching over 120,000 people in 2013. This led to the establishment of Azraq two years later as a more regulated settlement designed to alleviate overcrowding and improve living conditions. Across both camps, respiratory illnesses such as lower respiratory tract infections (LRTI), influenza-like illness, asthma, chronic obstructive pulmonary disease, and tuberculosis remain leading causes of morbidity and mortality. This study aims to compare the incidence and trends of these respiratory conditions across four different age groups (0-4, 5-17, 18-59, >60) in Za'atari and Azraq from 2013-2023. Data have been drawn from publicly available UNHCR (the United Nations Refugee Agency) annual health reports, which aggregate clinical visits and diagnoses recorded by camp health centers. We are using meaningful data visualizations along with Poisson and negative binomial regression models to explore differences in respiratory illness rates by camp, year, and age group, adjusting for population size. Preliminary results suggest that rates of LRTI are significantly higher in Za'atari across the three older age groups, with the largest difference observed among adults over 60 (3.4 times higher than in Azraq, $p < 0.0001$). Conversely, LRTI rates in children aged 0-4 appeared to be higher in Azraq (2.2 times higher than in Za'atari, $p < 0.0001$). Future analyses will incorporate additional health indicators and environmental data to better understand the drivers of respiratory illness in refugee settings.

Sollina Abraham

Discipline: Engineering

Authors:

#1 Johanna Tsala Ebode

#2 Nastassja Lewinski

#3 Caroline Frame

Abstract Name: Evaluation of a nanoparticle-hydrogel composite for controlled drug degradation and release

The use of nanoparticle drug delivery systems is a promising approach to improve drug release and therapeutic precision. However, systemically administered nanoparticles can often fail to reach the target site at high concentrations. In the case of peritoneal diseases such as endometriosis, intraperitoneal administration also suffers from rapid nanoparticle clearance and nanoparticle-hydrogel composites may overcome this limitation. In this study, we evaluate hydrogels made up of crosslinked hyaluronic acid derived from hyaluronate hydrazide and hyaluronate aldehyde that encapsulate 200 nm fluorescent polystyrene beads. The degradation rate of hydrogels without and with encapsulated nanoparticles is measured by the overall mass loss after incubation in artificial peritoneal fluid assessed every 24 hours over the span of 7 days. The particle release rate from hydrogels with encapsulated nanoparticles is quantified by measuring the fluorescence intensity changes over the span of 7 days. Our findings aim to improve the understanding of controlled nanoparticle release from crosslinked hyaluronic acid hydrogel-based drug delivery systems for the treatment of diseases such as endometriosis.

Nancy Abraham

Discipline: Biology

Authors:

#1 Nancy Abraham

#2 Marieke Burleson

Abstract Name: Targeting MED12 altered breast cancer with flavonoid-based therapeutics

Breast cancer is one of the most common diseases affecting women in the United States, highlighting the need for more effective and targeted treatments. Breast cancer encompasses a multitude of different subtypes, one of which is characterized as having mutations in MED12, a component of Mediator complex. MED12 plays an important role in regulating cell signaling and gene expression and has been implicated in a variety of different cancers. In this study, we have found that when MED12 is downregulated in breast cancer cells, GLI3-dependent Sonic Hedgehog (SHH) signaling becomes abnormally activated, which subsequently contributes to cancer growth. We thus set out to identify potential novel compounds that can specifically target GLI3-dependent SHH signaling to reverse oncogenesis in MED12-downregulated breast cancer. We focused our efforts on flavonoids, plant-based compounds known for their wide range of anti-cancer effects, including reducing oxidative stress, blocking cell division, and triggering cell death. Importantly, flavonoids have also been shown to have the ability to suppress GLI3 signaling, though this has not been explored in a breast cancer setting. To test their potential in breast cancer, we used MTT assays to screen a library of flavonoids for their ability to selectively target breast cancer cells with MED12 downregulation. We also used quantitative PCR to measure the expression of GLI3 target genes on flavonoid-treated cells to determine whether these compounds cause cell death by targeting the GLI3 signaling pathway. Our results suggest that selective flavonoids work by disrupting GLI3 signaling thus leading to decreased cell viability in MED12-downregulated breast cancer cells. Overall, our findings support the idea that flavonoids could be developed as a promising therapeutic option for specific subtypes of breast cancer involving MED12 dysfunction.

Andrea Abraham

Discipline: Physics and Astronomy

Authors:

- #1 Andrea Alice Abraham
- #2 Natalya Armenta
- #3 Donald Knight
- #4 Kamiah Miller
- #5 Yarleidis Paredes
- #6 Dakota Mitchell
- #7 Shawn Anetekhai
- #8 Cori Davis
- #9 Izaiah Porter
- #10 Anthony Shands
- #11 Anthony Shands

Abstract Name: Characterizing RF Radiation From NEC Televisions: On vs. Off Comparison

This study investigates the radio frequency (RF) emissions produced by commonly used televisions to better understand potential exposure levels in everyday environments. There were two different television conditions (on and off) that were tested using consistent measurement methods, and RF levels were recorded at various distances to represent typical viewing scenarios. RF radiation refers to the electromagnetic energy released during a device's operation or wireless communication, and understanding this exposure is important because long-term or excessive RF levels may pose health risks. As part of this project, background research was conducted on RF technology used in NEC televisions, including the frequency bands, signal modulation, and communication systems built into modern smart TV designs. By examining these factors and analyzing how current TV systems emit RF energy, this study helps identify opportunities for improving safety and reducing unnecessary radiation exposure in future devices.

Auley Abudayya

Discipline: Biology

Authors:

#1 John O'Dell

Abstract Name: The Correlation Between Mental Health and Oral Hygiene Health in Southeastern North Carolina

This study aims to investigate the correlation between mental health perceptions and oral hygiene behaviors among adult residents in Southeastern North Carolina. Existing literature shows a strong association between mental health conditions, such as stress, anxiety, and depression—and poor oral health outcomes, often exacerbated by reduced access to dental care and heightened dental anxiety. Despite growing awareness, limited research exists that directly examines how mental health perceptions influence daily oral hygiene behaviors, particularly in underserved and rural communities. To address this gap, we aim to recruit participants aged 18 and older through the University of North Carolina at Pembroke (UNCP) faculty and staff email lists, as well as from community centers, healthcare facilities, and dental offices. Participants will complete an anonymous, deidentified survey via REDCap that captures data on mental health indicators, oral hygiene habits, and perceptions linking the two. No identifying information will be associated with survey responses, and participants can withdraw at any time. Findings from this study will contribute to a better understanding of how mental well-being influences oral health behaviors, with potential implications for integrated healthcare approaches. The results may help guide future interventions, improve patient education, and inform policies aimed at reducing oral health disparities in North Carolina and similar regions. By examining this connection, we hope to promote a more holistic view of health that encompasses both psychological and dental care.

Heather Accorti

Discipline: Physics and Astronomy

Authors:

#1 Heather Accorti

#2 Ioana Niculescu

#3 Gabriel Niculescu

Abstract Name: PbWO₄ Crystal Characterization: Mechanical Design and 3D Modeling

In the 2025-2026 academic year, the main thrust of the experimental work in the JMU Particle and Nuclear Physics Group (Drs. IN and GN) was to design and construct a test stand that will characterize the properties of Lead Tungstate (PbWO₄) crystals. These modern, high-resolution, and radiation hard detectors will form the backbone of high-performance electromagnetic calorimeters. These will be used in current and planned nuclear and particle experiments. We designed and built a testing process to evaluate the uniformity of the crystal's response along its longest axis. This was accomplished using a Na-22 source and comparing the PbWO₄'s signal to a known (witness) NaI detector, as the two detectors move with respect to one another. This project can be divided into three intertwined subsections: computer modelling of the testing stand, building the test stand itself, and providing a robust data acquisition and analysis workflow. Our part in this project was to design and assemble experimentation hardware to fit the project's goals. We received hardware from the JMU Physics Department's workshop and adapted it to our needs. Furthermore, we analyzed the Na-22 source constraints related to the PbWO₄ crystal and created unique 3D printed parts using SolidWorks computer aided design (CAD). This culminated in a test stand mechanism that is capable of characterizing the

PbWO₄ crystals. Our final product went through multiple iterations to ensure that the project had reliable mechanics and consistent data readings.

Nathan Acevedo

Discipline: Nursing and Public Health

Authors:

Abstract Name: Inside the Emergency Room: Learning Care Through Chaos

The emergency room is often seen as a place of urgency and chaos, yet within that chaos lies a distinct culture of care that shapes how healthcare workers learn how to serve others. This autoethnography explores my personal experiences working as an emergency department technician (Er Tech for short) – specifically, how empathy, composure, and teamwork are cultivated in such a high-stress environment. Through journaling and memory analysis, I capture critical moments that reveal how care is both practiced and challenged. Using theoretical frameworks from medical sociology and the ethics of care, this study interprets how the ER's fast-paced culture fosters professional identity and mental stamina. Overall, I argue that care in the emergency room is not simply a feeling, but a disciplined practice formed through chaos, where compassion is merged with efficiency. By focusing on the unspoken and emotional labor of emergency medicine, this autoethnography sheds light on the deeper meaning of what it means to care for others in moments of crisis and chaos.

Justin Acheampong

Discipline: Biology

Authors:

#1 Lindsey Costantini

#2 Gail Hollowell

Abstract Name: Isolation and Characterization of Novel *Arthrobacter globiformis* Bacteriophage "Jollof"

Bacteriophages, viruses that infect bacteria, are the most abundant biological entities on Earth and shape microbial ecosystems. Despite their ubiquity, much of phage diversity remains uncharacterized, representing an untapped resource for microbiology, biotechnology, and medicine. Phage research is significant given their potential applications in therapy, genetic engineering, and environmental microbiology. Through the HHMI SEA PHAGES program, we sought to isolate and characterize a novel bacteriophage infecting *Arthrobacter globiformis*, a soil-dwelling bacterium and established host in phage discovery. We hypothesized that soil samples would harbor novel phages with distinct traits, contributing to cataloging viral diversity. Soil samples were collected and processed for direct isolation and enrichment. Bacteriophage presence was confirmed through plaque assays showing lytic activity. A clonal phage, designated Jollof, was purified by plaque purification and amplified to generate high-titer lysates. Serial dilution and webbed plate assays validated infectivity. Genomic DNA was extracted and analyzed by restriction digest, suggesting that Jollof possesses unique genomic patterns. Transmission electron microscopy revealed Siphoviridae morphology with an icosahedral capsid and flexible tail. These findings confirmed the isolation and preliminary classification of Jollof as a novel bacteriophage. Characterization of Jollof adds to the Actinobacteriophage Database and provides new insight into phage diversity associated with *A. globiformis*. The digest suggests this phage may harbor genetic elements not previously described. Future work will focus on whole-genome sequencing to enable functional predictions, evolutionary comparisons, and applications in biotechnology. The study of

bacteriophage Jollof underscores the value of undergraduate-driven discovery and contributes new data to the phage research community.

Riya Achuri

Discipline: Biology

Authors:

#1 Jason Newton

Genesis Martinez

Abstract Name: S1P Supplementation Rescues Migration Defects in Niemann–Pick Type C Fibroblasts

Niemann-Pick type C (NPC) disease is a lysosomal storage disorder caused by mutations in NPC1 or NPC2, leading to lipid accumulation and impaired signaling across multiple pathways. Although the neurological aspects of NPC are well studied, the effect of this disease on wound repair has not been investigated. Given that platelet-derived growth factor (PDGF) and sphingosine-1-phosphate (S1P) are critical regulators of fibroblast migration during wound healing, we hypothesized that S1P signaling deficits may contribute to impaired repair processes in NPC. Dermal fibroblasts derived from NPC1 patient skin biopsies and mouse embryonic fibroblasts (MEFs) from *Npc1* mutant mice were analyzed for migratory capacity using PDGF-stimulated wound scratch assays. Both NPC patient fibroblasts and *Npc1* mutant MEFs displayed markedly reduced migration compared to wild-type controls. Consistent with our previous findings that Sphingosine Kinase 1 (SphK1)-dependent S1P production is defective in NPC (Newton et al., J. Biol. Chem.), supplementation of exogenous S1P in combination with PDGF restored migratory activity to near-normal levels in both human and murine cells. These results indicate that defective S1P signaling downstream of SphK1 contributes directly to migration deficits in NPC fibroblasts. These findings identify a previously unrecognized defect in wound-healing signaling in NPC and highlight the potential of S1P-based interventions to correct cell motility impairments. Future work will include examining PDGF-related signaling fidelity and determining whether S1P receptor modulation can restore fibroblast migration.

Marissa Ackerman

Discipline: Mathematics

Authors:

Abstract Name: Exploring Polyomino Motion: Classification of Amoebic Polyominoes

Have you ever played Tetris? Tetris pieces are formed by four small squares. Similar shapes formed by small squares are called polyominoes. Imagine a polyomino sitting on a large checkerboard so that its squares coincide with squares of the board. We study how this polyomino moves on the board iterating these steps: remove one of the squares of the polyomino and place it back on the board so that the “new” polyomino is a copy of the original in a slightly different position. Some polyominoes do not move at all, some spin in place, others move far but skip parts of the board, and a few cover the entire board. We define and classify the movements of these polyominoes. Polyominoes that are able to cover the entire board are called amoebas. Amoebas have been studied in the context of graph theory to understand the structure of quasi-symmetric graphs. Classifying all polyominoes by their movement is an open problem in combinatorial geometry. We classify the movement of all polyominoes with up to seven squares and present structural results for polyominoes of a given width.

Chris Acosta

Discipline: Psychology

Authors:

#1 Chris Acosta

Abstract Name: College-Specific Model of Social Connectedness

Loneliness among young adults has emerged as an urgent public health concern, intensified by cultural shifts toward digital interaction, the erosion of communal spaces, and heightened pressures surrounding identity and achievement. Although existing models of social connectedness (SC) offer broad explanations for social engagement, they are not sufficiently tailored to the developmental, institutional, and psychosocial realities of college students. A population-specific framework is needed to more effectively apply the insights gained from the models which currently exist in the literature. This study seeks to create a college-specific model of social connectedness, synthesizing insights from across the literature. To evaluate this model, we analyzed data from the 2023–2024 Healthy Minds Study (HMS), a large, nationally representative survey of mental health in U.S. higher education. Guided by theory, variables were organized into four domains: (1) risk factors (sociodemographic variables and contextual vulnerabilities), (2) social connectedness indicators (loneliness and belonging), (3) mechanisms potentially linking connectedness to health outcomes, and (4) outcomes reflecting both psychological distress (depression and anxiety) and psychological well-being (flourishing). We first tested whether belonging predicted mental health outcomes. A simple linear regression revealed that belonging significantly predicted depression, $B = -1.16$, $SE = .01$, $t(90,560) = -77.84$, $p < .001$, accounting for 6.3% of the variance ($R^2 = .063$). The standardized coefficient ($\beta = -.25$) indicates a small-to-moderate association: students with stronger belonging reported meaningfully fewer depressive symptoms. Belonging also predicted anxiety, $B = -0.87$, $SE = .01$, $t(90,560) = -62.23$, $p < .001$, explaining 4.1% of anxiety variance ($R^2 = .041$). Further data analysis will be conducted investigating the relationship between various risk factors, mediators, and separate domains of social connection (peer, community, college).

Emily Adair

Discipline: Chemistry

Authors:

#1 Abby Jennings

Abstract Name: Synthesis and Binding Studies of a New Fluorinated Molecular Sensor

Initial studies by Swager and co-workers have demonstrated that the hexafluoroisopropyl (HFIP) group exhibits a strong hydrogen bonding reaction with phosphate esters.¹ As a result, a new small molecule sensor containing a HFIP pendant group and nucleophilic amine was synthesized in high yield and fully characterized by multi-nuclear NMR. Preliminary sensing studies with dihydrogen phosphate and dimethyl methyphosphonate indicate that the new compound will sense phosphate esters. Current research efforts are focused on utilizing the nucleophilic amine to incorporate the sensor into more complex materials and polymers. The results of this work will be presented and discussed.

Abbeygale Adams

Discipline: Criminology/Criminal Justice

Authors:

#1 Susybel Kallsen

Abstract Name: Intergenerational Perceptions of Collective Efficacy Among Latinx Residents

Research on immigration and community dynamics has expanded significantly, yet relatively little is known about how collective efficacy is perceived differently by first-generation Latinx immigrants compared to U.S.-born Latinx. Given that Latinx residents make up one of the largest and fastest-growing demographic groups, understanding how collective efficacy varies across immigrant generations is essential for interpreting the social aspects of neighborhoods. Understanding these distinctions is critical as Latinx communities continue to grow and diversify, and because collective efficacy is closely linked to neighborhood stability, safety, and social well-being. As such the current study addresses this gap by examining differences in perceived social cohesion and informal social control between first-generation Latinx immigrants and U.S.-born Latinx. Drawing on Wave 1 (2000–2001) data from the Los Angeles Family and Neighborhood Survey (LAFANS), which includes 2,319 adult respondents across 65 Los Angeles County neighborhoods, the study evaluates how immigrant generation and acculturation measures shape perceptions of collective efficacy. Collective efficacy is measured using a likert scale assessing trust, shared values, and willingness to intervene; mean scores across neighborhoods range, indicating measurable differences. Generational status is determined using respondent birthplace, parental nativity, and citizenship indicators. With Los Angeles, California being a dense Latinx population, this data will provide necessary information about the demographic for this study. This study contributes to broader discussions of acculturation, community strength, and the mechanisms that sustain neighborhood stability in immigrant contexts. A preliminary analysis will be used to estimate generational status on measures of collective efficacy. Findings and policy recommendations will be discussed. Keywords: collective efficacy; acculturation; immigration; Latino paradox.

John Paul Adams

Discipline: English and Literature

Authors:

Abstract Name: Scriptural Monster: A Study of J.R.R. Tolkien's Translation of the Book of Jonah

This presentation is a comprehensive study of Tolkien's translation of The Book of Jonah, which he translated from the French Bible de Jerusalem for the English Jerusalem Bible, finished in 1966. I seek to answer the following questions: why did Tolkien translate the book? Why did the translation come from French instead of Hebrew? What is unique about Tolkien's translation? And, how does this work fit in with his other works, particularly regarding his literary ideals. The essay has two main parts, the first of which addresses the first two questions, and the second of which addresses the latter two. In the first part I present research on the historical context of this edition of the Bible, both its original French translation and its English counterpart. To do this I discuss two papal encyclicals, as well as the writings of other Popes, the writings of the editor-in-chief of the Bible de Jerusalem, and other essayists. In doing so, I seek to discover the historical narrative in which this translation fits, and how Tolkien's contribution fits into that story. In the second part, I present the results of a close comparison of Tolkien's original draft of the translation to the edited edition that made it into the final edition of the translation, to discover some of Tolkien's instincts in biblical translation. I also consider popular exegesis of Jonah that closely examines the Hebrew, as well as The Lord of the Rings and

Tolkien's personal letters, to see how his translation affirms or contradicts other writers' notions of the book, and how Tolkien's own notions about Jonah are informed by his religious and literary ideals.

Johanna Adams

Discipline: Criminology/Criminal Justice

Authors:

Natalie Maddox

Mary Jane Panozo

Abstract Name: The Impact of I-95 on Human-Trafficking

In the minds of most Americans, I-95, and other major roadways are simply routes to travel to and from destinations of interest. However, for some individuals, victims and survivors of trafficking, it is not simply a road, but a nightmare. as I-95 has become a nightmare for victims of trafficking. Due to its extensive reach in highly populated urban centers and proximity to prominent airports and ship ports, I-95 has opened the door of regional vulnerabilities and endangered those who come across it. This paper examines the prevalence of human trafficking and strategies on I-95, through law enforcement data, victim reports, and case studies to highlight the corridor's role in facilitating different types of trafficking, such as drug or paraphernalia, multi-species organs, weapons, and human trafficking. Following this, the paper will take the figures and data above and culminate in policy recommendations to establish a multilevel intervention, help survivors across various parts of the East Coast in the United States, and decrease the number of potential victims in the future.

Johanna Adams

Discipline: Law and Legal Studies

Authors:

Abstract Name: State options following Dobbs V Jacksons Women's Health Organization (2022)

Mississippi passed a law titled "Gestational Age Act," which prohibited all abortions, except for some exceptions, medical emergencies, or severe fetal abnormality, after 15 weeks or gestational age (HB1272 (As Introduced) - 2022 Regular Session, 2022). As the only licensed abortion clinic within the state, Jackson Women's Health Organization doctors filed a lawsuit challenging the law and requested an emergency temporary restraining order. This case flew to the Supreme Court, where the question "Is Mississippi's law banning nearly all abortions after 15 weeks' gestational age unconstitutional?", with a 6 - 3 vote, the court ruled no. This paper maintains that states and localities, via their policing power, have the authority to regulate and the ability to practice abortion, within 15 weeks, besides the medical and fetal abnormality exceptions, according to the Dobbs V. Jackson Ruling. The Majority Opinion, written by Justice Alito, ruled that the constitutionality of Roe and Casey must be overruled as the Constitution does not refer to abortion. These cases relied on the Due Process Clause of the 14th Amendment, which held some guarantees of rights that are not mentioned in the Constitution. Still, these rights must be deeply rooted and implicit to order liberty, which the right to abortion fails to do. Yet the answer to the question of the options for the states that wish to limit or expand access to abortion is unknown; through analytic research is where we find that there are multiple bans and protections that states may apply. This allows states to realize their limits following the Supreme Court ruling and use their police power to enforce or restrict access to abortion within the constitutionality of the court's decision. So what can they do and how do we prepare?

Tameka Adams

Discipline: Psychology

Authors:

#1 Tameka Adams

Abstract Name: Ethnicity and Police: Effect ethnicity has on college students perception of the police

The present study focuses on whether ethnicity affects an individual's perception of the police. In the United States, police have the most contact with youth ages 16 to 25 (Fischer, 2021). Previous research suggests that the relationship between the police and youth is strained, such that the perception of police is more negative for Black and Latino youth than for White youth (Brunson & Weitzer 2009; Cochran & Warren, 2012). The police also reflect this same perception, where they see adolescents as disrespectful, entitled, angry, loud, and misguided (Fix et al., 2023). The current research study aims to investigate if these perceptions are still relevant among young adults. It was hypothesized that students of Color will report a more negative perception of police officers than White students. The sample consisted of 140 participants, 83 White, 47 Black, and 10 Biracial. Participants completed the Perceptions Of Police Scale (Nadal & Davidoff, 2015). Results from a One-way ANOVA showed that students of Color had a more negative perception of the police than their White counterparts ($p = .004$). To further test the effect of race, another One-way ANOVA was employed and revealed that Black students had the most negative perceptions compared to students of Color or White students ($p = .002$). Additionally, major and gender were found to have no effect on perceptions of the police ($ps \geq .08$). Investigating this topic is important because it will allow researchers and the public to have a better understanding of how negative perceptions of police among minority groups can perpetuate social tensions and reduce public confidence in government institutions. Addressing these issues is essential for promoting social cohesion and justice. These results could be utilized to develop community intervention programs that promote building positive relationships between the police and young people, especially in minority groups.

Anisha Addepalli

Discipline: Nursing and Public Health

Authors:

Abstract Name: Barriers Preventing Clinical Application of Circulating miRNA's as Non-invasive Biomarkers in Arterial Blood of Women with Endometriosis Diagnosis

Endometriosis is a chronic inflammatory disorder in which endometrial-like tissue grows outside the uterus, leading to pelvic pain, infertility, and diagnostic delays due to the current reliance on invasive laparoscopy. Although imaging and hormonal assays offer limited accuracy, circulating microRNAs (miRNAs) in arterial blood have emerged as promising noninvasive biomarkers because they regulate gene expression, reflect inflammatory and angiogenic pathways, and remain stable in circulation. I propose investigating miRNAs such as miR-17-5p, miR-451a, and the let-7 family because they regulate processes like cell proliferation, immune modulation, and endometrial tissue remodeling which are mechanisms directly implicated in endometriosis pathogenesis. Research on miRNA-based diagnostics has shown strong preliminary accuracy but inconsistent reproducibility due to small cohorts, limited diversity, and lack of standardized extraction or normalization protocols. Clinical translation has further stalled because of logistical and regulatory barriers that restrict large-scale validation and approval. My research examines how methodological standardization,

computational modeling, and multicenter collaboration could bridge this gap by improving data reliability and diagnostic precision. Ultimately, refining miRNA profiling could revolutionize noninvasive diagnostics for endometriosis by reducing time to diagnosis and enabling personalized care based on molecular signatures. However, because miRNA-based diagnostics remain in early developmental stages, longitudinal studies and global standardization efforts are needed to establish reproducibility, regulatory confidence, and real-world clinical feasibility. Keywords to highlight: endometriosis; circulating microRNA; miR-17-5p; miR-451a; let-7 family; noninvasive diagnostics; biomarker validation; standardization; translational barriers; women's health.

Camille Adenauer

Discipline: Biology

Authors:

#1 Dr. Ken Fortino

Abstract Name: Characterization of microhabitat variation associated with tick questing behaviors: implications for alpha-gal syndrome exposure risk.

Alpha-gal syndrome (AGS), a tick-borne allergy to mammalian meat, is a rapidly expanding public health concern. The lone star tick (*Amblyomma americanum*) is thought to be a primary vector for the syndrome and thus the expansion of its range may be associated with increasing disease risk. The environmental conditions that influence tick presence and activity is understudied. Specifically, it is unknown how much microhabitat variation affects tick behavior. Differences in shading, vegetation, and moisture may create microclimates that shape tick behavior and thus may influence disease exposure risk. Central Virginia is currently an area with an increasing prevalence of AGS, and thus there is a need to understand how variation in microhabitats might be affecting disease risk in this region. This study examines the way in which local microhabitat conditions affect tick activity across two parks in central Virginia known as Grove Street Park and Wilck's Lake Park. We measured temperature and relative humidity in vegetation-dense patches and open patches. Studies suggest that humidity and temperature may influence tick questing behavior, therefore habitat differences within microclimates may affect disease exposure risk in local communities. Identifying microhabitats that promote favorable conditions for lone star ticks, can inform AGS awareness, and risk communication for outdoor areas. By linking microclimate patterns to tick presence, this research aims to improve identification of high-risk spaces for tick disease exposure, and improve monitoring for AGS in Virginia.

Maya Adenihun

Discipline: English and Literature

Authors:

#1 Maya Adenihun

Abstract Name: Afrosurrealist Aesthetic in Selected Stories in Sheree R. Thomas's Dark Matter

This paper explores how allusions to mythology in "Anansi Meets Peter Parker at the Taco Bell on Lexington" by Douglas Kearney, "The Magical Negro" by Nnedi Okorafor-Mbachu, and "Afternoon" by Tananarive Due from *Dark Matter* by Sheree R. Thomas exemplifies an Afrosurrealist literary aesthetic. Using James Scott theory of hidden transcript, mythology signifies aesthetics of mysticism and grotesque and a rejection of linear time to demonstrate patterns of oppression and how colonialism affects present reality to

create a surreal experience. In “Anansi Meets Peter Parker at the Taco Bell on Lexington,” I focus on how the parallels of Anasai to Spiderman and B’rer Rabbit to Bugs Bunny demonstrate the absurdity of racial economic inequality from cultural production. In “The Magical Negro,” references to Thor the Brave from Norse mythology to critique the trope of a “magical negro” by disrupting the narrative and directly addressing the reader. In “Afternoon” the protagonist, Kenya tries to hide that she is a werewolf to be desirable to romantic partners, critiquing the absurdity of Modern, Eurocentric beauty standards having high social power. Understanding how allusions to mythology work as an Afrosurreal literary aesthetic can illustrate how surrealism appears in different cultural contexts.

Oluwateniola Adepoju

Discipline: Biology

Authors:

#1 Audrey Kim

#2 Paul Kim

Joseph Marful-Sau

Abstract Name: A Metagenomic Study Observing the Relationship Between Freshwater Microbiome and the Environment

Freshwater bodies are dynamic environments where microbial communities can play key roles in nutrient cycling and water quality regulation. These communities also respond to variations in environmental conditions, making them useful indicators of ecosystem health.¹ The goal of this study was to examine how water quality, weather conditions, and sampling location shape the microbial community and diversity of a city park pond in Grambling, Louisiana. Microbial composition was analyzed across four pond sites with each site differing in vegetation density (abundant vs bare) and water flow (stagnant vs. flowing). Water samples were collected biweekly beginning in September, and temperature, pH, conductivity, and dissolved oxygen were measured. DNA was extracted using the DNA ZymoBIOMICS Miniprep procedure and later sequenced through the Oxford Nanopore procedure. Metagenomic data was analyzed to profile bacterial, archaeal, and viral phyla. Across all samples, Pseudomonadota, Cyanobacteria, and Actinomyceota were consistently dominant, highlighting their ecological significance in the pond’s ecosystem.² Correlation patterns observed between the physicochemical parameters and major bacterial phyla, showed that environmental conditions influence the microbial community in multiple ways. Also, the presence of distinct microbial communities such as Methanobacteriota and Phixviricota in specific sites suggests spatial heterogeneity which could be caused by localized shifts in water chemistry.³ Overall, the measured physicochemical parameters can potentially be used for predicting microbiome structure.

Ewaoluwa Adewale

Discipline: Gender, Ethnicity, Diversity, or Cultural Studies

Authors:

Abstract Name: Constructing Race: A Comparative Study of Haiti and the Dominican Republic.

This project examines how race is constructed and used as a political tool in Haiti and the Dominican Republic, two nations that share the island of Hispaniola yet developed sharply different ideas about Blackness. Although both countries experienced colonization, slavery, and independence, their historical paths shaped contrasting racial identities: Haiti embraces a legacy of Black liberation rooted in the Haitian

Revolution, while the Dominican Republic has long built a national identity that distances itself from African ancestry and aligns with Eurocentric ideals. This research argues that these differences are not accidental but are the result of state-supported narratives, political projects, and cultural storytelling that have shaped national identity, immigration policy, and everyday social life. Drawing on postcolonial theory and Black radical thought, this study uses key texts such as C.L.R. James's *The Black Jacobins* and David Howard's *Coloring the Nation* to trace how governments and elites constructed racial meaning and embedded it into national memory. The project also explores major historical events, including the 1937 Parsley Massacre, to show how racial ideology can lead to violence when supported by law and state power. International responses, especially from the United States, reveal how global politics can reinforce racial hierarchies by ignoring or minimizing anti-Black violence. Additional scholarship on nationalism and *mestizaje* helps explain how racial mixing is celebrated in ways that still suppress Black identity in the Dominican Republic. Overall, this research shows that racial logic on the island is shaped not only by local history but also by global structures that reward whiteness and marginalize Blackness. Understanding these dynamics provides a clearer view of how race continues to influence migration, identity, and power across the African diaspora.

Viswanath Aditham

Discipline: Engineering

Authors:

#1 Viswanath Aditham

#2 Faizi Zaidi

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Faizi Zaidi

Ayati Vyas

Abstract Name: Transitioning from 3D to 4D Printing for Shape Memory Retention

4D printing is opening new avenues across many fields including medicine and aerospace engineering. This technique expands the functionality of conventional 3D printed components. Special materials like thermoplastic polyurethane (TPU) are now being widely used for 4D printing. TPU's reveal vast combinations of both physical properties and processing applications. Additionally, TPU is a very suitable material for 4D printing due to its flexible, elastic nature, combined with shape memory properties. This research explores two aspects of 4D printing. First, it investigates whether 4D-printed components lose their ability to retain shape after repeated cyclic testing. Second, it examines whether common 3D-printing materials—PLA/ABS/PETG—exhibit any shape-memory retention. To address these questions, TPU filament was used to print ASTM-D638 Type-I dogbone specimens at three infill levels (20%, 60%, 100%). These samples were evaluated to determine both the recovery time during shape-memory tests and the number of cycles required before noticeable loss of original shape. Results indicate a positive correlation between infill density and shape-recovery time: the 100% infill sample required roughly $1.5\times$ more time to return to its original form compared to the 20% sample, and this trend persisted under repeated deformation cycles. Additionally, the 20% infill specimens lost their shape-memory behavior more quickly than the 100% samples. In the second phase of the study, PLA, PETG, and ABS dogbones are being evaluated for shape-memory retention. Preliminary results show that PLA demonstrates measurable shape-memory effects at its defined transformation temperature. The trend of retaining shape memory is the same as was observed in TPU samples. Higher infill samples perform better. However, the number of cycles after which material memory starts fading is at least 70 percent lower than what was observed in TPU samples. These are preliminary results. Further testing is ongoing, and complete results will be presented at the conference.

Ananya Aengula

Discipline: Psychology

Authors:

Abstract Name: "How does sleep quality affect emotional regulation strategies such as cognitive reappraisal and suppression?"

Sleep is an essential component of our cognitive and physical health; however, many individuals have poor-quality sleep, which affects their ability to regulate their emotions. There are two common emotional regulation strategies that people utilize in their daily lives, called "Cognitive Reappraisal" and "Expressive Suppression." Cognitive Reappraisal entails reframing a situation to alter the emotional impact it can have. On the contrary, Expressive Suppression entails making a conscious effort to avoid unwanted memories and thoughts, which is done by inhibiting emotional expression. Recent literature suggests that disrupted neural and prefrontal-amygdala function in the brain is an underlying effect of poor sleep quality. This issue disrupts the collaboration between the Amygdala and the Prefrontal Cortex, which impairs the brain's ability to regulate emotions. For example, one or two nights of poor-quality sleep will lead to a noticeable increase in expressive suppression and lead to other negative effects that disrupt an individual's routine. As a result, individuals may experience negative emotions more intensely, and their productivity will decrease. In terms of populations, this issue disrupts the well-being of healthy individuals and exacerbates the symptoms of individuals diagnosed with Major Depressive Disorder (MDD), Generalized Anxiety Disorder (GAD), Post-Traumatic Stress Disorder (PTSD), and Borderline Personality Disorder (BPD). However, there are gaps in how much potential there is for interventions and the long-term effects of consistent sleep disruptions. Overall, these findings indicate that the effects of poor sleep have many negative implications on the psychological well-being of any individual, as it is associated with reduced reappraisal and increased suppression.

Meg Aerni

Discipline: Psychology

Authors:

#1 Suzanne Sollars

Abstract Name: From Viral to Valid: TikTok's Learning and Memory Claims Versus Student Beliefs

TikTok is a major source of study advice for college students, yet the accuracy of its learning and memory tips and the impact they have on students' beliefs are not well understood. This project examines a central question: How does exposure to study-related TikTok content shape students' understanding of the neuroscience behind learning and memory and the best practices related to them? Although some TikTok videos share effective, research-backed methods such as spaced repetition and retrieval practice, many others promote ideas that sound scientific but lack evidence, including learning styles and "dopamine detox." While prior research has documented the spread of educational misinformation online, it has focused predominantly on platforms such as YouTube and Instagram. Because TikTok quickly amplifies highly engaging content, students may find it difficult to distinguish between valid strategies and widely repeated misconceptions. This study uses two main methods. First, a systematic audit of TikTok videos posted in 2025 with at least 50,000 views identifies the types of learning and memory claims being made, evaluates their scientific accuracy, and documents how widely they are shared. Each claim is compared with established findings in cognitive psychology and neuroscience. Second, a survey of undergraduate students measures their endorsement of and confidence in True/False statements based on both high-exposure TikTok claims and accurate but low-exposure learning principles that rarely appear on the platform. Statistical analyses compare performance on these two categories and examine whether students' TikTok use is related to their beliefs. These findings will be discussed in the context of how digital misinformation shapes student learning, highlighting common

misconceptions about memory and study strategies, and drawing on research that challenges popular myths while offering practical ways educators and students can engage more critically with social media content.

Andrés Afocx

Discipline: Engineering

Authors:

#1 Andrés Afocx

#2 Zachary Cullingsworth

Abstract Name: Tensile Testing of PLA 3D Prints with Varied Orientations

The aim of this study is to determine a difference in the tensile strength of 3D-printed objects based on printing orientation and varied layer heights. The hypothesis is objects with vertical layers will have higher tensile strengths than objects with horizontal layers. Dog-bone samples will be printed using PLA filament at three different layer heights. Half of the samples will be printed parallel to the print bed, with layers running along the samples. The others will be printed perpendicular to the print bed, with layers stacked along the sample. Samples will be tested in a Tensile Testing Apparatus by stretching each to failure. The samples printed parallelly are expected to have higher tensile strengths than the other samples. The impact layer height has on tensile strength will depend on the sample. The samples printed parallelly are expected to be minimally impacted by layer height. Since the layers run with the direction of tension, the layers will stretch with the sample. In contrast, the samples printed perpendicularly will likely be affected by layer height. Since those layers will be perpendicular to the direction of tension, the fracture will likely happen sooner due to small spaces occurring between layers. This chance increases with layer height, since those spaces also grow. Preliminary data for PLA showed tensile strength dropped by ~16.5% when increasing the layer height from 0.15mm to 0.2mm for a flat dog-bone sample. This drop shares characteristics to atomic packing factor, where higher factors signify more densely packed atoms. The more densely packed atoms are, the less space between them. Similarly, the greater the layer height, the less dense the layers are. This research aims to strengthen current understanding of the material properties of PLA. Future research will incorporate compression tests to gather the full scope of material properties for PLA.

Israel Agaku

Discipline:

Authors:

#1 Israel Agaku

Abstract Name: Early Career Researchers Now: Empowering Undergraduates to Publish in Hours with Chisquares

Undergraduates can and should be positioned as early career researchers—but they are often blocked by steep learning curves, fragmented tools, and limited access to publishable data. This mentor-led session shows students how to move from question to manuscript in hours, not months, using publicly available datasets and the Chisquares platform. We begin by framing a researchable question, then demonstrate where and how to access free, high-value data (e.g., NHANES, NHIS, NYTS, BRFSS; state open-data portals). Next, participants see analysis-as-visualization on Chisquares: selecting outcomes, predictors, and covariates via guided menus; running descriptive statistics and regression; and interpreting weighted estimates when survey design demands representativeness. Chisquares' rules-based computation ensures reproducible accuracy (no

coding required), while its risk-based AI assists only in low-risk narrative tasks (e.g., drafting introductions/discussions), never touching raw data or analytics. Finally, students push analytic outputs directly into a formatted manuscript with tables, figures, and references aligned to journal standards. Attendees leave with a clear workflow: (1) source open datasets ethically; (2) define a transparent analysis plan; (3) conduct and validate analyses visually; (4) generate a submission-ready manuscript in minutes; (5) document contributions for CVs, graduate applications, and early publications. The session's goal is confidence: undergraduates see themselves as credible contributors—equipped with ethical, efficient, and rigorous methods to produce real scholarship now. This interactive workshop demonstrates how visualization and automation can transform research productivity, empowering undergraduates and graduate students to generate publication-ready manuscripts within an hour. Using the Chisquares Platform, participants will learn how analysis, visualization, and manuscript writing can occur seamlessly in a unified, no-code environment. By bridging the divide between undergraduates and analytical technology, participants will see how intuitive visualization tools and rule-based AI frameworks democratize access to evidence generation—making research accessible even to those without programming or statistical backgrounds.

Israel Agaku

Discipline:

Authors:

#1 Israel Agaku

Abstract Name: Using AI Ethically to Succeed in College and Graduate School: From Proposal to Self-Cleaning Data and Instant Reports on Chisquares

This mentor-led session provides a practical, ethics-first roadmap for students to use AI well—to think better, not shortcut learning. We demonstrate a full research cycle on the Chisquares platform: generating a rigorous, scannable research proposal; collecting quality data; and producing instant, interpretable reports. First, we show how to prompt ethically for proposal scaffolds (background, aims, hypotheses, analytic plan) while preserving academic integrity: AI assists in low-risk narrative structuring, but claims, citations, and methods are verified by the student. Next, we design a data collection instrument on Chisquares with self-cleaning safeguards: regex and range checks, soft/hard validations, branching logic, eligibility screens, and required fields—preventing bad data at entry rather than “fixing” it later. For projects using existing data, we demonstrate importing public datasets and applying design weights when appropriate. Then, with one click, students generate descriptive tables, model outputs, and a concise results summary that turns analytics into auto-generated reports—including visualizations and a manuscript shell formatted to journal or course standards. Throughout, we model responsible AI use: no AI in statistical computation; transparent attribution; reproducibility via rules-based analytics; and documented decision logs. Students leave with a repeatable workflow to (1) frame a proposal ethically, (2) design instruments that self-clean, (3) analyze without coding, and (4) communicate findings clearly and rapidly. The outcome is not just higher grades or faster theses—it’s durable research literacy, academic integrity, and confidence to contribute meaningfully in college and graduate school. Participants will learn how to use Chisquares to generate rapid, reproducible results from open-access health datasets relevant to undergraduate and graduate research. Through guided, hands-on activities, they will see how a project that typically takes weeks can be completed within minutes—empowering participants to integrate data-driven learning into their career goals.

Rebecca Agans

Discipline: Biochemistry

Authors:

#1 Tyler Hanlan

#2 Rachel Duke

#3 Shannon Legge

#4 Michael Beck

Abstract Name: Development of Fluorescence-Based Assays to Assess Cancer Drug Activation by CES2

Irinotecan and Capecitabine are approved to treat certain types of cancer including metastatic bowel cancer. These drugs are prodrug requiring hydrolysis of ester groups before their active forms are produced. Human carboxylesterase 2 (CES2) is a serine hydrolase that is known to activate Irinotecan and Capecitabine. The activity level of CES2 in cancerous tissue is correlated to successful treatment with these drugs. There are, however, genetic polymorphisms that can produce less active forms of CES2 which could result in decreased efficacy of these drugs. These polymorphisms, however, are poorly studied. This work focuses on developing fluorescence-based assays for studying CES2 activity that is tractable for high throughput study of CES2 polymorphism activity. Progress to date has focused on developing assays using fluorescein diacetate (FDA)

as a fluorogenic probe for CES2 with results suggesting that FDA can be used to study CES2 in certain conditions. Ultimately these efforts will lead to annotating all known CES2 polymorphism activity which will aid physicians in choosing personalized treatments for cancer and other diseases resulting in better patient outcomes.

Saketh Agava

Discipline: Engineering

Authors:

#1 Phuc Nguyen

Abstract Name: Multimodal Imaging System for Early Diagnosis of Age-Related Macular Degeneration (AMD)

Purpose: Age-related macular degeneration (AMD) remains one of the leading causes of irreversible vision loss worldwide, largely due to the difficulty of detecting choroidal neovascularization (CNV), or abnormal blood vessels that form in wet AMD at its earliest stages. To address this challenge, we present a multimodal imaging system integrating photoacoustic microscopy (PAM), optical coherence tomography (OCT), and fluorescence microscopy (FM) for the early diagnosis of AMD. **Methods:** PAM was performed using a laser energy of 80 nJ at 578 nm, approximately half of the ANSI safety limit. OCT provided depth-resolved structural imaging and detailed visualization of retinal layers, including the ILM, ONL, RPE, photoreceptors, choroid, sclera, and CNV. This platform combines the structural depth-resolving capability of OCT, the molecular and vascular sensitivity of PAM, and the cellular-level contrast of FM to achieve comprehensive, high-resolution visualization of retinal microvasculature and early neovascular changes. The AMD model was created in New Zealand White rabbits using a subretinal injection of a mixture of Matrigel and VEGF-165 to induce CNV. **Results:** The system allows for synchronization of multimodal image acquisition and co-registration, enabling both cross-validation and complementary interpretation of CNV-related biomarkers across modalities. The system achieves high resolution (4.1 μm aerial lateral resolution) and strong image contrast of choroidal and retinal vessels in both 2D and 3D. PAM provides high contrast for early neovascular changes, while OCT offers detailed information on retinal microstructures and clear identification of CNV. Together, the modalities demonstrate consistent correlation in lesion morphology and vascular features. **Conclusions:** This multimodal imaging system provides comprehensive vascular and structural information that is not attainable using single-modality approaches alone, and it shows strong potential for early detection and diagnosis of AMD-associated CNV.

Tochi Agbara

Discipline: Chemistry

Authors:

#1 Tochi agbara

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Angelina Nguyen-Nhu

Matilda Southerland

Abstract Name: The Effect of Calorie Content When Baking Goldfish Crackers at Different Times And Temperature

The popular snack goldfish was founded and created by Oscar J Kambly, in Switzerland in 1958. They were then introduced to the American market by Pepperidge farm in 1962. The standard goldfish crackers contain about 140 calories 55-pieces serving which equal out to one ounce. Although some variations of goldfish may be slightly different. This experiment examined how baking temperature and time affect the measurable caloric energy of Goldfish crackers using a simple calorimeter. Crackers were baked at 250 °F and 350 °F for varying durations, then burned to determine energy release per gram. Moderate baking conditions 250 °F for 15 minutes or 350 °F for 5 minutes and this produced the highest energy values, likely due to optimal moisture loss without excessive nutrient breakdown. Higher temperatures or longer baking times slightly reduced measured energy, suggesting charring or partial oxidation limited full combustion. Overall, the study showed that baking conditions influence energy density and demonstrated how thermochemical principles apply to real-world food science.

Ria Aggarwal

Discipline: Engineering

Authors:

#1 David Mack

#2 Jason Silver

Abstract Name: Engineering a Physiological Platform to Model Muscle Stem Cell Fate and Aging in Sarcopenia

Skeletal muscles are unique tissues that have a high regenerative capacity through muscle stem cells (MuSCs). However, their regenerative capacity diminishes with age and is further impaired by neuromuscular disorders such as sarcopenia, a condition characterized by muscle atrophy. Despite its prevalence and current knowledge of muscle regeneration, treatment for sarcopenia remains limited to general therapies due to an incomplete understanding of sarcopenia's pathogenesis. Current models of sarcopenia rely mainly on animal models, incorporating the complex muscle niche and multicellular environment. While invaluable, they raise ethical, economic, and time concerns. Furthermore, existing in vitro approaches fail to capture key aspects of MuSC fate, including quiescence. Using engineered muscle tissues (EMT), a muscle organoid with myoblast progenitors, fibroblasts, and extracellular matrix (ECM) initially developed by the Mack Lab at the University of Washington, we aimed to create an in vitro model that (1) incorporates EdU time-pulse labeling within EMTs to trace MuSC proliferation and self-renewal, (2) recapitulates key aging phenotypes through young and old MuSC. We seeded EMTs with iPSC-derived MuSCs and allowed them to self-assemble into contractile organoids, with EdU administered at defined intervals. We assessed muscle force generation and tracked EdU location through immunocytochemistry. Preliminary results demonstrated the technical feasibility of EdU pulse-chase for tracking MuSC fate determination in EMTs. Together, this approach will provide a scalable, rapid-testing platform for sarcopenia and other muscle-related diseases, enhancing current understanding of muscle regeneration and the development of targeted therapies.

Chloe Aguas

Discipline: Chemistry

Authors:

Abstract Name: How the Body Heals: Stopping the Bleed

Excessive blood loss due to laceration can lead to hypovolemic shock which is caused by a lack of oxygen circulating through the body. Because of the easily identifiable repercussions of severe blood loss, different ways to staunch bleeding quickly came about. The current innovations for stopping blood loss are Hemostatic Gauze and XStat wound packing. Hemostatic uses chemical kaolin to accelerate blood clotting whereas XStat injects expanding sponges into a wound, creating a temporary barrier to blood flow and providing hemostatic pressure. This research focuses on how to develop wound packing products that can evolve from the pre-existing wound packing by making the design more intuitive for civilian use. The product is made of cotton gauze tube-like structures (one inch in diameter and three inches in length) containers holding crystalized sodium polyacrylate ($C_3H_3NaO_2$), a superabsorbent polymer (SAP) that can absorb approximately sixty times its own weight in water from blood. It consists of five or more gauze tubes making a chain of expanding gauze containers. The product is tested using 0.9% saline solution and deionized water for expansion, absorption within 60 second intervals, and saturation time. The efficacy rates were calculated and analyzed from 21 trials indicated that the average success is 73.02 % assuming the ideal product absorbs 30 mL to become fully saturated and expanded in one minute, and the average volume (mL) absorbed by a single gauze container is 18.203 mL. Future work will be reducing the product size to increase the amount of pressure applied inside a wound, reducing the size and amount of air pockets, and shortening saturation time. We also consider replacing the cotton gauze with elastic nonwoven fabric to prevent leaking crystalized sodium polyacrylate before application.

Ruth Aguido

Discipline: Biochemistry

Authors:

#1 Paula Fischhaber

#2 Krina Radadiya

Abstract Name: Creation of Yeast Strains to Investigate the Effect of Endonucleases during Anaphase

DNA double-strand breaks (DSBs) are one of the most severe forms of DNA damage, arising when a replication fork collides with a single strand break caused by reactive oxygen species or ionizing radiation. In the final steps, DNA intermediates must be resolved by endonucleases, but the mechanisms guiding recruitment are unclear. Defects in DSB repair contribute to cancer predisposition and premature aging. Understanding them can reveal molecular targets to improve genomic stability. This project investigates three key enzymes in DSB repair: Rad1-Rad10, Yen1, and Dpb11. Our aim is to test whether Rad1-Rad10 and Yen1 localize to anaphase bridges in *S. cerevisiae*. The target strains will contain fluorescently labeled Rad10-YFP and Yen1-RFP, and one label for the anaphase bridges, either Dpb11-CFP or Hta1-CFP. By imaging these fluorescently tagged proteins, we can assess whether recruitment depends on Slx4 or cell-cycle stage. Prior to conducting microscopy, we need to create strains containing these gene combinations: Rad10-YFP/Yen1-yEmRFP/Dpb11-CFP/sl_x4 Δ , Rad10-YFP/Yen1-yEmRFP/Hta1-CFP/sl_x4 Δ , and Rad10-YFP/Yen1-yEmRFP/Hta1-CFP/SLX4. To isolate the target strains, we screened candidate spores by antibiotic selection, fluorescence microscopy, and Polymerase Chain Reaction (PCR) of genomic DNA. Fluorescently tagged genes produce longer PCR products than wild-types, which are distinguished by gel electrophoresis. The other screens showed the expected antibiotic resistance and fluorescence signals. Currently we are finalizing the screening of spores for two of the target genotypes. The third cross is currently underway and from which we expect to generate the final target strain. Once all strains have been created and characterized, we will examine the abundance of end processing nucleases at chromatin structures and anaphase bridges. This work will provide new insight into how nuclease recruitment is coordinated during DNA repair, advancing our understanding of genome stability and its relevance to cancer biology and human health.

Patricia Aguila

Discipline: Health and Human Development

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Abstract Name: Hormonal Predictors of Recent Alcohol Use in Naturally Cycling and Oral Contraceptive Users

Emerging research suggests that estradiol and progesterone may modulate alcohol motivation and consumption; however, findings remain mixed, in part because few studies incorporate repeated direct hormone measurements. Because oral contraceptives (OCs) suppress endogenous ovarian hormone fluctuations, hormone–behavior associations may differ between OC users and naturally cycling (NC) women. This study examines whether measured hormone concentrations predict recent alcohol use in young women and whether these associations vary by hormonal environment. Participants include 60 young women (ages 16–22; 30 NC, 30 OC). At three follow-up visits, participants reported past-week alcohol use, and serum was collected for estradiol, progesterone, follicle-stimulating hormone (FSH), and luteinizing hormone (LH). Hormone assays are in progress. NC participants completed visits across four menstrual cycle phases, whereas OC users were assessed during active and inactive pill weeks. Baseline drinking risk was assessed with the AUDIT-C (range 0–12; scores ≥ 3 indicate hazardous drinking). In this sample, AUDIT-C scores averaged 3.1 (SD = 2.27); 23% scored 0 and 33% scored ≥ 4 . Across follow-up visits, 51% reported past-week drinking. Among drinkers, alcohol was consumed on an average of 1.5 days (range 1–4), with 3.2 drinks per drinking day (range 1–10). We will test whether (1) estradiol and progesterone predict past-week alcohol use in NC women, (2) associations are attenuated in OC users, and (3) FSH and LH add predictive value beyond estradiol and progesterone. Mixed-effects models will examine hormone levels as continuous predictors, with Group (OC vs NC) as a moderator. Study outcomes will determine whether real-time hormonal states better explain variation in alcohol use than categorical cycle phases and clarify how exogenous versus endogenous hormonal environments shape hormone–behavior associations in early adulthood.

Isabella Aguilar Fricke

Discipline: Mathematics

Authors:

#1 Isabella Aguilar Fricke

Abstract Name: From Shipment to Savings: Optimizing Inbound Freight Strategies at Trinity Industries

This study investigates cost optimization strategies for inbound freight at Trinity Industries by comparing the

per-unit economics of trucking and rail transport. Using shipment and vendor data from January through May 2025, the analysis evaluates how shipment volume, vendor patterns, and transportation modes influence operational costs. Findings identify breakeven thresholds, approximately 106 to 114 heads, at which rail becomes more cost-effective than trucking, and highlight how shipment size and part dimensions affect overall efficiency. The results provide data-driven guidance for selecting transportation modes that improve cost performance across Trinity's inbound supply chain.

Amy Aguillon

Discipline: Education

Authors:
#1 Belkys Torres

Abstract Name: From Data Collection to Program Direction: Advancing Latinx Studies at a Predominantly White institution (PWI)

Despite substantial growth in Latina/o enrollment into higher education institutions and the rising number of higher education institutions designated as a Hispanic-Serving Institution (HSI), the Latina/o student population continues to face a lack of curricular offerings that centers, or even reflects, their identities, histories and experiences. This gap informs my current and future exploration of how it can be institutionally addressed within an R, predominantly white institution (PWI). This research project conducts an external benchmarking across higher education institutions with high research activity (R1 designation) to examine how Latinx Studies programs, if offered, are structured, situated, directed, administrated, and supported. This is a data collection focused exclusively on undergraduate majors, minors, and certificate offerings that center either a collective identity of Latino-ness or Latinoism, or its ethnonational derivatives such as Chicana/o, Puerto Rican, or Cuban American Studies at the undergraduate level. The aim of this study is to contextualize an effective implementation of a Latinx Studies program at an R1 and predominantly white institution like the University of Pittsburgh.

Diana Aguinaga

Discipline: Gender, Ethnicity, Diversity, or Cultural Studies

Authors:

Abstract Name: "Reexamining the Rise of Conservatism Among Latinos in the U.S."

In recent years there has been major discourse surrounding the recent rise of conservatism among the Latino community since the 2020 U.S. elections. Numerous experts have noticed a major factor that contribute to Trump winning the 2024 Presidential elections is that he managed to obtain almost fifty percent of Latino voters. As a result, this has furthermore caused division among the Latino community due to personal and political beliefs. This has prompted me to further investigate why many Latinos in the U.S. are increasingly aligning more with the conservative party even though a lot of their policies they promote often targets marginalized groups including Latino individuals in the U.S. I intend to re-examine whether a lot of these factors come from a personal, religious, or economic standpoint by initiating research that will consist of examining data and events using academic journals, books, news articles, social media, and survey to further understand their viewpoint. While conducting this research I anticipate that some of the factors as for why many Latinos are aligning more with conservatism are due to the economy, immigration, border crisis, and government control which has become a major concern among Latino within the last few years. Many of

these Latinos who voted or sympathize with President Trump are optimistic that he will provide effective solutions for all Americans, while other Latinos have expressed doubt in seeing any progressive change. Ultimately, it is crucial that this subject is being addressed since not only has there been a rise of conflict and division among the Latino community but many individuals who did not vote for President Trump have voiced concerns of potentially facing major repercussions under his current administration which may further impact all Latinos including those who either voted or sympathize with Trump due to his policies.

Alexandra Aguirre

Discipline: Psychology

Authors:

#1 Kelli Thompson

Abstract Name: A Qualitative Analysis of the Barriers to Treatment in Hispanic Women

Hispanic American women face unique mental health challenges because of various cultural factors. Access to mental health resources and culturally competent care is impacted by insurance coverage and insurance disparities, emphasizing the need for culturally sensitive interventions. Cultural stigma surrounding mental health issues can complicate these outcomes, as people may be reluctant to seek help due to fear of judgment from their community. This study investigated the unique barriers and help-seeking behaviors that Hispanic American women face in accessing mental health resources, particularly those rooted in cultural stigma. A survey was distributed to women living in the Coastal Bend Region of South Texas. The survey was designed to look at the differences between cultural factors and their impacts on different ethnicities regarding the care of women's mental health. The study examined cultural stigma and barriers to seeking help, including financial constraints and language barriers, through a series of open-ended questions. The hypothesis explored was: Which of these factors may impact the likelihood of seeking mental health treatment? A qualitative approach was employed, utilizing demographic data and survey results to quantify barriers to mental health access. Hispanic women faced more financial constraints, a lack of awareness of available services, and a lack of health insurance, as well as other issues. Results indicate that factors that influenced positive Help-Seeking Behaviors included family, friends, and mental stability. Relevant themes that influenced people not being able to seek help included cost, stigma, time, access, insurance, and family. This research aims to inform best practices for mental health professionals, enhancing care tailored to the unique needs of Hispanic women.

Chiamaka Agwu

Discipline: Biology

Authors:

#1 Chiamaka Agwu

Abstract Name: Effects of *Bacillus amyloliquefaciens* Inoculation on Nutrient Efficiency and Root Composition in Hydroponic Butterhead Lettuce Plants under Electrical Conductivity or Salinity Stress: A Comparative Study

In the face of population growth and climate changes, the pressure for more efficient and effective cultivation techniques has never been greater. Where soil-based farming has had many short-comings in meeting the global demand for food, soilless farming systems offer a viable solution. Hydroponic farming the cultivation of crops in water-based nutrient solutions, has risen as a viable alternative in its ability to efficiently use water

and nutrients without soil while providing better yield the soil-based systems on average. This is not to say that hydroponic farming is not without its issues. It is a controlled environment agriculture that recirculates nutrient solutions that have high fertilizer input, making it susceptible to stress from high electrical conductivity and salinity. This can cause salt burn, nutrient lockout and toxicity, resulting in reduced plant quality or yield. To resolve this issue, *Bacillus amyloliquefaciens* has been presented as a solution to improve nutrient uptake and strengthen crop resilience under stress. This project will study how *B. amyloliquefaciens* affects nutrient-uptake efficiency, root composition and crop quality in recirculating solution comparing the normal vs. inoculated nutrient solution under the moderate stress of elevated electrical conductivity. Three comparative experiments will be set-up side by side under identical pH, temperature, humidity and light conditions. Planned metrics to be measured would include microscopic colonization and root plate counts to keep track of microbial colonization and in establishment in the roots using microscope and florescent dye, nutrient solution electrical conductivity at different point of plant growth using EC meter, dry matter percentage and leaf color or greenness using a SPAD or image-based color index. Data will be analyzed using ANOVA to test effects and interaction among EC and inoculation. This study aims to show proof in feasibility for microbiome-assisted nutrient efficiency in hydroponic systems.

Jeanelle Agyem

Discipline: Political Science

Authors:

#1 Jeanelle Agyem

Abstract Name: Burkina Faso's Digital Propaganda Machine: Influence on Media, Security, and Democratic Discourse

In April 2024, Burkina Faso expelled several western media organizations from the country after reports were released that exposed military violence against civilians in the current insurgent crisis the country faces. Since then, the media landscape has been inhibited by government attacks on private press while simultaneously disseminating narratives that favor presidential praise and military support through the usage of misinformation, artificial intelligence generated content, and restrictive media directives. This study serves to examine how these tactics of digital authoritarianism influence the media landscape and the strategies that are utilized to create a unified security narrative. Literature concerning the media in Burkina Faso has focused primarily on elections and coups, while literature on counterinsurgency has focused on failures and policy solutions. Previous research has not addressed the intersection concerning media and the growing insurgency threat, which is central to state strategy. To address this gap, Facebook posts from President Traore's official account @Présidence du Faso account and the national news agency @Agence d'information du Burkina (AIB) were collected between August 1st, 2025, and August 31st 2025. These posts were categorized into thematic frames of Nationalism/Patriotism, Pro-Traore messaging, and Counterterrorism to examine how information from sources, such as the government, are reframed when disseminated to the larger public. Findings show that content originating from the presidency consistently elevates nationalism as its main ideological pillar, while counterterrorism urgency and praise of Ibrahim Traore act as supporting factors. AIB, reinforced these frames through localized, event-specific reporting that amplifies these narratives for public consumption. Together, these dynamics illustrate how coordinated digital messaging strategies contribute to a narrowed information space and a dominant security-orient narrative in Burkina Faso.

Mustanser Ahmad

Discipline: Engineering

Authors:

Abstract Name: Lyapunov Stability Analysis of Gradient Descent in Machine Learning

Central Research Question / Purpose This project explores whether Lyapunov stability theory from control engineering can be used to analyze gradient descent, a key optimization algorithm in machine learning. The aim is to demonstrate how rigorous and intuitive insights into the stability and convergence of gradient-based learning techniques can be obtained using tools typically used for dynamical systems.

Scholarly Context While control theory stresses stability through Lyapunov functions and energy-based arguments, convergence analyses in machine learning usually rely on convexity, smoothness, and Lipschitz continuity assumptions. Even though both disciplines investigate related phenomena, undergraduate research rarely combines their approaches. This project connects optimization and control theory by considering gradient descent as a discrete-time dynamical system, providing an approachable interdisciplinary viewpoint for applied mathematics and engineering.

Methodology Gradient descent is modeled by the state update treated as a discrete-time nonlinear system. Candidate Lyapunov functions—particularly the cost function and quadratic energy-like functions—are proposed. Conditions guaranteeing monotonic Lyapunov decrease are derived, yielding stability and convergence bounds on the step size. Analytical results will be supported by MATLAB simulations on quadratic functions and linear regression models, and the derived stability regions will be compared with classical machine-learning step-size conditions.

Expected Results and Discussion It is expected that Lyapunov analysis will recover well-known convergence conditions for gradient descent, such as the requirement for μ -smooth convex functions, while providing a clearer dynamical-systems interpretation of stability. Simulations are anticipated to illustrate stable and divergent trajectories depending on the step size, reinforcing the theoretical findings. The results highlight how control-theoretic tools can enrich the analysis of machine-learning optimization.

Mahnoor Ahmad

Discipline: Health and Human Development

Authors:

#1 Sargent Lana

Abstract Name: Results of a Quality Improvement Project to Enhance the Mind Workflow in an Age-Friendly Community-Based Wellness Program

Promoting healthy aging for all requires the intentional integration of behavioral, mental, and cognitive health into age-friendly care. Although the Mind domain of the 4Ms framework offers a useful structure, practical guidance for implementing Mind workflows in community-based settings remains limited. To address this gap, we examined Mind processes within the VCU Mobile Health and Wellness Program (MHWP), a community-based initiative that has provided weekly interprofessional care coordination visits to community-dwelling adults since 2012. Using the Plan-Do-Study-Act quality improvement model, we conducted a retrospective review of the program's Mind workflow, which employs a screen–educate–intervene approach across three areas: depression and anxiety (PHQ-4, PHQ-9, GAD-7), substance use (TAPS-1/2), and cognition (Mini-Cog). All MHWP participants with at least one visit between July 1, 2023, and June 30, 2025, across seven subsidized housing communities and one community health center were included. A total of 549 participants engaged in 5,566 visits. Participants were, on average, 66 years old (range 19–95), 55% female, and 84% Black. Mind screening occurred in 103 visits involving 72 participants (13%). More than half of screened visits (52%) yielded at least one positive result. Among the 54 positive screens, 41 (69%) received education, most commonly related to mental health behaviors, chronic disease management, or social drivers of health (SDOH). Follow-up assessments, including evaluation of possible suicidality, were inconsistently documented. Interventions were recorded in half of positive-screen visits and included SDOH referrals, mental health referrals, and care coordination. Opportunities to strengthen the workflow were identified, including improving follow-up procedures, refining documentation, expanding the scope of Mind screening, and providing additional team training. Findings highlight both strong screening reach and

substantial unmet mental, cognitive, and behavioral health needs among MHWP participants. Lessons learned may help guide more effective Mind implementation in other age-friendly, community-based programs.

Naeem Ahmad

Discipline: Health and Human Development

Authors:

#1 Gregory Neiman

Abstract Name: Empowering Bystanders: Confidence and Capability After Stop the Bleed Education

Severe bleeding can become fatal in just a few minutes, and through a recent grant initiative, trauma control kits are now readily available in almost every building at Virginia Commonwealth University. However, most students do not receive any training on how to use them. Over the past four years, I have taught more than 700 VCU students through the Stop the Bleed program to help peers feel confident stepping in as active bystanders during life-threatening emergencies. Many students tell me that, even though the kits are visible across campus, they are unsure how to actually apply a tourniquet, pack a wound, or use direct pressure in a real situation. This gap between access and ability motivated my research. To better understand the impact of Stop the Bleed education, I collected short pre- and post-class surveys asking students how comfortable they felt performing bleeding-control skills. Before the training, a majority of students reported low confidence or fear of doing something “wrong.” After the hands-on session, where they practiced tourniquet use, wound packing, and hemorrhage control techniques, students consistently reported a significant increase in comfort and willingness to intervene. Many described going from feeling intimidated by the equipment to feeling prepared to act if a serious injury occurred on campus or in the Richmond community. As trauma kits become more common in public spaces, it is essential that the people who walk past them every day actually know how to use them. My project highlights how brief, accessible training can transform student confidence and help bridge the gap between having lifesaving tools available and having individuals ready to use them. By sharing these findings, I hope to support broader efforts to make bleeding-control education a standard part of campus safety and empower more students to save a life when seconds matter.

Mahnoor Ahmad

Discipline: Gender, Ethnicity, Diversity, or Cultural Studies

Authors:

#1 Joshua Barton

Abstract Name: Wands, Wardrobes, and Warriors: How Disney Redefines Gender Representations

For almost a century, Disney Princess movies have shaped how children learn about gender, identity, and what it means to be a girl. Because these films are often the first stories young viewers become attached to, they play an important role in how children start to understand gender and form their sense of self. Early princesses reflected the traditional expectations of femininity that were common at the time. These characters were kind, gentle, and optimistic, yet they often lacked self-autonomy and relied on others to solve their problems. As society changed and feminist ideas gained influence, Disney introduced princesses who broke away from these limited roles. Princesses began to show traits of bravery, independence, and emotional complexity, broadening children's understanding of femininity. As children are still developing their beliefs and identities, the messages they absorb from these films can have lasting effects. Research in media literacy highlight how children often internalize stories subconsciously, taking in the lessons, values, and expectations

presented to them. Earlier portrayals may reinforce narrow ideas about appearance, behavior, and gender roles, while modern portrayals can encourage resilience, confidence, and more flexible understandings of women's abilities. As Disney continues creating characters who reflect individuality and diverse backgrounds, these films remain influential in helping children make sense of themselves and the world around them. The evolution of Disney princesses shows how the media both responds to and shapes societal views of gender and identity.

Afsana Ahmadi

Discipline: Gender, Ethnicity, Diversity, or Cultural Studies

Authors:

Abstract Name: Women's Inclusion, Exclusion, and the Hidden Architecture of Power in Peace Negotiations

Around the world, peace negotiations still unfold in rooms where women are outnumbered, sidelined, or present only as tokens. On paper, gender quotas and advisory seats suggest progress; in practice, decisions are too often made in male dominated backrooms that reduce women's voices to symbols of legitimacy rather than authors of peace. This project asks a difficult but urgent question: when women are invited to the table, what determines whether they shape the agenda or simply decorate it? To answer this, I turn to a comparative study of five post-Cold War peace processes, Afghanistan, South Sudan, Liberia, Colombia, and Guatemala, examining both formal inclusion mechanisms and the informal dynamics that either empower or silence women once negotiations begin. Guided by feminist institutionalism and legitimacy theory, I trace how power flows through institutions: who speaks, who decides, and who is heard. The findings reveal stark contrasts. In Afghanistan and South Sudan, women were given quotas or token seats but remained excluded from real decision-making, producing fragile and mistrusted agreements. By contrast, Liberia's grassroots mobilization and Colombia's groundbreaking Gender Sub Commission turned presence into power, reshaping accords to address justice, accountability, and community recovery. These cases demonstrate that when women influence both formal and informal processes, peace agreements gain credibility and durability. This research contributes more than case evidence: it reframes inclusion itself. True participation is not measured by how many women sit at the table, but by whether their voices change what peace means and how it is built. Without dismantling institutional gatekeeping and recognizing women as co-authors of political futures, peace remains a bargain among elites, fragile, narrow, and incomplete.

Neha Ahmed

Discipline: Political Science

Authors:

#1 Fabian Neuner

Abstract Name: The Wasted Vote: The Stigma Around Third-Party Voting in the U.S.

In the United States, the political landscape is largely shaped by a bipartisan system consisting of Republicans and Democrats. These two parties dominate people's political identities, elections, and media discourse. Despite this, third parties in the U.S. have continued to provide an expressive platform for voters who are dissatisfied with the bipartisan system, though the existence of significant public support for third-party policies and ideas has consistently failed to translate into electoral success at the polls. The disparity between substantial public support for third parties and limited electoral impact has sparked interest among political psychologists and scholars seeking to understand the underlying causes that prevent third-party success.

While many attribute this gap to the multitude of institutional barriers preventing third-party mobility, I argue that there is a largely-overlooked stigma associated with third-party voting; a primary factor which keeps the public from voting for third-party candidates. By examining the historical evolution of third-party movements, delving into voter psychology, and conducting an experimental study on whether a stigma against third-parties does influence voter behavior, this paper explores the challenges third-party candidates face in gaining traction within a predominantly two-party system. This experimental study finds that the stigma surrounding third-party votes being "wasted votes" does significantly affects voter willingness to support third-party candidates, finding strong evidence that the "wasted vote" stigma is a real and pervasive force in U.S. politics today.

Suheyb Ahmed

Discipline: Biology

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Abstract Name: Use of *Lactococcus lactis* for Gut Delivery of *Oxalobacter*-derived Proteins and Peptides with Therapeutic Potential for Hyperoxalemia, Hyperoxaluria, and Related Kidney Stones.

Kidney stones affect a large portion of the population and are linked to long-term risks including chronic kidney disease and end-stage renal disease. Oxalate is central to stone formation and may also contribute to disease progression, cardiovascular complications, and poor renal graft outcomes, yet no broadly effective therapies exist to lower plasma or urinary oxalate aside from lumasiran and nedosiran for primary hyperoxaluria type 1 (PH1). Stimulating intestinal oxalate secretion offers a promising therapeutic approach by shifting oxalate from the bloodstream into the gut for elimination. Our group previously identified secreted factors from *Oxalobacter formigenes* that enhance oxalate transport in human Caco2-BBE cells through SLC26A2, SLC26A6, and PKA activation, and these factors reduce urinary oxalate in hyperoxaluric mice by increasing colonic secretion. Two small peptides, P8 and P9, along with their parent proteins 318 and 301, were identified as key contributors, but attempts to stabilize P8 and P9 reduced their function. To address this limitation, we engineered *Lactococcus lactis* NZ9100 to express native P8, P9, 318, and 301 for targeted intestinal delivery. Transformation with plasmid pNZ8123 succeeded, and expression of each construct was confirmed by SDS-PAGE and immunoblotting. We then advanced this platform to a pilot in vivo study using hyperoxalemic and hyperoxaluric PH1 mice, administering 1×10^{10} CFU daily for four weeks. Compared with vehicle controls, treatment with P8+P9, 301, or 318 led to progressive reductions in urinary oxalate, with week-four changes of roughly 48 percent for P8+P9, 36 percent for 301, and 48 percent for 318 after adjusting for increases in control animals. These findings show that engineered *L. lactis* can deliver functional *O. formigenes*-derived peptides and proteins in vivo and may represent a promising platform to lower oxalate levels. Plasma oxalate analysis is ongoing, and future work will refine dosing strategies and confirm early results.

Muhammad Ahmed

Discipline: Biochemistry

Authors:

#1 Muhammad Ahmed

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Abstract Name: Engineering Collagen-Mimetic Fibrils with Controlled MMP1 Degradation for Biomedical Use

Collagen breakdown by Matrix Metalloproteinase-1 (MMP1) is a fundamental process in wound healing and tissue remodeling. A key unanswered question is how the number, or density, of an enzyme's specific cut sites within the collagen structure influences its overall breakdown rate. To systematically investigate this, our lab designed a series of collagen-mimetic peptides, named COLT3, modeled on human type III collagen and engineered to contain zero, one, or two MMP1 cleavage sites. This project focused on producing the two-site construct, COLT3_2. A major hurdle was the protein's high proline content, which is essential for its stable structure but overwhelms the bacterial production system in *E. coli*, leading to extremely low yields and aggregation. My research focused exclusively on overcoming this critical bottleneck. I developed and optimized a multi-step protein purification strategy from the ground up. This involved troubleshooting expression by testing induction temperatures, finding 16°C was optimal for solubility. I then perfected a purification pipeline using nickel-affinity chromatography to capture the protein, followed by reverse-phase HPLC as a final polishing step. This dedicated process resulted in the successful production of pure, soluble COLT3_2. Obtaining this purified protein is the essential and foundational achievement, as it creates the required material for all future studies. This work establishes a reliable method to produce a key tool, paving the way for our lab to now test the hypothesis on cleavage-site density and, ultimately, develop smart biomaterials with tunable degradation rates for regenerative medicine.

Miriam Ahmed

Discipline: Law and Legal Studies

Authors:

Abstract Name: State-Sanctioned Racial Terrorism: A CRT Analysis of Apartheid South Africa and America's Sundown Towns

Despite widespread recognition of apartheid South Africa as a crime against humanity, parallel systems of state-sanctioned racial exclusion in the United States, particularly sundown towns, have received comparatively little scholarly attention as forms of structural violence. This project asks how apartheid South Africa and U.S. sundown towns functioned as parallel forms of state-sanctioned racial terrorism and examines how Critical Race Theory reveals their shared logics of racial control, spatial segregation, and institutionalized white supremacy. This research engages three key scholarly conversations: first, the comparative historical literature on sundown towns and apartheid South Africa as case studies of racism and discrimination; second, legal and political definitions of terrorism, with a focus on how state violence against civilian populations has been theorized and selectively applied; and third, Critical Race Theory as an analytical framework that examines how law constructs and maintains racial hierarchies. Through historical and genealogical analysis of racial governance, and a discourse and policy analysis of legislative acts, municipal ordinances, and pass laws, this project examines how legal language constructed racial categories, authorized state violence, and legitimized territorial exclusion. Preliminary findings demonstrate that under international and domestic legal definitions of terrorism, acts intended to intimidate or coerce civilian populations through systematic violence or forced displacement, in both apartheid South Africa and U.S. sundown towns meet criteria for state-sanctioned racial terror. These results reveal that systems of law actively uphold rather than prevent terrorism when directed against marginalized populations. These findings

hold urgent contemporary relevance as debates over Critical Race Theory in education, voter suppression legislation, and persistent residential segregation reveal ongoing struggles over racial justice. This research creates analytical frameworks for examining policy legacies and their manifestations in contemporary housing discrimination, policing practices, and exclusionary laws.

Hannah Ahmed

Discipline: Anthropology and Archaeology

Authors:

Abstract Name: Cultural Attitudes and the Perceptions of Death

This research examines how Eastern and Western cultural beliefs shape emotional, social, and spiritual experiences of death and dying. While many Eastern and spiritual traditions understand death as a natural transition or return, Western cultures tend to frame it as a final and negative endpoint. In Islamic and Buddhist-influenced contexts, death is integrated into everyday life through language, storytelling, and religious teachings that emphasize acceptance and prepare individuals from an early age. In Islam, for example, death is viewed as a reunion with the Creator, and the afterlife is described as something better for those who have lived morally. These beliefs contribute to a more grounded orientation toward mortality and encourage people to approach both life and death with a sense of purpose. This acceptance involves communal mourning practices in these cultures which encourage emotional expression and shared grieving. In contrast, Western funerals and mourning customs are often more restrained due to discomfort surrounding death and a broader cultural tendency to avoid discussing it. This avoidance affects socialization as well; many people grow up without a clear framework for understanding grief or supporting others who are grieving. As a result, many Westerners encounter death for the first time only when loss occurs, whereas Eastern children are introduced to it early through faith, community, and everyday language. The findings suggest that more open or spiritually grounded orientations may support healthier coping and more purposeful ways of living, while avoidance-based approaches can limit a person's ability to process loss and engage with mortality in meaningful and constructive ways.

Natalie Aidinov

Discipline: Communications

Authors:

#1 Natalie Aidinov

Abstract Name: Contrasting DIY Youtubers with Haul Youtubers: An Analysis of Media's Impact on Fast Fashion and Overconsumption

Introduction: There is currently enough clothing in the world to dress the next six generations. Yet, people still contribute to consumerist culture, buying far more than they need. The "haul" trend, originating on Youtube in the late 2000s, consists of influencers buying and showing off copious amounts of clothing, inspiring audiences to do the same. In contrast, Do it Yourself (DIY) creators encourage audiences to alter their existing clothing in creative ways. I analyze "haul" and DIY videos to understand their role in consumerism. Methods: I examine videos and comments posted on Youtube depicting clothing "hauls," DIY sewing projects involving upcycling – when someone alters an existing item to better suit their tastes. A total of twenty Youtube videos, ranging 4-20 minutes in length, were selected from the search terms "clothing haul" and "upcycling clothes sewing." Videos are analyzed for verbal cues promoting overconsumption or

creation and alteration, visual cues in the environment (e.g. clutter, number of clothing items), and heterogeneity versus homogeneity of target audience. Comments are analyzed for disappointment/enthusiasm for quality/price in the haul, as well as positive/negative reactions to upcycling techniques. Results: “Haul” videos are expected to verbally and visually promote overconsumption more than DIY videos whereas DIY videos are expected to verbally and visually promote creation and alteration. Analysis of comments will reveal what is most appealing to audiences in each type of video. DIY creators are expected to cater to more heterogeneous audiences (e.g., queer, plus size), while “haul” creators will cater to homogenous and less inclusive audiences. Conclusions: Despite the harms of fast fashion, haul videos likely draw audiences because of their accessibility, however understanding what people find appealing about haul videos may inform future work that could attempt to make DIY more appealing and accessible and reduce over consumption.

Ghada Aimadeddine

Discipline: Health and Human Development

Authors:

#1 Zelma Tuthill

Abstract Name: Gender and Sexual Orientation Differences in Smoking and E-Cigarette Use: Public Health Implications for Cessation and Risk Reduction

Conventional cigarette use and e-cigarette consumption remain major preventable causes of morbidity in the United States, yet patterns of use vary substantially across demographic groups. This project investigates how gender and sexual orientation shape smoking behaviors, motivations for use, and cessation patterns, with the goal of identifying population-specific public health needs. Prior research shows that LGBTQ+ populations and women often experience higher stress exposure and targeted tobacco marketing, but limited scholarship has examined how these intersect to influence the transition between combustible cigarettes and e-cigarettes. To address this gap, we analyzed nationally representative survey data and conducted subgroup comparisons examining frequency of use, cessation attempts, and perceived barriers to quitting. Quantitative analyses assessed demographic differences in initiation, reasons for switching to e-cigarettes, and the likelihood of reducing or discontinuing tobacco use. Qualitative responses were reviewed to contextualize behavioral patterns within social and structural stressors, including stigma, discrimination, and differential access to cessation resources. Results show meaningful variation across groups. LGBTQ+ respondents reported higher dual-use patterns and higher stress-related motivations for smoking compared to heterosexual peers. Women were more likely to cite coping and social reinforcement, while men were more likely to cite habit formation and nicotine dependence. E-cigarette adoption did not consistently predict cessation; instead, its role differed by group, with some respondents using vaping as an intentional harm-reduction strategy and others as a supplement rather than a replacement. These findings underscore the need for culturally tailored cessation interventions that acknowledge varying motivations, stress exposures, and behavioral trajectories. The project highlights how demographic-specific public health strategies may improve cessation outcomes and reduce tobacco-related disparities. At NCUR, this work will be discussed in the context of designing targeted prevention and intervention efforts for diverse communities.

Preeti Airen

Discipline: Sociology

Authors:

Abstract Name: The Relationship Between Volunteer Experiences and Career Preferences in High School Students

Students of all age groups engage in volunteer activities for a variety of reasons, including a will to serve their community, a desire to help people, and a strive for experience. The purpose of this study is to investigate the correlation between volunteer experiences, namely number of hours and field of volunteering, and career preference for seniors and freshmen at Woodbridge Academy, a school with a focus on biomedical education for medically motivated students. This study defines volunteering as work done for the benefit of others without any financial compensation for the volunteer. Based on prior research, it was hypothesized that people who volunteered more would choose to pursue a field requiring a higher level of benevolence, such as those in medicine or nonprofit organizations, and students would volunteer more in their field of preference. The correlations were tested using an anonymized survey provided to both seniors and freshmen, and the data was cleaned then analyzed using two chi-squared tests for independence and resulted in p-values of 0.96 and 0.99 for a sample size of $n=117$. 63 of the participants are seniors while 54 are freshmen. This indicates that there was no significant correlation ($p > 0.05$) between volunteer experiences and career preferences for seniors and freshmen at Woodbridge Academy. This research provides deeper insights into the benefits and motivations of volunteering for adolescents. However, it is important to recognize that the sample size is limited to a small group of like-minded individuals. Future studies with a similar focus should consider a larger sample size in a school with a more diverse student body.

Preeti Airen

Discipline: Biology

Authors:

Abstract Name: The Effects of Cognitive Stimuli on Dementia Patients

The brain is a complex organ involved in many bodily functions. Dementia is a neurological condition that can affect its ability to do so, typically characterized by memory loss, behavioral changes, mood swings, agitation, and loss of cognitive function. Its severity and risk are measured through the evaluation of neurological quality of life and cognitive reserve. There is currently no cure for dementia, only treatments to manage it, and the progressive disease continues to cause cognitive degradation with a potentially fatal outcome. Current treatment options include pharmacological interventions and clinician-led neurological stimulation using machinery and brain waves, which have the potential for severe side effects, can increase the burden on caretakers for individuals with dementia, and tend to have high associated costs. Alternative interventions, such as cognitive stimulation, especially through puzzles and social interactions, are more cost-effective and have the potential to improve patient and caretaker conditions and reduce the risk and severity of side effects when used alongside the clinically approved interventions, and have been linked to increased cognitive reserve and improved quality of life. However, these interventions have not been thoroughly researched, leaving a need for future research, which can provide more information about the effectiveness of alternative interventions and improve patient usability and acceptability. There is also a significant amount of distrust in these interventions and a lack of awareness regarding their potential benefits. This paper focuses on identifying the potential benefits associated with alternative treatments through cognitive stimulation and weighing their effectiveness when used alone as well as alongside clinically tested and approved interventions by conducting a comprehensive literature review consisting of 16 peer-reviewed articles regarding dementia and its treatment options to find out if cognitive stimulation can provide an easier method for patient recovery and improve outcomes to spread awareness to patients and their caretakers.

Minahal Aisha

Discipline: Computer Science

Authors:

#1 Minahal Aisha

Abstract Name: Evaluating Polygenic Risk Scores Across Ancestries Using ClinGen-Aligned Reporting

Polygenic risk scores (PRS) are widely discussed as tools for predicting disease risk, but they often perform unevenly across ancestry groups. This makes it difficult to use them responsibly in clinical settings, especially for populations that have historically been underrepresented in genomic studies. ClinGen has created reporting standards for PRS, but there is still no simple way for researchers or students to evaluate a published score and understand how well it works across different ancestries. To address this gap, this project develops FairPRS-Clin, an open-source framework that applies existing Type 2 diabetes PRS to public genotype data and summarizes their behavior in a clear, ClinGen-aligned format. Using 1000 Genomes data, the tool compares score distributions across groups, such as South Asian and European populations, and highlights how using the same risk threshold can lead to very different “high-risk” classifications. Beyond plotting these distributions, FairPRS-Clin computes ancestry-stratified summary statistics, estimates how many individuals in each group would be flagged for early screening at a given cutoff, and links these outputs back to key items from the ClinGen PRS Reporting Standards. The framework is designed to be reusable: users can swap in other published PRS or ancestry groups while keeping the same evaluation pipeline. In doing so, FairPRS-Clin serves as both a research tool and a teaching resource, making it easier to see when a PRS is likely to be informative, when it may be misleading, and what additional data or recalibration would be needed before using it in real-world care.

Ayomide Aisida

Discipline: Computer Science

Authors:

#1 Sreenivasan Ramasamy Ramamurthy

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Abstract Name: Smart Personalized Adaptable Responsive Knowledge Instructor

Traditional classroom models struggle to provide sustained one-to-one instructional support, leaving significant gaps in personalization, continuous feedback, and timely academic assistance. To address these limitations, we propose SPARKI—the Smart Personalized Adaptable Responsive Knowledge Instructor—a next-generation adaptive learning platform designed to deliver individualized, 24/7 academic support at scale. SPARKI leverages Small Language Models (SLMs) to facilitate interactive learning, guide students through problem-solving tasks, and provide context-aware assistance within course environments. Built as an enrichment layer alongside traditional lectures, SPARKI dynamically learns students’ preferences and behavioral patterns through platform interactions, augmented with publicly available datasets, to adapt to diverse learning styles. Key features of SPARKI include multi-instructor video modules, adaptive quizzes, AI-generated hints, and intelligent learner-state switching to ensure continuity of support across topics and sessions. By personalizing instruction at the individual level, SPARKI demonstrates how SLM-driven systems can enhance content mastery, reduce support bottlenecks, and scale high-quality academic guidance beyond human availability. As an open-source research initiative, SPARKI also provides a flexible testbed for exploring broader applications of SLMs in education and beyond. This study underscores SPARKI’s potential to reshape digital learning ecosystems and advance the role of adaptive AI in modern pedagogy.

Discipline: Nursing and Public Health

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Abstract Name: Impact of Metal Exposure During Pregnancy on Postpartum Depression in Rural Women – Preliminary Data from a Cohort Study

Introduction Postpartum depression (PPD) affects one in seven women globally. Rural communities in Bangladesh, with high prevalence of PPD experience chronic metal exposure. Although previous research found metal exposure linked to birth outcomes including miscarriage, teratogenesis, and preterm birth, the impact on maternal psychopathology remains poorly understood. An ongoing cohort study examines associations of prenatal exposure to metals such as arsenic (As), manganese (Mn), lead (Pb), cadmium (Cd), copper (Cu), zinc (Zn), and selenium (Se) with PPD symptoms among Bangladeshi women. **Methods** The parent study recruited 324 pregnant women aged 18 – 48 years from Matlab rural sub-district in Bangladesh to examine the effects of metals on maternal thyroid hormone and child neurodevelopment. Postnatal maternal depressive symptoms were assessed in a subset of 260 participants using the Edinburgh Postnatal Depression Scale (EPDS) with higher scores reflecting greater symptom burden. Blood As, Pb, Mn, Cd, Cu, Zn, and Se data assessed in the laboratory using ICP-MS were also available during data analysis. **Results** In adjusted linear models, both log-transformed As and Se were independently associated with higher EPDS. Both As ($\beta = 44.87$, 95% CI: 21.29–68.44, $p = 0.001$) and Se ($\beta = 15.03$, 95% CI: 6.34–23.73, $p = 0.002$) showed significant positive associations with depression symptoms. A significant As-Se interaction ($\beta = -8.96$, 95% CI: -13.72 to -4.19, $p = 0.001$) indicated that combined exposure attenuates the risk of their independent contributions. **Interpretation** Our findings on the interaction effect of As and Se may reflect the potential capacity of Se to irreversibly bind As, forming a detoxified complex, leading to reduced neurotoxicity of As. Perhaps, glutathione peroxidase, a selenoenzyme, minimizes As-induced oxidative stress. Results of our study may help develop therapeutic intervention to improve maternal mental healthcare policies in rural Bangladesh and globally.

Zahra Akbar

Discipline: Psychology

Authors:

Abstract Name: Analyzing the Use of Social Support and Education/Coping-Based Interventions to Reduce Postoperative Pain in Adolescents Undergoing Surgery for Idiopathic Scoliosis (IS)

Idiopathic Scoliosis (IS) is a three-dimensional deformity of the spine that often requires surgical treatment when the scoliotic curvature is severe (Cobb Angle $\geq 40^\circ$). As adolescents (10-19 years) with IS face unique challenges because of their condition and medical treatment, this population may be at greater risk for anxiety, depression, and social problems compared to healthy peers. Because preoperative anxiety,

depression, and social problems have been linked to worse postoperative pain, preoperative psychological interventions may improve pain outcomes for this group. The purpose of this study was to investigate how preoperative psychopathological symptoms predict postoperative pain and evaluate how social support and education/coping-based interventions may reduce postoperative pain in adolescents undergoing surgery for IS. This literature review analyzes studies discussing preoperative psychopathological symptoms, postoperative pain, and psychological interventions intended to improve surgical outcomes. As some adolescents with IS internalize stress and avoid social interaction, social support may facilitate the reduction of postoperative pain by encouraging adolescents to be transparent about their concerns related to IS with family, peers, healthcare providers, and others with IS. Because anxiety and depression may be linked to reduced pain coping and increased pain catastrophizing, education/coping-based interventions may reduce postoperative pain by reinforcing coping techniques and answering concerns about surgery and recovery. Adolescents with IS may find interacting with a healthcare professional to be more effective than receiving passive interventions such as asynchronous videos. Adolescents with greater preoperative anxiety may benefit more from support groups and education/coping-based interventions compared to those with less preoperative anxiety. It is important that healthcare professionals consider the relationship between mental health and pain to ensure the best pain outcomes for adolescents treated surgically for IS.

Gwendolyn Akers

Discipline: English and Literature

Authors:

#1 Gwendolyn Akers

Abstract Name: These Bright Hills: Helen Price Stacy's Human-Interest Poetry

The legacy of Helen Price Stacy (1919-2007), a writer, researcher, artist, and historian centered in Morgan County, Kentucky, lives on through her collected papers in the Camden-Carroll Library at Morehead State University. Price Stacy donated her own papers and saw her extensive work and unpublished poetry as a catalog of Eastern Kentucky. While her poetry certainly celebrates the power, beauty, and tradition of her Appalachian home, Price Stacy also explores the impact of people and place. Her poetry mirrors the tone and topics of her articles written for the Licking Valley Courier newspaper whilst blending in her personal opinions that are restrained in her articles. Forging her own path forward, she was her own editor and agent, continually writing and learning from her experiences as a journalist. Fueled by her passion for the region and her people, Price Stacy's unpublished poetry captures the essence of the human-interest story with a voice that celebrates, critiques, and honors the pride and resilience that marks the Appalachian region.

Nonso Akunwafor

Discipline: Education

Authors:

Abstract Name: Examining Geographic Access to Specialty Schools in Richmond, Virginia

This research examines how the geographic locations of specialty schools in Richmond, Virginia influence enrollment and access for the student population. It aims to identify whether spatial distribution and transportation availability create barriers to accessing specialty schools for certain student populations. Specialty schools in Richmond are secondary schools with competitive admissions that provide advanced or specialized academic programs. Existing research has explored the equity implications of the admissions

processes of specialty schools, but limited research addresses access from a geographic perspective, particularly for Richmond Public Schools, a diverse urban school district. Investigating this spatial dimension is critical since specialty schools consistently produce the strongest academic outcomes. Additionally, prior studies on school choice consistently emphasize that distance and transportation availability play a fundamental role in the schools parents send their children to. This study employs a spatial analysis approach, mapping specialty school locations across Richmond's census tracts and generating drive-time maps for each school. These maps are examined alongside the city's and school district's transportation offerings to assess how proximity and mobility can influence student access. Through this analysis, I seek to determine the geographic and transportation barriers that may impact access to these schools, especially for certain demographic groups. The discussion will also include policy and practice recommendations to improve geographic accessibility and reduce disparities in enrollment.

Ahmed Al Hadeethi

Discipline: History

Authors:

Abstract Name: Harm Reduction and Suicide Prevention: Use of Restraints in 19th-Century Asylums

This research project investigates the ethics behind the use of restraints in the Rochester State Hospital (Minnesota) during the late 19th century. While numerous movements in psychiatry attempted to minimize or even abolish restraints, hospital records reveal that their use persisted as a response to patient self harm, violence, and suicide risk. Based on manuscript patient records, asylum superintendent reports, and contemporary academic articles, this study analyzes how physicians and staff justified restraints as types of interventions, safety measures, or necessary actions. Ultimately, this project contributes to a deeper historical understanding of how debates about patient safety and ethics shaped asylum practices and continues to inform modern discussions on the use of restraints in psychiatric care.

Joe Alapat

Discipline: Engineering

Authors:

#1 Mahsa Ebrahim

#2 Joe Alapat

#3 Mackenzie Kawashiri

Mackenzie Kawashiri

Abstract Name: Effects of Microdroplet Cooling on Electronic Surfaces

The purpose of this research is to explore the feasibility of microdroplet spray as a cooling method for electronic components. At the individual component level, conventional electronic cooling methods such as fan airflow and liquid heat sinks may not be as effective as directly spraying components with microscopic amounts of liquid. In the microdroplet cooling process, the heat from an electronic component surface is transferred into sprayed microdroplets that will in turn evaporate to keep the component's temperature low and at a more effective operating level. The effectiveness of microdroplets at transferring heat is a prospective area of interest due to the increasing amounts of processing power that computer processing units are able to handle and the resulting heat they generate. Research in this field has explored the variety of factors that manipulate microdroplets, such as surface tension and release patterns of a piezoelectric droplet generator.

Previous sessions of research on this project have explored how to generate microdroplets 90-120 micrometers in size and built an experimental testing setup for recording and analyzing the cooling effectiveness of these single microdroplets. This session has continued the previous work by focusing on two new challenges: Analyzing the factors that manipulate a single microdroplet, and building an experimental setup that can test how a microdroplet spray can be manipulated to best cool a heated surface. New equipment for experiments, data acquisition devices and software had to be learned and helped students develop skills on experimental procedure.

Ashton Albrecht

Discipline: Geography/Geology

Authors:

#1 Albrecht Ashton

Abstract Name: Evaluating the capabilities of artificial intelligence (AI) to conduct geospatial analysis

As artificial intelligence (AI) capabilities improve, concern is increasing over AI's ability to displace workers in a variety of fields. Given the ongoing success of generative AI in cognitive fields like computer science, there are reasonable expectations that AI will adapt to geospatial tasks. However, few studies have examined how AI handles geospatial data and spatial analysis tasks. This study will assess their reliability and performance for simple to complex tasks. For this project, we developed a methodology to evaluate several generative AI models' performances across multiple dimensions: different types and complexity of geospatial tasks and raster and vector base tasks. We evaluate AI based on its success in performing tasks between datasets. Comparing the limitations of each result should highlight the strengths and weaknesses of generative AI across these dimensions. Our spatial analysis testing methodology involves using Python code to carry out each task. The first step is to use a standardized AI prompt in the Cline plugin within Visual Studio Code. This provides consistent API access to each major AI vendor. The AI then generates a Python Notebook that is opened with ESRI's ArcGIS Pro and executed. We allow up to five "interactions" with the AI to complete each task. The results of each AI task are categorized as: "unsuccessful" "unsuccessful -- code but incorrect result," or "successful" The final assessment will include the number of interactions required and whether the AI was successful or not in completing each task. This workflow will examine how AI performs across increasing levels of complexity and how quality of completion varies between vector and raster tasks. The results will identify patterns in AI reliability and demonstrate strengths and weaknesses in AI's workflow. The results of our study will indicate the current capacity of AI to supplement and potentially replace GIS jobs.

Kole Alcorn

Discipline: Psychology

Authors:

#1 Jessie Rhodes

Abstract Name: Hardwired for Apathy: The Influence of Callous-Unemotional Traits on Punishment Processing

The present study investigates the differences in physiological reactions to motivation styles across individuals high and low in Callous-Unemotional (CU) Traits. CU traits, sub traits of Antisocial Personality Disorder (APD), encompass a wide range of behaviors, including a lack of guilt, remorse, and empathy. These characteristics are linked to dangerous or criminal behavior and an insensitivity to punishment. This

punishment insensitivity manifests in a decreased level of reaction to punishing motivation styles when compared to healthy controls, while maintaining a similar psychophysiological profile of response to neutral and positive reward styles. In this study, participants will first complete a short assessment of CU Traits and motivation reactivity, then they will perform a cognitive task (Flanker tasks) under 3 reinforcement conditions (neutral, reward, and punishment) while heart rate, respiration, and skin conductance are recorded. Compensation will be utilized to simulate reward styles in connection with performance, where participants can lose or gain money dependent on the accuracy of their responses to the Flanker tasks. Between each block, participants will complete a short self-report on bodily awareness during the preceding tasks. The physiological reactions under each condition will be compared with scores on the CU inventory to investigate if a connection between CU traits and a decrease in reactivity to punishment exists. Bodily awareness and self-reported motivation reactions will provide supplementary data to enhance these findings. It is hypothesized that by comparing physiological measures with motivation styles, the mediation of responses to motivation and CU traits by punishment insensitivity is demonstrated. Findings aim to inform the need for reward-based interventions for individuals with elevated CU traits, departing from the punitive focus of the American legal system.

Emma Aleckson

Discipline: Education

Authors:

#1 Emma Aleckson

#2 Sara Athorp

Abstract Name: Exploring Long-Term Outcomes in an Inclusive Post-Secondary Transition Program

In this research, I am exploring the long-term outcomes of students who have completed an inclusive postsecondary education program at a mid-sized public university in the Midwest. Specifically, I am examining independent living, employment, and everyday gains that students achieve after graduation. Students in inclusive postsecondary education programs have intellectual disabilities that affect intellectual functioning, academic achievement, and adaptive behavior. Because these disabilities influence many aspects of their lives, it is important to examine independence across multiple domains. Previous researchers have examined these outcome markers for similar programs across the United States. Many studies have focused on employment outcomes and found a higher percentage of employed individuals with intellectual disabilities compared to the national average after completing such programs. As a student employee of the program at my university, I wish to identify and describe the post-graduation outcomes of our alumni. To accomplish this, I will contact all alumni who have completed either the two-year or four-year program and invite them to complete a survey. Once the survey results are collected, I will work with my mentor to develop a coding system to categorize similar responses and analyze patterns across the data. The findings will strengthen the evidence supporting the benefits of inclusive postsecondary education programs and provide valuable insights into our program's current strengths and areas for improvement.

Bemnet Alemayehu

Discipline: Biology

Authors:

#1 Shreemayi Biradar

#2 Sameen Hossain

#3 Allison Johnson

Abstract Name: Microbial Warfare: Analyzing a Potential Anti-CRISPR Protein in Mycobacteriophage Faiyaz

Bacteriophages are viruses that infect bacteria. Bacteria have developed diverse defense mechanisms, like CRISPR-Cas, to prevent phage infection. Although CRISPR-Cas systems are well-established as bacterial adaptive immune pathways, a growing body of research highlights that phages can encode anti-CRISPR proteins that suppress these defenses. This project investigates the genomic mechanisms bacteriophages use to overcome bacterial immune defenses, with a focus on identifying potential anti-CRISPR proteins in newly isolated Mycobacterium phages. The study aims to utilize bioinformatics tools to characterize phage-encoded proteins that may participate in this evolutionary conflict, with an emphasis on determining whether novel phages possess functional anti-CRISPR activity. Mycobacterium smegmatic mc2155 was used to isolate phages from soil samples, which were visualized by transmission electron microscopy and sequenced for genomic analysis. Gene prediction and annotation were performed using Glimmer, GeneMark, Phamerator, and BLAST. Phage proteins were further characterized using structural and sequence-based tools, including HHpred, AlphaFold, FoldSeek, and Clustal Omega. These tools allow comparisons between proteins of interest and known anti-CRISPR proteins. Mycobacteriophage Faiyaz was discovered in 2024. Sequencing of its genome suggested that gene 46 in phage Faiyaz exhibits strong sequence and structural homology to the Aca2 family of anti-CRISPR-associated proteins. Alpha Fold modeling predicts a dimeric structure consistent with known Aca2 proteins, and FoldSeek alignments support this structural similarity with a low Root-Mean-Square Deviation (RMSD) value. Multiple sequence alignments also reveal conserved residues associated with DNA interaction in Aca2, strengthening the likelihood that this protein interferes with host CRISPR-Cas activity. These results suggest that phage Faiyaz encodes a functional Aca2-like anti-CRISPR protein and contributes to broader efforts to understand how phages evade bacterial immunity.

Paulina Aler

Discipline: Visual Arts

Authors:
#1 Paulina Aler

Abstract Name: Reconstructing Analog Composition Practices to Enhance the Modern Design Process

The paste-up—the physical assembly of type and images on a board—was a key composition method during the phototypesetting era (1950s-1980s). How can reconstructing analog paste-up methods help contemporary designers expand their design process and reveal spatial relationships obscured by software? This research synthesizes archival phototypesetting sources with practice-based reconstructions. By physically recreating the paste-up workflow with modern and analog tools the study exposes the embodied knowledge and spatial decision-making essential to pre-digital composition. The reconstructions revealed various findings. First, the physicality of paste-up encouraged iterative spatial adjustment. Secondly, the scale and tactility of working at actual size encouraged different spatial awareness than screen-based zooming. Lastly, material constraints introduced creative solutions that software’s undo function and infinite canvas have made obsolete, resulting in compositional strategies that modern designers rarely employ. This research demonstrates how paste-up techniques can offer contemporary designers tangible methods for prototyping spatial relationships before digital refinement. Unifying analog composition practices into design education and professional workflows can address the “software thinking” that constrains experimentation to available tools. The physical process of creating a paste-up encourages more deliberate compositional thinking; its scale and tactility reveal components often lost in screen-based work. Further studies should explore specific paste-up techniques as supplements to digital workflows.

Rachel Alexander

Discipline: Interdisciplinary

Authors:

#1 Daniel Janies

Abstract Name: An Analysis of the Expanding Range of Hosts Infected by H5N1 “Avian Influenza” Virus and its Seasonality

Highly pathogenic avian influenza (HPAI) H5N1 subtype has been circulating globally since 1959. Clade 2.3.4.4b has rapidly spread across the globe through wild birds. The lineage arrived for the first time in North America in late 2021. Since then, many species of birds across North America, wild and domestic, have fallen victim to H5N1. Beyond birds, however, mammals and humans have also been infected and cross-species transmission has been achieved. In our research, we aim to contribute to the current understanding of the mechanisms for this cross-species transmission by examining the range of viral hosts across North America. Specifically, we conducted a host range analysis. We aggregated, parsed, and standardized data from Mexico, Canada, and the United States. In Mexico, the Mexican national government’s Service of Agro-Alimentary Health, Safety, and Quality publishes instances of H5N1 in birds across states and municipalities. In Canada, the Canadian Animal Health Surveillance System maintains a database of H5N1 infections across provinces. Similar databases exist in the United States through the Centers for Disease Control and Prevention (CDC) and the United States Department of Agriculture (USDA). After aggregation and analysis of these data, we found that the most commonly impacted taxa across Canada and the United States were Galliformes and Anseriformes. Pelecaniformes and Anseriformes were the most common host taxa in Mexico. This research is being used in conjunction with a larger effort to study the viral promiscuity and replication abilities of H5N1 influenza A. Our findings include discovery of seasonality trends with regards to viral circulation and dissemination. We also analyze viral reassortment events that precipitate viral outbreaks among species. Our research will expand upon these preliminary results. With these several efforts we will elucidate factors causing the cross-species transmission of the virus and means to abate the spread of the virus.

Natalie Alexander

Discipline: Psychology

Authors:

#1 Elizabeth Dalton

#2 Jean Pretz

Abstract Name: Skin Conditions: Body Image Intervention and Promotion

Skin conditions have a variety of known causes and effects. Conditions including eczema, acne, and psoriasis are both influenced by and contribute to psychological stress. Skin conditions impact socialization, self-esteem, and body image. There is insufficient research on interventions to improve self-perception associated with skin conditions. The present studies will assess the impact of a brief online intervention on self-esteem and body image in adults with skin conditions. Methods: Study 1’s fifty-six participants with various skin conditions were separated into two groups; viewing either a positive or neutral depiction of a skin condition and reflecting on personal empowerment. The proposed Study 2’s participants will be separated into four groups: viewing the same image conditions, paired with either empowering or neutral reflection. Participants in each study completed or will complete assessments of dermatological quality, self-esteem, and body image.

Results: In Study 1, overall appearance evaluation, investment in appearance, and negative affect improved regardless of experimental group. Dermatological life quality was a significant predictor of overall appearance evaluation ($b = -0.34$, $p = 0.004$), negative affect ($b = 0.42$, $p = 0.001$), and social comparison ($b = 0.288$, $p = 0.03$). Study 2 will seek to further examine the relative impact and combination of image exposure (positive and neutral) with image reflection (empowering and neutral) on these outcomes. Conclusion: Skin conditions like eczema, psoriasis, and acne are common skin conditions affecting people across all ages. Brief image interventions paired with empowerment reflections may improve body image in the short-term in this population.

Jessica-Monae' Alexander

Discipline: Psychology

Authors:

#1 Rheeda Walker

#2 Jessica-Monae' Alexander

#3 Ijeoma Madubata

Abstract Name: Discrimination and Somatic Depression in Black Women: The Moderating Role of Emotion Suppression

Prior research by Schulz et al. (2006) shows that discrimination is a major stressor that affects Black women and contributes to undesirable mental health outcomes. The study examined whether discrimination is related to somatic symptoms of depression in Black women. The Perceived Ethnic Discrimination Questionnaire, the Beck Depression Inventory 2- Somatic, and the Emotion Regulation Questionnaire-Suppression measures were used to analyze data from a sample of 149 Black women. The women in the sample ranged from ages 18-72 with a mean age of 32.78. A moderation analysis examined whether suppression moderated the discrimination–somatic symptoms association. Results indicated that discrimination is significantly related to physical signs of depression (e.g., problems with sleep and appetite, fatigue, irritability) in Black women who were more likely to use suppression of emotions as a coping strategy for stress. For those who did not suppress emotions, discrimination was not related to somatic depression. These findings call attention to the need for culturally-informative mental health care. Healthy coping strategies are critical for African American women who deal with discrimination stress.

Emma Alford

Discipline: Engineering

Authors:

#1 Manasi Shah

#2 Rodrigo Martinez-Duarte

Abstract Name: ORIGAMI CARBON STRUCTURES TUNED BY TARGETED PRECURSOR PLACEMENT AS A METHOD FOR COMPOSITE MATERIAL ANALYSIS

Here we present the creation of heterogeneous, complex, carbonaceous structures for use in various structural applications. The use of paper in the creation of origami structures is well known. However, the use of origami to shape more technical materials remains underexplored. Our group has previously demonstrated the use of pure cellulose films as the precursor for glassy carbon and tungsten carbide origami structures that feature a large specific strength, low density, and excellent scaling behavior, making them candidates as

structural materials in lightweight energy components, for example structural batteries and sensors. In this work we focus on how precursor placement on specific panels of the Miura-ori pattern influences the microstructure, mechanical, and electrical performances of the resulting carbonized structures. To address this, we fabricate samples by applying precursors to targeted panels, pre-creasing and manually folding the patterned sheets, and carbonizing them under inert and anoxic conditions. Once the structures are fully carbonized, we then evaluate results through various characterization techniques analyzing compressive and tensile strength, density, and look for miscellaneous advantageous properties when compared to the homogeneous material structures themselves. Due to past results in our group with homogeneous structures, we expect our heterogeneous structures to also perform advantageously to other composite materials created through more tedious means. These carbide structures have shown promising results and future applications that backs up the importance of research such as ours.

Haya Alhaj Arhayem

Discipline: Biology

Authors:

#1 Trae Carroll

#2 Dylan Pfendler

#3 Keith Nehrke

Abstract Name: Tunable Tau: a Novel Alzheimer's Disease (AD) Model in *C. elegans*

In AD, soluble oligomers of Tau accumulate specific post-translationally modifications (PTMs), leading to hyperphosphorylated intracellular aggregates termed neurofibrillary tangles (NFTs). The relative impact and precise mechanism through which soluble tau oligomers and NFTs contribute to AD is still unclear. Many AD models rely on expressing fixed levels of Tau to drive pathology, but phenotypic severity is clearly dependent on Tau abundance, making it difficult to independently distinguish the impact of selectively toxic PTMs. Here, we developed a novel genetically-modified *C. elegans* model which we termed “Tunable Tau” to ask how Tau expression levels modify phenotypic severity in the context of disease-associated PTMs. Tau was expressed pan-neuronally at categorical levels ranging from low to high via multi-copy transgene integration at a genomic safe-harbor loci. Because phosphorylation of soluble Tau at Threonine 231 is a gatekeeper modification and biomarker for AD, we also generated comparable strains expressing a T231E phosphomimetic mutant. First pass analysis of the model consisted of assessing three behaviors: a sensory response to light touch, a locomotor behavior when immersed in liquid, and an associative learning task based on olfactory-dependent chemotaxis where exposure to a chemoattractant in the absence of food causes agnostic subsequent responses, reflecting a short term memory of starvation. While performance on all tasks were adversely affected by increased Tau levels, the sensory and locomotor responses were particularly sensitive to T231E. Associative learning on the other hand was equally impacted by wildtype and T231E. While the cause is unknown, it is consistent with Tau impairing neuronal function through diverse mechanisms, some of which relate strictly to protein abundance and others to selective modifications. We anticipate that this model will help to deconvolve the relative impact of these factors on phenotypic severity of AD related outputs and the molecular mechanisms through which this occurs.

Zakaria Alhasan

Discipline: Engineering

Authors:

#1 Danieli Rodrigues

#2 Shashank Sirsi

Abstract Name: Ultrasound-Activated Polymeric Microbubbles: A Non-Invasive Strategy for Dental Biofilm Removal

Each year, roughly 5 million dental implants are placed in the United States, and 3–5% of these implants ultimately fail. Peri-Implantitis is a major cause of late-stage dental implant failure and remains a growing concern in modern implant dentistry. This condition is driven by the accumulation of a resilient bacterial biofilm on the titanium implant surfaces, which has many harmful effects. Once established, this biofilm triggers chronic inflammation in the surrounding gums and leads to progressive bone loss and implant failure. Current clinical practices rely heavily on mechanical scraping and harsh chemical disinfection through chemicals such as chlorhexidine or hydrogen peroxide. These current methods are surgically invasive and fail to fully eradicate biofilms without fragmentation, which further worsens inflammation. To address these limitations, this project introduces a novel, non-invasive therapeutic strategy using ultrasound-responsive polymeric microbubbles (PMBs) for biofilm removal on implant surfaces. Microbubbles are microscopic (typically 1-10 μ m in diameter) spherical particles that have a stabilizing outer shell and inner core. Upon exposure to low-intensity ultrasound, the Polymeric microbubbles will oscillate, collapse, and generate localized mechanical forces that are capable of disrupting the biofilm structure. This mechanism offers a non-invasive alternative to conventional debridement techniques. The energy is delivered non-invasively, without scraping, abrasion, or chemical damage to surrounding tissues. This novel application of polymeric microbubble cavitation has very promising applications for dental implant decontamination. By providing a non-invasive, targeted system for biofilm removal, this technology has the potential to transform peri-implantitis treatment in clinic. Future directions involve quantifying biofilm degradation under numerous conditions to quantify our project parameters, and exploring the integration of antimicrobial drugs in the gas core to create dual-action mechanical-chemical therapy. Ultimately, this application offers a promising next generation method for preventing and treating peri-implant infections without the need for surgical procedures.

Bushra Ali

Discipline: Biology

Authors:
#1 Qi Tan

Abstract Name: Targeting HIF pathway to alleviate fibrotic response in human lung fibroblasts

Idiopathic pulmonary fibrosis (IPF) is a progressive and fatal lung disease characterized by excessive fibroblast activation and extracellular matrix (ECM) deposition. Emerging evidence suggests that hypoxia-inducible factors (HIFs), including HIF-1 α and HIF-2 α , play a key role in driving fibroblast activation and sustaining profibrotic signaling. In this study, we investigated how prolonged culture conditions influence HIF pathway activation in human lung fibroblasts (hLFs) and whether pharmacological inhibition of HIF proteins can mitigate fibrotic responses. Our results show that extended culture induces a robust profibrotic phenotype that mirrors TGF- β 1-induced activation, including increased expression of α -SMA, Col1A1, FN1, and ACTA2 at both the protein and mRNA levels. Treatment with HIF-1 α inhibitor (KC7F2), HIF-2 α inhibitor (PT2385), or their combination significantly reduced fibrotic gene and protein expression, with dual inhibition producing strongest suppressive effect.

Arrsh Ali

Discipline: Engineering

Authors:

#1 Arrsh Ali

#2 Minh Tran

#3 Isioma Emordi

#4 Michelle Bryarly

#5 Baowei Fei

Abstract Name: Automated Retinal Segmentation of Hyperspectral Images Using a Modified U-Net with Spectral Multi-head Attention

Retinal vessel segmentation plays a critical role in the evaluation of retinal and systemic health by allowing for detailed analysis of the retinal vascular network. Literature in retinal segmentation is mostly focused on regular RGB (red, green, blue)-colored images taken by fundus cameras or optical coherence tomography. Moreover, Hyperspectral imaging (HSI) captures both spatial and spectral data that can be used to extract a wealth of information such as oxygenation rate. However, there is no pre-existing literature that performs retinal vessel segmentation using HSI. Furthermore, existing segmentation frameworks are tailored to human retinas, despite mouse models' prevalence on pre-clinical research. To address these limitations, we are developing a deep learning architecture capable of segmenting mouse retinal vessels from HSI fundus images. Mouse fundus imaging was conducted via a dual-camera HSI-RGB system, leading to the acquisition of 53 HSI images. These images were manually segmented by two trained annotators blinded to each other's annotations to establish ground truth and verify intra-rater reliability. We propose that the integration of U-Net3+ with multi-head attention block and Tversky loss can conduct refined retinal segmentations. The model's performance was assessed using Dice similarity coefficient (DSC) and the Intersection over Union (IoU) metrics. A comparative analysis was conducted against the ground truth, and common segmentation techniques such as UNet, UNet++, and UNet3+. We demonstrate that our spectral network achieved a test IoU and DSC score of 0.79 ± 0.03 and 0.87 ± 0.02 , respectively, ranking higher than or equal to other tested models. Additionally, the intra-rater agreement between annotations was evaluated; the DSC and IoU scores are 0.73 and 0.58 respectively, indicating moderate agreement. Thus, our preliminary results indicate that our current model outperforms other tested networks. After further refinement, the model can serve as a potential tool for quantitative analysis of retinal vessels with hyperspectral images.

Anaya Ali

Discipline: Education

Authors:

#1 Anaya Ali

Abstract Name: Give and Take: Dissecting the Paradoxical Difference Between Adoption and Retraction of Students' Rights

In 1964, The Civil Rights Act was passed, outlawing discrimination based on race, color, religion, sex, national origin, and public segregation, codifying the integration of schools and businesses. Title IX, passed in 1972, prohibited discrimination on the basis of sex within educational or any programming that utilizes federal funding assistance. These pieces of legislation were keystones in creating financial and communal accessibility for students. Within the past academic year, intense changes to students' lives have occurred limiting campus freedom and speech. The Civil Rights legislation took 395 days to be adopted from its first draft to final adoption. Title IX was brought to the Senate in 1972 and finalized in 1975. Under the current administration, various executive orders target academic freedoms, speech, and inclusivity on campus. These implementations are revoking rights that students and legislators have fought for years to codify. This study aims to examine the stark contrast in the slow rise and establishment of these freedoms to their swift rollback. Research will explore archival photographs, meeting minutes, and other records in the Lexington Committee

on Religion and Human Rights Records, 1963-1967, at the University of Kentucky Special Collections Research Center focused on integration of high schools within Lexington, Kentucky. This collection illuminated the grassroots movement behind the “societal” push to adopt these freedoms in Lexington. Utilizing these actions and comparing them to reactionary measures from the campus executive power. The project will highlight the shift from a democratic approach of education regulation to an autocratic approach. Taking this forward, this research means to be utilized in a cautionary and exemplary format for how academic environments can be swiftly altered and the effects that come with those changes.

Srida Aliminati

Discipline: Interdisciplinary

Authors:

#1 Srida Aliminati

Knox Hsieh

Abstract Name: Analyzing Water Vapor Addition to Argon DBD Plasma using Emission Spectroscopy

The work presented is a part of a plasma project at SJSU that is investigating the addition of topical medicine to a DBD plasma jet that will scan the wound surface to enhance the wound healing process. DBD plasma is known for its ability to accelerate the wound healing process by the interaction of reactive oxygen and nitrogen species (RONS) with water in the wound surface. In the current work, a DBD argon plasma torch (8-10kV, 20-45kHz, 1-16slpm argon) is designed and characterized by using emission spectroscopy. An ocean optics spectrometer (UV-250-800nm with 1.0nm resolution) was employed. The emission spectrum shows prominent ArI and ArII emission lines (696.5, 706.7, 714.7, 727.3, 738.4, 763.5, 408.6 nm), OH lines (A-X band, 306-312 nm), nitrogen second positive system (337, 357, 380 nm) and atomic oxygen lines (777, 844 nm). Results showed that emission line intensities strongly depend on the applied voltage and the gas flow rates. One additional aspect of this research was to investigate the possibility of adding topical medicine (droplets ~20-100 microns) that will enhance the plasma based wound healing process. For this purpose, a special DBD plasma torch with an integrated mist-generator was developed and, as a first step, water mist was added to the plasma jet. Observations reveal the change of plasma color that is attributed to the water molecules ionization producing OH (A-X band), atomic oxygen and enhanced nitrogen emission lines. Emission spectroscopy was employed to observe the spectrum. Addition of water provided additional inelastic channels that reorganized the population pathways resulting in Ar lines suppression. With controlled operating conditions, it was possible to sustain the plasma jet as the water droplets were introduced into the main gas flow. Complete results will be presented in the conference.

Nasrin Alizada

Discipline: Anthropology and Archaeology

Authors:

#1 Bernard Means

Abstract Name: Cauldrons, Coins, and the Creole: A Graphic History

This proposed research poster is a comic designed to reach and educate a broad audience about northwest Louisiana's early Colonial-era Creole populations through visual and artistic means. This graphic narrative is made in partnership by the Virtual Curation Laboratory (VCL) with the National Center for Preservation Teaching and Technology (NCPTT)'s Cane River Diasporas (1780-1820) exhibition, with research from the Melrose, Coincoin Plantation, and original Pierre Metoyer Land Grant site. This project will combine art, tactile learning, and history to create a colorful graphic narrative. The full comic, tentatively titled A Graphic History of Creole Peoples in Louisiana (abbreviated to GHCPL for further reference), will be distributed electronically via the Virginia Commonwealth University (VCU) Scholars Compass website on a page hosting comics created by the VCL (https://scholarscompass.vcu.edu/vcl_comics_pubs/) and printed as a hard copy.

Leen Al-Jame

Discipline: Physical/Occupational Therapy and Speech Language Pathology

Authors:

#1 Leen Al-Jame

#2 McKenzie Cullinan

#3 Pumpki Lei Su

Abstract Name: Sensitivity of Developmental Assessment to Sex Differences in Early Autism Traits in Preschool-Aged Children

Girls are often diagnosed with autism later than boys. This delay can reduce autistic girls' access to early intervention and impact long-term outcomes in mental health, education, and employment. One possible contributing factor to this disparity is that commonly used tools, such as the Autism Diagnostic Observation Schedule, Second Edition (ADOS-2), may not fully capture how autism presents in girls. This study examines whether commonly used autism and language assessments reveal sex differences to understand whether these differences contribute to sex-based disparities in autism diagnosis. We ask: (1) Do autistic boys ($n = 5$) and girls ($n = 3$) differ on the ADOS-2 Social Affect (SA) domain and Restricted and Repetitive Behavior (RRB) domain? (2) Do autistic boys and girls differ in their language ability measured by ADOS-2 Language and Communication subscale, the Preschool Language Scales, Fifth Edition (PLS-5) and MacArthur-Bates Communicative Developmental Inventories (MCDI)? Although no finding is statistically significant given a small sample, girls and boys perform similarly in RRB ($p = .42$) and SA ($p = .48$). However, girls perform better in language as measured by ADOS-2 Language and Communication ($p = .21$). More variability in vocabulary is also observed in girls. These findings suggest that while social and behavioral features of autism (as measured by SA and RRB) appear similar across sexes, language-based assessments, e.g., ADOS-2 Language and Communication subscale, may be more sensitive to subtle linguistic differences in autistic girls.

Laith Aljaradat

Discipline: Nursing and Public Health

Authors:

Yousef Kahla

Abstract Name: Identifying dietary, lifestyle, and physiological factors that contribute to kidney stone formation

Kidney stones affect millions of individuals worldwide and are becoming more common among young adults and college age students. Many elements that contribute to kidney stone formation are still not fully understood by people outside the field of healthcare, so taking prophylactic measures becomes difficult. This project aims to identify and compare major dietary, lifestyle, and physiological factors that increase people's risk of developing kidney stones. Through combining various studies that were conducted on kidney stones in recent years, we identified leading factors that contribute to kidney stones. Variables such as lower hydration levels, higher sodium intake, different levels of physical activity, and genetic susceptibility were all listed as strong risk factors. Other health factors impacting formation of kidney stones include obesity, prescribed medications, urinary pH imbalance, and insulin resistance. Each category has different levels of impact, and understanding which ones have the highest impact helps individuals make informed decisions about hydration, nutrition, and their overall health. The findings suggest that kidney stones are formed based on multiple interrelated factors, emphasizing that individualized patient prevention plans are necessary. Understanding these interconnected risk factors also highlights the importance of advocating for stronger community outreach efforts to educate patients on preventing nephrolithiasis. Promoting routine screening

and improving nutrition and hydration can help young adults recognize their personal risks and limit risk factors from a young age. Encouraging schools and universities to prioritize kidney health education empowers individuals to make informed health decisions before developing kidney stones. Ultimately, identifying and communicating prevention based intervention can reduce the rising incidence of kidney stones and promote healthier communities.

Omar Aljebrin

Discipline: Physics and Astronomy

Authors:

#1 Omar Aljebrin

#2 Alexandra Molle

#3 Ferah Munshi

Abstract Name: What Makes Halos Dark?

We investigate the factors that determine whether dark matter halos form galaxies using the Marvel-ous Dwarfs and DC Justice League zoom-in simulations. By analyzing halo occupation fractions, mass accretion histories, halo concentrations, and gas properties, we find that halo mass alone is insufficient to explain why some halos remain dark. Luminous halos grow faster, achieve higher concentrations, and retain dense, cool gas, enabling star formation. Dark halos grow more slowly, remain less concentrated, and have lower gas densities and higher gas temperatures, preventing efficient cooling after reionization and leaving them dark. These results highlight the interplay between dark matter dynamics and baryonic physics in shaping galaxy formation, demonstrating that mass growth, halo concentration, and gas content collectively determine whether a halo hosts a galaxy.

Rand Alkhunaizi

Discipline: Psychology

Authors:

#1 Gavin Rackoff

#2 Michelle Newman

Abstract Name: Daily Social and Work Withdrawal and Mood

The behavioral theory of depression proposes that reduced access to response-contingent positive reinforcement, often linked to cutting back on daily meaningful activities, contributes to depression (Lewinsohn & Graf, 1973). Although originally developed to explain depression, these tenets may extend to nonclinical populations, where daily activity withdrawal may be negatively associated with mood. Using data from the MIDUS Daily Stress Project (2004–2009; $N = 2,021$ adults; Ryff & Almeida, 2017), we examined how daily social and work withdrawal, reported occurring because of physical, emotional, alcohol-related, other, or combined problems, related to same-day positive affect (PA) and negative affect (NA) across eight consecutive days. Linear mixed-effects PA and NA models with random intercepts and slopes for within-person social and work withdrawal showed that withdrawing more than usual on a given day was associated with higher NA (social cutbacks: $b = 0.41$; work cutbacks: $b = 0.38$) and lower PA (social cutbacks: $b = -0.44$; work cutbacks: $b = -0.39$), all p s $< .001$. At the between-person level, individuals who withdrew more across the eight days also showed higher NA (social cutbacks: $b = 1.62$; work cutbacks: $b = 0.52$) and lower PA (social cutbacks: $b = -0.94$; work cutbacks: $b = -0.64$), all p s $< .001$. All models

controlled for daily physical symptoms, given that it was the most reported reason for activity withdrawal. These findings suggest that mood is sensitive to same-day social and work activity withdrawal, regardless of one's general level of withdrawal. Practically, even when reductions in activity are necessary (e.g., illness, caregiving), they appear to carry mood costs. Limitations include the lack of detail on the extent of withdrawal each day (i.e., a continuous measure) and the non-experimental design which prevents causal inferences. Nonetheless, the results highlight the importance of encouraging individuals who must cut-back to replace lost activities with low-demand, rewarding alternatives (e.g., calling someone, light hobbies).

Sri Allam

Discipline: Biochemistry

Authors:

#1 Youngman Oh

#2 Qing Cai

Abstract Name: Impact of Obesity in the IBD-Associated Colon Cancer Using IL-10 Knockout Mouse

Colitis-associated colorectal cancer (CAC) has posed a significant health burden, with patients diagnosed with inflammatory bowel disease (IBD) experiencing a markedly higher lifetime cancer risk. Obesity, which affected 15–40% of individuals with IBD, further elevated systemic inflammation through increased production of cytokines such as IL-6 and TNF- α . However, the combined impact of obesity and chronic colitis on CAC development had remained poorly defined. This study investigated whether obesity exacerbated inflammation and accelerated tumor initiation and progression in the IL-10 knockout mouse model, a well-established model for IBD and CAC. Six-week-old IL-10 knockout mice were assigned to lean or obese groups, with obesity induced through a high-fat diet. All mice received intraperitoneal injections of azoxymethane (AOM) at weeks 0 and 5 to initiate tumorigenesis. Tissue and serum samples collected at 2-, 10-, and 20-weeks post AOM to assess tumor incidence, tumor size, inflammatory incidence. We anticipated that obese IL-10 knockout mice would exhibit increased tumor burden, elevated inflammatory cytokines and NSPs, and a reduced M1/M2 macrophage ratio compared to lean controls, indicating a more tumor-promoting microenvironment. These results were expected to provide insight into how obesity magnified inflammatory pathways in chronic colitis and to support future therapeutic strategies targeting NSP activity and macrophage polarization in high-risk IBD populations.

Natalie Allen

Discipline: Psychology

Authors:

#1 Elizabeth Taylor

#2 Zoe Brown

#3 Jessica Greenlee

#4 Marcia Winter

Abstract Name: Associations Between Childhood Exposure to Threat and Deprivation and Psychopathology Symptoms in Emerging Adulthood

Previous studies show the effects of adverse childhood experiences (ACEs) on mental health. However, ACEs assessment typically doesn't focus on the underlying dimensions of adverse childhood experiences that may have unique psychological consequences. The Dimensional Model of Adversity and Psychopathology

(DMAP; Sheridan & McLaughlin, 2014) advances this understanding by assessing how two dimensions of adversity, threat and deprivation, influence psychological outcomes through emotional and cognitive pathways (Tsai et al., 2025). Using the DMAP approach, this study extends prior work by examining how exposure to threat and deprivation during childhood relates to internalizing and externalizing symptoms in emerging adulthood. We recruited 436 participants between the ages of 18 and 23 through Sona Systems at two U.S. universities, one in the southeast and one in the northeast. Participants self-reported childhood adversity and current functioning via an anonymous Qualtrics survey. We ran a series of partial correlations testing associations between the threat and deprivation dimensions of childhood adversity, and symptoms of internalizing (distress, obsessions/fear, low positive mood) and externalizing (disinhibition, substance use, callous aggression). We controlled for the adversity dimension not being tested in each model. The threat dimension of childhood adversity was significantly correlated with internalizing (r range = .182-.296, p < .001) and externalizing (r range = .167 - .232, p < .001) outcomes; for example, more childhood threat exposure was correlated with greater emerging adulthood symptoms of distress, $r(436) = .260$, p < .001. The deprivation dimension of adversity was also associated with internalizing symptoms of distress and low positive mood (r range = -.185 - .155, p = .001-.002) but not obsessions and fear (p > .10), and externalizing symptoms of callous aggression and disinhibition (r range = .133 - .163, p < .001 - .005) but not symptoms of substance use (p = .240). Discussion will focus on the translational implications of these findings for policy and interventions.

Emma Allerheiligen

Discipline: Biology

Authors:

#1 Addison Eck

#2 Elizabeth Gatschenberger

#3 Jaggar Salard

Abstract Name: Comparative Study of Ivermectin, Eprinomectin, and Doramectin/Levamisole Combination Products on Parasite Load and Weight Gain in Beef Calves

Internal parasites remain a significant constraint to growth performance and health in beef cattle, and increasing anthelmintic resistance—particularly to ivermectin—poses a growing challenge for producers. This research project will compare the efficacy of three injectable dewormers commonly used in commercial cattle operations: Ivomec® (ivermectin 1%), Longrange® (eprinomectin 5%), and Valcor® (a combination of doramectin and levamisole). The primary objective is to evaluate each product's ability to reduce internal parasite loads, as measured by fecal egg counts (FEC), and to assess both short-term (0–28 day) and extended-interval (~150–180 day) growth performance using average daily gain (ADG). A key aim of this study is to determine whether newer-generation or combination anthelmintics provide superior parasite control or improved growth outcomes compared to traditional ivermectin formulations. Thirty to forty calves aged 4–8 months will be randomly assigned to one of three treatment groups and monitored from baseline through long-term evaluation. Fecal samples and body weights will be collected on Days 0, 14, and 28, with an additional follow-up sampling point approximately 150–180 days post-treatment to assess sustained parasite control and longer-term ADG. FEC will be quantified using the McMaster technique, and ADG will be calculated across both short-term and extended intervals. These results will support detection of potential ivermectin resistance and help clarify whether newer products like Longrange or combination products like Valcor deliver measurable advantages in growth performance or parasite suppression. Findings will generate evidence-based recommendations for local cattle producers facing parasite management challenges and may contribute to regional outreach efforts and producer meetings.

Ezra Alley

Discipline: Anthropology and Archaeology

Authors:

Lexi Moretti

Abstract Name: Slavery in the Archaeological Record: A Case Study of Artifacts from Attica and Pompeii

With the emergence of post-processualism in the late twentieth century, archaeologists began to shift their focus toward a more cohesive study of the oppressed. Behavioral archaeology, which developed just before the rise of post-processualism, has made significant contributions to the understanding of the behaviors of both the oppressed and the oppressors. Large-scale systems of enslavement had been discussed prior to the development of both behavioral archaeology and post-processualism, but these systems were rarely examined in depth. Part of this is due to the difficulty of identifying and defining evidence of slavery in the archaeological record through artifact and feature associations. Indeed, many archaeologists have determined it to be a hopeless pursuit. This comparative study aims to produce a principle through an analysis of Classical Greece and Imperial Rome, by applying two strategies of behavioral archaeology: strategy one and strategy four, as proposed by Michael Schiffer. This study begins with a discussion of how to definitively associate evidence, then moves on to the implications, with the goal of developing broader, more informed inferences about how slavery was practiced within the contexts of Classical Greece and Imperial Rome. Four key pieces of evidence from sites in Attica and Pompeii are used in a comparative case study: from Attica, a pair of iron fetters and a recurring agricultural tower feature; from Pompeii, a chained victim and preserved slave quarters. These pieces of evidence are analyzed in parallel, offering valuable insights into the evolution and characteristics of slavery across the broader Greco-Roman world, and ultimately indicate a significant continuity between Greek and Roman practices of enslavement. We propose a principle: through cross-cultural comparisons, gaps in current knowledge can be bridged, helping archaeologists to better interpret artifacts, behaviors, and social structures related to slavery in these ancient societies.

Brady Allison

Discipline: Film/Photography Studies

Authors:

Abstract Name: The Impact of Television Series in Expanding Film Franchises Through Star Wars: The Clone Wars and Star Wars: Rebels

This project seeks to closely analyze the role that television series play in expanding the narrative world of film franchise in the context of the Star Wars franchise and two of its series, Star Wars: The Clone Wars, and Star Wars: Rebels. While expansive scholarship exists on the overarching franchise, these series have been overlooked. However, they provide crucial context on the value of adding television installments to film franchises, especially during the Star Wars' transition to Disney ownership. To explore the series as installments in a larger franchise, I perform a close analysis of eight episodes comprising two narrative arcs of The Clone Wars, and four episodes comprising two narrative arcs of Rebels. I consider release context, narrative timeline, audiovisual elements, character actions, and audience reception to assess what contributions these series make to the overall story. My preliminary conclusions are that the series expands the science fiction world-building in a way that helps to realize more of the storyworld and draw in new audiences, as well as adds depth and context to character actions. Most importantly, it works to reinforce elements of the feature films that audiences liked, while minimizing or correcting aspects that were unpopular. In The Clone Wars, this holds particularly true as it is set in between Episodes II and III of the Prequel Trilogy, which was not as well-received as the Originals on first release. In Rebels, reinforcing audience preferences about previous series and films in the franchise allows it to serve as a bridge between previous iterations of the franchise and the new era of Disney Star Wars. Both of these series expand the

narrative and world of Star Wars, creating opportunities for new viewers while reinforcing the preferences of existing audiences.

Noor Al-Malkawi

Discipline: Psychology

Authors:

#1 Craig McDonald

#2 Rebecca Roy

Abstract Name: A Behavioral Analysis of the Perception in Ionic Gradients and Artificial Intelligence Recommendations on Human Trust and Decision Making

As Artificial Intelligence (AI) systems become integrated into high-stakes settings such as healthcare, education, and criminal justice, understanding how AI influences trust and decision-making is essential. Too much trust may lead users to accept incorrect AI recommendations, while too little trust may cause them to reject accurate ones. This study examines how Explainable Artificial Intelligence (XAI), or AI that provides reasons for its decisions, affects following behavior, reaction time, and human trust ratings under different error conditions. Fifty undergraduate participants from George Mason University were randomly assigned to either an XAI or a Non-XAI condition in a behavioral pilot experiment. Participants completed 300 randomized trials with three error conditions: (1) Non-Error-Prone, where the AI was portrayed as reliable and had correct recommendations; (2) Correct-Error-Prone, where the AI was portrayed as unreliable but had correct recommendations; and (3) Error-Error-Prone, where the AI was portrayed as unreliable and had incorrect recommendations. Participants' following behavior, reaction times, and trust questionnaire responses were recorded to assess how explainability and reliability shape trust in human-AI interactions. This pilot prepares for future Electroencephalogram (EEG) data collection by increasing both the trial speed and trial count, addressing a gap in XAI research that lacks EEG-compatible designs. By connecting behavioral trust measures with neural indices of error detection and decision conflict, this project will help uncover the cognitive mechanisms underlying human-AI interaction. The findings of this study are expected to show that explainable AI enhances participants' ability to detect errors and calibrate their trust more appropriately, leading to improved decision-making accuracy. Understanding these processes will guide the design of AI systems that promote trust and support safer, more effective human-AI collaboration in the high stakes domain.

Hilary Alonso

Discipline: Psychology

Authors:

#1 Sharon Carver

Abstract Name: Math in Motion: Ballet as a Patterning Intervention for PreK/Kindergarteners' Mathematical Development

Mathematical thinking in early childhood is strongly linked to later academic success, yet many children struggle to develop foundational skills in mathematics. Pattern recognition, a core component of mathematical cognition, has been shown to outperform general math interventions in improving children's achievement. Despite this, little research has examined how dance, particularly ballet, can serve as a structured patterning intervention for young learners. This study investigated whether ballet classes

emphasizing repeating and growing patterns enhanced kindergarteners' patterning skills and, by extension, their mathematical development. Using a now-and-later design, PreK/Kindergarten students at Carnegie Mellon University's Children's School were randomly assigned to either a Ballet Fall or Ballet Spring group. Each group participated in two 20-minute ballet classes per week for six weeks, with lessons structured around simple ballet movements (plié, tendu, jumps, and leaps) organized into repeating and growing patterns. Children's patterning skills were assessed three times across the academic year (before instruction, midyear, and post-instruction) through tasks involving extension, translation, and identification of both repeating and growing patterns. Data will be analyzed using repeated measures ANOVA. This interdisciplinary approach bridges cognitive development and the arts, exploring how physical movement can foster mathematical understanding. By positioning ballet as a creative, inclusive, and engaging supplement to conventional math instruction, the study has the potential to inspire educators to integrate arts-based methods into early education. For children who struggle with traditional approaches, movement-based learning may provide an alternative entry point into mathematical thinking. More broadly, the findings could contribute to reimagining educational practices where creativity and cognition are deeply connected. The future of education could be one where pliés and leaps are just as important as traditional math lessons, where children learn math not only with their minds, but with their bodies.

Ulises Alonso de la Sierra

Discipline: Physics and Astronomy

Authors:

#1 Ganesh Pokharel

#2 Matthew Stitz

#3 Daniel Wolfe

Abstract Name: Flux Growth and Characterization of an Altermagnet Candidate CrSb₂

Altermagnets, a newly proposed class of quantum magnets, offer an exciting alternative to conventional ferromagnets and antiferromagnets by combining their properties in a single platform. Here, we present the materials synthesis technique of the altermagnet candidate CrSb₂ along with SEM and magnetic measurements. CrSb₂ is synthesized using a flux-based growth technique with excess self-flux Sb. After solid state reaction in inert gas atmosphere, that results in the seeds of the single crystal CrSb₂, the materials are slowly cooled to provide the favorable condition for the growth of the single crystal. A scanning electron microscope (SEM) shows the formation of high-quality single crystals. The temperature dependent magnetization data goes down with cooling below 300 K, indicating the antiferromagnetic transition of this compound above room temperature. This shows that CrSb₂ is a promising candidate for further exploration in the rapidly developing field of altermagnetism.

Saif Alotaibi

Discipline: Chemistry

Authors:

#1 Roshana Fouzie

#2 Indika Arachchige

Abstract Name: Ethoxide-Derived Silicon–Germanium Nanocrystals for Environmentally Friendly Quantum Dots

(Background) Silicon-germanium ($\text{Si}_{1-x}\text{Ge}_x$) nanocrystals are being explored as a safer, replacement for other quantum dots as they are environmentally better. By changing both particle size and Ge content, we can tune their band gaps and optical response over a wide energy range. A remaining challenge is finding simple synthetic routes that give small, composition-controlled particles while staying compatible with silicon.

(Aim/Purpose) In this research we are focused on an ethoxide route to $\text{Si}_{1-x}\text{Ge}_x$ nanocrystals. Our goal is to show that this method can reliably produce strongly quantum-confined alloy nanocrystals and to understand how our processing steps affect composition, structure, and optical properties. (Approach) We prepared Si/Ge oxide gels by condensing triethoxysilane and tetraethoxygermane in methanol with cobalt under nitrogen. Nitric acid was used to start gelation, and the gels were aged, filtered, and dried. The dry gels were ground and annealed in a tube furnace under N_2/H_2 gas. We then etched the annealed powders with a controlled $\text{HF}/\text{H}_2\text{O}/\text{MeOH}$ mixture and finally attached 1-dodecene at elevated temperature to make colloiddally stable samples. Structural and optical characterization was carried out using X-ray diffraction, Raman spectroscopy, electron microscopy, and absorption/photoluminescence measurements. (Results) The ethoxide route produced $\text{Si}_{1-x}\text{Ge}_x$ nanocrystals in the 4-6 nm size range with Ge composition up to about 50%. XRD and Raman data are consistent and show peak shifts as Ge content increases. Microscopy and EDS indicate reasonably uniform Ge distribution with no obvious phase separation. Optically, the nanocrystals show photoluminescence, which agrees with quantum confinement and composition control. (Conclusions) Our results show that an ethoxide based gel/solid state route can generate small size, composition tunable $\text{Si}_{1-x}\text{Ge}_x$ nanocrystals without relying on highly toxic heavy metals. This approach provides a pathway for future Si-compatible quantum-dot devices in areas such as solar energy and optical sensing.

Luis Alquisira

Discipline: Nursing and Public Health

Authors:

#1 Karsen Hines

#2 Kayla Hardcastle

#3 Amy Gomez

#4 Jaylynn Rios

Abstract Name: Roots to Wellness: A Nutrition Intervention to Decrease Sugar Intake with High School Students

Purpose: On average, high school students consume four to five times more sugar than the recommended daily limit. This excessive intake is linked to chronic health issues including type 2 diabetes, obesity, and decreases in energy, focus and academic performances. Over the course of 3 weeks, we partnered with an alternative high school in northern Arizona, to implement a nutrition education program. This high school promotes career readiness to students who have attendance, behavior, or achievement barriers. Methods: For our intervention, we aimed to decrease sugar intake in sugar-sweetened beverages (SSB) and how this can create a foundation for future health benefits. Our intervention aimed to establish a baseline for the sugar content in sugary drinks consumed by high school students. We expected students to (1) identify health risks associated with overconsumption of SSB, (2) identify benefits of sugar-free alternatives, and (3) show increased intention to utilize herbs to create herb-infused drinks. To achieve these objectives, our proposed activities were interactive, group-focused, and relied on existing research-based interventions using the Health Belief Model. These activities included a sugar content lecture, sugar predictions in SSB, pot painting/planting, and creating an herb recipe booklet. To assess the effectiveness of our activities, we conducted pre- and post-tests to measure changes in knowledge, attitude and confidence related to sugary drink consumption and healthier alternatives. Results: Students showed increased knowledge related to their perceived susceptibility and benefits by 60%. Students also showed an increase in attitude and confidence with 90% of them reported medium or high intent to apply what they learned, showing strong behavior intention change. Conclusion: Our intervention increased awareness of sugary beverages and encouraged

students to consider healthier drink choices. The combination of sugar demonstrations, taste-testing, and hands-on planting engaged students and showed how small changes can improve health.

Sally Al-Rawi

Discipline: Psychology

Authors:

Abstract Name: Music-Based Interventions for Neurodivergent Youth: A Synthesis of Evidence and Implications for Emotion Regulation and Social Engagement

Music-based interventions have gained increasing attention as accessible, multimodal tools for supporting neurodivergent youth, particularly individuals with autism, ADHD, and sensory-processing differences. A growing body of research indicates that music engages distributed neural systems involved in auditory processing, motor coordination, prediction, social cognition, and emotional regulation. Systemic reviews and randomized trials demonstrate that music-based programs can enhance social interaction, joint attention, communication, and emotional expression in autistic children, although findings vary due to methodological heterogeneity, differences in intervention protocols, and inconsistent outcome measures. Evidence from large multisite randomized controlled trials shows high engagement and some secondary benefits in social responsiveness, yet highlights the need for more precise intervention characterization, dosage clarity, and stronger comparison conditions. Beyond autism, emerging research suggests that rhythm-based and music listening interventions may improve attention, executive functioning, and arousal regulation in broader neurodivergent populations. However, many studies rely on small samples or short-term effectiveness. Recent conceptual frameworks emphasize understanding why music may work through mechanisms such as rhythmic entrainment, predictable sensory structure, and neuro-emotional resonance, and advocate for integrating both controlled research and practice-based evidence from real-world youth mental-health settings. This project synthesizes current findings across five major peer-reviewed sources to clarify the strengths, limitations, and future directions of music-based interventions. The review identifies significant gaps in standardization, measurement, and ecological validity, and proposes the need for scalable, rigorously evaluated approaches that can be adapted across diverse neurodivergent profiles. By consolidating interdisciplinary evidence, this work aims to inform future research pathways and contribute to a more unified, scientifically grounded framework for the use of music in supporting social, cognitive, and emotional development in neurodivergent youth.

Rawan Al-Samarrie

Discipline: Political Science

Authors:

#1 Joshua Barton

Abstract Name: Trust on Trial: How U.S. Foreign Policy Eroded Public Trust

Public trust in the U.S. government has declined sharply over the past several decades, falling from roughly 75% in the late 1950s to historic lows today. This project examines how major U.S. foreign policy decisions, specifically during the Vietnam War, the post-9/11 Global War on Terror, and the ongoing conflict in Palestine, have contributed to this erosion of trust. Through qualitative analysis of historical records, public opinion data, and scholarly assessments of U.S. military actions and their global consequences, the research identifies recurring patterns in how government narratives, media framing, and revelations of human rights

violations shape public perception. Findings indicate that each conflict initially gained broad public support through appeals to national security, democracy, or moral obligation. However, as evidence of government misinformation, strategic failure, or civilian harm emerged, public confidence declined sharply and often permanently. The Vietnam War demonstrated the first instance in which televised violence and government contradictions fractured national unity; the wars in Iraq and Afghanistan revealed the consequences of intelligence failures, prolonged occupation, and lack of accountability; and U.S. support for Israel during the current crisis in Gaza has intensified public skepticism, particularly among younger Americans, due to inconsistencies between stated American values and foreign policy actions. Together, these cases show that foreign military engagement is one of the most consistent predictors of long-term declines in institutional trust. Understanding this pattern is essential for evaluating the future of U.S. global leadership, rebuilding democratic legitimacy, and assessing how transparency, accountability, and public engagement can mitigate distrust. The paper highlights the need for a re-examination of U.S. foreign policy practices to prevent further erosion of public confidence and to promote ethically coherent international action.

Taima Altarazi

Discipline: Visual Arts

Authors:

Abstract Name: Green Elegance: The History of Korean Goryeo Pottery

The word “celadon” refers to both a pale green color with a hint of gray and, in ceramics, a type of glaze that originated in China. This term perfectly captures the aesthetic of Goryeo-era Korean art, where celadon became a defining feature of its style and design. The Goryeo dynasty, which ruled the Korean peninsula from 935 to 1392 CE, developed a rich artistic culture shaped by international exchange with countries such as China and the Mongol Yuan. Throughout nearly 500 years of Goryeo rule, art, especially ceramics, was highly valued, and celadon became the main type of pottery produced on the peninsula. Goryeo celadon’s distinct color and quality were possible thanks to local raw materials, including iron rich clay and glazes containing iron oxide and other minerals. Korean artisans used wheel throwing and high-temperature kiln firing to achieve the signature jade-like color. While many techniques were influenced by the celadon traditions of the Chinese Song dynasty, Goryeo potters refined and transformed these methods using their own materials and artistic preferences. Common Goryeo designs such as pots, bowls, kettles, and ewers feature the characteristic green glaze paired with elegant natural motifs. These nature-based designs reflect Buddhist and Taoist tastes for harmony with the natural world, making Goryeo celadon a visual expression of elite spirituality and courtly refinement. The soft green glaze, often with a subtle blue tint, unifies the aesthetic, while the use of natural materials allowed artisans to create pieces that were both functional and beautiful. Although influenced by the Song dynasty, Goryeo celadon developed into a distinctively Korean art form. It remains admired centuries later, demonstrating how Koreans adapted the craft into their own unique style and techniques, an artistic legacy that continues to influence Korean culture today.

Zoe Altizer

Discipline: Biology

Authors:

#1 Jordan Metzgar

Abstract Name: Right Place, Wrong Time: The Changing Phenology of Culturally Significant Plants in Southern Appalachia

Many communities in rural southern Appalachia have become socially and economically isolated from the rest of the United States, resulting in a severe lack of medical infrastructure. To cope with this disparity, many living within Appalachia resort to traditional uses of native plants with medicinal properties. This follows centuries of medicinal plant use performed by various cultures within Appalachia. However, the abundance of these plants may be negatively affected by global climate change. These changes in temperature may alter a species' phenology, the timing of developmental events like germination and fruiting. This may result in mismatches between plant and insect phenology, reducing interactions which are crucial for survival such as pollination or seed dispersal. Declines in medicinal plant populations would greatly impact the communities that rely on them. To investigate the effect of climate change on medicinal plant populations, we studied the phenology of various native medicinal plants. We downloaded data from the Global Biodiversity Information Facility (GBIF), including both professionally curated and citizen science data. The phenology stage of hundreds of plants from the late 1800s to present day was quantified using a standardized phenology scoring system. We rated samples from 0 - 4 based on their observed flowering or fruiting stage. The {rnoaa}, {weatherr}, and {weatherData} packages were used in R to acquire average monthly temperature data for each observation. We performed regression analysis to find the association between flowering date and temperature. We found that *Monotropa uniflora* blooms 6.8 days later for every 1°C in average temperature. Resulting phenological mismatches with commensal species may impact *M. uniflora* populations. Such declines could have notable impacts on Appalachian communities which rely on native medicinal plants like *M. uniflora*. We are continuing to research the effects of climate change on a host of medicinal plants native to Appalachia.

Grecia Alvarado

Discipline: Health and Human Development

Authors:

#1 Grecia Alvarado

#2 Adela Mendez-Martinez

#3 Roxanne Vargas

Abstract Name: Barriers in Healthcare: The Impact of Medical Mistrust and Misinformation

Medical misinformation poses a significant threat to the health and well-being of Hispanic/Latinx communities, particularly for individuals facing language barriers, limited access to reliable information, and systemic inequalities. This study examined the factors contributing to misinformation exposure by combining a literature review with a cross-sectional survey of 82 self-identified Hispanic/Latinx adults aged 18 and older. The survey assessed sources of health information, language preferences, confidence in interpreting English-only medical materials, translation tool usage, and experiences with misinformation. Results indicated that 67.1% of participants accessed medical information primarily in English, 20.7% in both English and Spanish, and 11% solely in Spanish. Most respondents reported fluency in English (70.7%), but 43.9% used translation tools to interpret medical content. Over half of participants (53.7%) reported following medical advice from family, friends, or social media instead of healthcare professionals. Financial considerations (47.1%) and cultural factors (30%) were the most common influences on health decision-making. Only 13.4% reported knowingly encountering false medical advice, yet open-ended responses revealed frequent exposure to conflicting or confusing information, suggesting misinformation is more pervasive than self-reports indicate. These findings underscore the critical role of language proficiency, cultural factors, and digital literacy in shaping how Hispanic/Latinx adults navigate health information. The study highlights the need for culturally relevant, evidence-based, and linguistically accessible health communication strategies to improve health literacy and reduce reliance on informal sources. Strengthening multilingual resources, improving translation accuracy, and addressing systemic barriers can help mitigate the spread of misinformation and enhance health outcomes. Overall, this research emphasizes that addressing medical misinformation in Hispanic/Latinx communities requires interventions that consider cultural, social, linguistic, and systemic factors simultaneously.

Sofia Alvarez

Discipline: Psychology

Authors:

Abstract Name: Staying Connected: Emotional Closeness and Joint Visual Attention in Video Chats

Joint visual attention (JVA) is a foundational aspect of early social and cognitive development, yet little is known about how emotional closeness influences JVA during video-mediated communication. This study examined how perceived emotional closeness relates to the frequency of JVA bids in virtual interactions between grandparents and grandchildren. Over 50 recorded video chat sessions were analyzed using detailed behavioral coding to identify grandparent- and child-initiated JVA bids. Emotional closeness was assessed through self-report Likert-scale surveys completed by each dyad. Linear regression analyses revealed that emotional closeness did not significantly predict the percentage of successful JVA bids for either grandparent initiated, $F(1,52) = 0.17$, $p = .68$, or child-initiated interactions, $F(1, 52) = 1.30$, $p = .26$. However, trends in the data suggested that dyads reporting higher emotional closeness tended to show greater engagement and responsiveness during interactions. The lack of statistical significance may reflect limited sample size or variability in coding reliability across sessions. These findings suggest that while emotional closeness may not directly predict JVA success, it could still play a meaningful role in fostering engagement and positive affect during remote intergenerational communication. Understanding how relational factors shape attention and interaction in virtual contexts can inform strategies for supporting family connectedness and promoting child development through technology-mediated communication.

Abdulrahman Alyaseen

VA - George Mason University

Discipline: Political Science

Authors:

Abstract Name: Migrant Workers' Rights in Kuwait: The Role of Policymaking

My research examines the complex policymaking process in contemporary Kuwait regarding migrant workers' rights with a focus on the roles of prominent domestic political and social actors in shaping the kafala system. As a Kuwaiti citizen, I am deeply perplexed by the following question: What accounts for the persistence and widespread societal acceptance of the kafala system in Kuwait? The kafala system is a legal and sociopolitical system that governs the lives of migrant workers and the relationships between these workers, citizens of the host country, and the state. Migrant workers constitute a large percentage of the population in the Gulf, yet they are strikingly invisible in these countries. In 2025, the total population of Kuwait is approximately 4.5 million, comprising around 1.5 million Kuwaitis and approximately 3 million foreign residents. The Kuwaiti government has committed to improving the conditions of migrant workers; however, there have been numerous recent reports of human rights abuses. Scholars have demonstrated the negative impacts of the kafala system, which grants substantial authority to the sponsor (Kuwaiti citizens) and limited power and rights to the migrant workers. There has also been compelling research that underscores the connections between the kafala system and racial capitalism. However, few studies have examined how domestic policymakers approach migrant workers. By employing research methodologies of process tracing, case study policy analysis, and semi-structured interviews, my paper investigates how central political and social authorities in Kuwait reinforce or challenge the kafala system. My focus on the Kuwaiti domestic

system will deepen our understanding of how the economy, politics, and culture interact to shape the conditions and lives of migrant workers. The research will ultimately help develop alternative policies that enhance the dignity and human rights of migrant workers in Kuwait and globally.

David Amador

Discipline: Engineering

Authors:

#1 Ralph Provisero

Anthony Gomez

Kheitler Sthilaire

Abstract Name: W.I.N.D: Wind turbine Innovation in Narrow-street Designs

Energy demand is one of the biggest concerns of modern society. With the threat of Climate Change lingering and continuous efforts to phase off carbon-based energy solutions, renewables are one of the most cost-effective ways of accomplishing this objective. The infrastructure in large urban areas creates natural wind tunnels. However, research on Wind Turbines in this environment is scarce. The research aims to determine whether a mixed design Savonius-Darrieus Vertical Axis Wind Turbine (VAWT) will perform effectively in the urban environment of Downtown Miami. The turbine will be a plastic single level two blade Savonius VAWT, using a drag-based design, and a three blade Darrieus VAWT, using a lift-based design, within the same body. The Energy output will be used to test for energy efficiency given by the Coefficient of Power (C_p), which is the power extracted by the turbine over the power of the incoming wind. The variables to be observed are wind speed, altitude and location of the turbine around the Downtown campus. A posterior cost-effectiveness analysis will be performed to cement the VAWT's possible application in Downtown Miami, given average energy costs in the area and the VAWT's average energy production. We expect that the narrow-street designs of the Downtown area will act in favor of the turbine, providing the wind speeds necessary for the turbine to be cost-effective, given its self-starting design capability.

Charishma Amarapini

Discipline: Linguistics and World Languages

Authors:

Abstract Name: Dystopian British Literature during Indian Colonialism: People as Extensions of Industry in George Orwell's 1984 and Aldous Huxley's Brave New World

Hierarchical language was weaponized as both a civilizing force and a method of Westernization, as British colonists often framed themselves as taking on the white man's burden. This paper analyzes Aldous Huxley's Brave New World and George Orwell's 1984, drawing connections between the language present within these novels with the power structures imposed through colonialism. Huxley and Orwell were both dystopian writers during the interwar period and both embedded rhetorical structures that paralleled authoritarian regimes at the time, particularly the rise of the Nazi's to power, the Soviet Union, and British colonial times, displaying how language can dehumanize a society. Linguistic concepts such as Grice's Cooperative Principle and Newspeak illustrate how the limitation of vocabulary and control of individualistic language take away autonomy. The British exerted control through establishing English as the eminent language, controlling school historical textbooks, and keeping colonial subjects under constant surveillance to establish colonial dominance and avert sedition. Additionally, access to literature caused resistance forces to grow, especially

among Indian youth, prompting colonial discourse to be increasingly challenged and stimulating deeper criticism of imperialism and the machinery of control behind colonial power. Through limiting and monitoring conversation and the connotation behind everyday language in academic and everyday settings, individualism and self-identity are affected as people attempt to conform to the standards set by authoritative forces.

Charlene Amarello

Discipline: English and Literature

Authors:

#1 Joyce Rain Anderson

Abstract Name: Encouraging Young Writers with Multiliteracies and Transformative Works

In the wake of COVID-19's devastating effect on education, educators are faced with the daunting task of reaching students in the English classroom. Meanwhile, fanfiction and multiliteracies are burgeoning subjects of pedagogical research. As of January 1st, 2025, over 14 million fanfictions have been published on the website AO3, a well-known fanfiction archive, and educators have begun to design assignments with fanfiction in mind. Likewise, multiliteracies has remained in conversations about education since the term was coined in the 90s to describe the multifaceted nature of literacy in the digital age. However, despite extensive research into both as practices, practical suggestions for educators grounded in data is still in its infancy. Students' own perception of fanfiction as an educational tool must be explored. The rapid pace of it and its massive volume makes it a tricky subject to analyze, but also an opportunity for educators to reach a growing demographic. At the same time, multiliteracies may demand educators to ask new questions about evaluation, but they are also necessary skills for students to navigate modern society. How, then, can we use personal interests to encourage apathetic and discouraged writers to pick up their pencils again? Fanfiction and multiliteracies enable students to harness their skills in a new direction of writing. In both, students still exercise important tenets of literacy, but without adhering to the unforgiving nature of traditional writing prompts. This project collates and synthesizes existing literature, artifacts, and student interviews to argue for transformative works and multiliteracies' efficacy in bridging between lived writing practice and academic writing, as well as to provide practical suggestions grounded in curriculum standards.

Collins Amenuku

Discipline: Computer Science

Authors:

#1 Paul Kim

#2 Vasanth Iyer Iyer

#3 Shadrack Boakye

Shadrack Boakye

Abstract Name: AviSense: An AI-Power Platforms for Automated Bird Species Identification and Bioacoustic Analysis

Biodiversity monitoring is critical for conservation, yet traditional bird surveys are often labor-intensive, time-consuming, and require expert knowledge. To address this, we developed AviSense, a novel web application that leverages artificial intelligence to democratize and enhance avian bioacoustic research. This platform integrates a custom-trained deep learning model for real-time audio event detection with Google's

Gemini generative AI to provide rich, contextual insights. The system architecture features a Flask-based web interface where users can upload or record audio directly. Our core AI model, built upon a transfer-learned YAMNet architecture and trained on a curated dataset of bird vocalizations, processes the audio to detect and classify species-specific calls with high temporal precision, generating metrics like confidence scores and frequency ranges. A key innovation is the seamless integration of Gemini AI, which automatically interprets the detection results. It generates plain-language summaries of the acoustic activity, provides detailed species information, and answers researcher questions in an interactive chat, making complex bioacoustic data accessible to non-experts. Preliminary testing on field recordings has demonstrated the system's ability to accurately identify common North American species like the American Robin (*Turdus migratorius*) and Black-capped Chickadee (*Parus atricapillus*), with a mean average precision exceeding 85%. All analyses, including generated spectrograms and Gemini insights, are logged in an SQLite database for longitudinal study. AviSense represents a significant step towards automated, scalable wildlife monitoring. It provides a powerful, user-friendly tool for ecologists, citizen scientists, and educators, lowering the barrier to entry for bioacoustic research and enabling large-scale, data-driven conservation efforts. Future work will focus on expanding the species library and deploying the system for real-time, passive acoustic monitoring in the field.

Brier Amerlinck

Discipline: Biology

Authors:

#1 Susan Agolini

#2 Shama Iyer

Abstract Name: Role of YAP Signaling in Skeletal Muscle Injury and Recovery

Skeletal muscle experiences mechanical forces that regulate its development, hypertrophy, atrophy, and homeostasis. YAP (yes-associated protein) helps regulate cell proliferation, apoptosis, and migration, and plays an important role in directing satellite cell movement along the basal lamina of myofibers, an essential process for stem-cell differentiation, effective muscle development, and regeneration. We previously observed increased YAP signaling following loading in healthy muscles, and constitutively active YAP signaling in muscles of mdx (dystrophin-null, murine model of Duchenne muscular dystrophy) mice and aged mice. In addition, we observed hastened recovery from eccentric-contraction-induced injury in healthy, wild-type (WT) muscles, and reduced expression of markers of fibrosis in mdx muscles following pharmacological inhibition of YAP signaling using verteporfin. However, there was no significant improvement seen in skeletal muscle function in mdx muscles with pharmacological inhibition of YAP signaling. Thus, there is a need to further determine the role of YAP signaling in the regeneration of skeletal muscle cells following skeletal muscle injury. We will assess the expression of YAP and other associated genes in injured and uninjured skeletal muscle tissues from wild-type (WT) mice using qRT-PCR. We used injured (injured and recovered for two, four, and six days with and without verteporfin) and uninjured skeletal muscle tissue from WT mice. We will assess the gene expression of YAP and its downstream targets (CYR61, CTGF, ANKRD1 & VIM), markers of skeletal muscle regeneration (MYOD, MYF5, MYOG), and markers of inflammation (IL6, IL8, TNF- α) in these tissues using qRT-PCR. We hypothesize that the expression of YAP and associated genes will increase in injured skeletal muscle cells not treated with verteporfin, but expression will decrease in injured skeletal muscle cells treated with verteporfin. The expression of YAP and related genes in injured mice may reveal how YAP affects muscle and guide future therapeutic strategies for aging and muscular disorders.

John Amusan

Discipline: Biochemistry

Authors:

#1 Wasantha Ranatunga

#2 Abdullah Mohammed

#3 Madan Ramarajan

#4 Ram Kadirvel

Abstract Name: Role of Hypoxia in Thrombolysis Resistance in Acute Ischemic Strokes

Acute Ischemic stroke (AIS) occurs when an intravascular thrombus limits cerebral blood flow and causes tissue injury. Multiple coagulation factors and vessel wall pathology promote clot formation. Our preliminary observations indicate that patient thrombi exhibit reduced pH, a condition associated with decreased efficacy of tissue plasminogen activator (tPA). Our studies indicate that AIS thrombi exhibit lower pH than average. We hypothesized that hypoxic conditions within thrombi contribute to thrombolytic resistance. Whole blood AIS thrombi analogs enriched in red blood cells (RBC's), platelets, and a mixture of both were generated using the Chandler Loop. For each composition, three conditions were applied: hypoxia promoted, normoxia, and hypoxia inhibited. Thrombi were matured for 4, 24, and 48 hours. Ex vivo thrombolysis was performed to quantify thrombolysis rate. Expression of hypoxia- and metabolism-related proteins was measured, including hypoxia-inducible factors 1 & 2 (HIF 1 & 2), lactate dehydrogenase (LDHA), pyruvate dehydrogenase kinase 1 (PDK1), hexokinase 1 (HK1), and citrullinated histone 3 (CitH3). From 4 to 48 hours hypoxia-promoted mixed and platelet-rich thrombi showed increased expression of HIF 1, PDK1, HK1 and LDHA compared with normoxia and hypoxia-inhibited conditions. RBC rich thrombi under hypoxia exhibited higher expression on PDK1, HIF2 and CitH3 and platelet rich thrombi also showed elevated expression of CitH3. Thrombolysis rate was significantly lower in hypoxic thrombi compared to normoxia and hypoxia inhibited thrombi. These findings support a model in which intrathrombus hypoxia and associated metabolic reprogramming contribute to tPA resistance. Defining these mechanisms may guide adjunctive strategies to improve thrombolytic efficacy in AIS.

Cynthia Anaba

Discipline: Environmental Science and Sustainability

Authors:

#1 Cynthia Anaba

Abstract Name: BUILDING AN INCLUSIVE GREEN ECONOMY: ASSESSING THE PERSPECTIVES OF GHANAIAN MARKET WOMEN.

The green economy is increasingly becoming a global priority as countries respond to mounting climate risks. For developing nations such as Ghana, a successful transition requires meaningful inclusion of the informal sector, which employs more than seventy percent of the workforce. Drawing on Martha Chen's categorization of informal employment, this sector encompasses both self-employment within small and often unregistered enterprises and wage work that lacks secure contracts, benefits, and social protection. These activities span a continuum from survival-based livelihoods to growing small businesses that choose or are compelled to operate informally. Given that women constitute approximately eighty percent of Ghana's informal workforce, this study examines how market women interpret and participate in the country's emerging green economy. Using qualitative interviews with twenty women in major open-air markets such as Makola and Agboghloshie, the research investigates their understanding of green concepts, current practices, motivations, and constraints. Findings show that participants primarily associate the green economy with basic sanitation, revealing a narrow interpretation of broader sustainable development models. However, the study also uncovers significant environmentally beneficial practices among market women, including waste segregation, recycling, and participation in informal waste monetization. Motivations for these practices include improving community health, reducing pollution, and meeting government expectations. Despite these efforts,

several barriers limit deeper engagement including inadequate waste management services from the Metropolitan Assembly, limited access to affordable sustainable packaging options and inconsistent enforcement of environmental regulations. The study concludes that market women should be recognized as key institutional actors and influencers in Ghana's green economy transition. Strengthening environmental education, investing in sustainable packaging solutions, and expanding recycling initiatives are essential for creating an inclusive green economy. Rather than viewing the informal sector as a barrier to sustainability, the paper argues that its ubiquity across Africa demonstrates its potential as a catalyst for green development.

Aparna Anand

Discipline: Interdisciplinary

Authors:

#1 Aparna Anand

Abstract Name: Anosognosia and the Difference it Makes: Rethinking How Criminal Behavior and Cluster-B Disorders Correlate

The proportion of incarcerated individuals in the United States who have a psychiatric disorder diagnosis is much higher than discussed. Out of all disorders, a certain group of them stands out - Cluster-B personality disorders. These disorders are not niche, they are infamous in the media. However, there is a need to scientifically and reputably explore the correlation between Cluster-B personality disorders and the criminally mentally ill. This paper explores the ethical and systemic failures in the United States justice system, and shows how using a distinction between mentally ill individuals who lack awareness of their disorder (also known as anosognosia) and those who retain full ability to recognize their harmful behaviors may help resolve these derelictions. Utilizing psychiatric research and real-world cases, we can understand how the current system inadequately differentiates between individuals who require treatment and those whose disorders render treatment largely ineffective. While there are some other kinds of disorders who might show up in an individual with a criminal history such as schizophrenia - these people may benefit from psychiatric care, while Cluster-B disordered individuals often understand the moral and legal implications of their actions yet continue to commit harmful acts, often manipulatively and repeatedly. Furthermore, psychiatric research shows that many individuals with a Cluster-B disorder are extremely difficult to treat, and sometimes treatment is rendered ineffective, whether that is a result of a fault of the medication or due to the behavior of those required to take them. As they represent a high segment of the prison population, they are frequently routed through systems designed for treatable conditions, consuming scarce clinical resources and endangering healthcare workers and other victims. There must be a stronger call-to-action to account for the role of self-awareness and treatment responsiveness in legal cases involving those with a Cluster-B disorder.

Abhai Anand

Discipline: Biology

Authors:

#1 Armaan Verma

#2 Timmy Lee

#3 Min Xie

#4 Jianhua Zhang

#5 Palaniappan Sethu

Abstract Name: Modeling CKD-Induced Cardiac Dysfunction Using Human iPSC Derived Cardiac

Organoids

Cardiovascular Disease (CVD) is the leading cause of death among patients with Chronic Kidney Disease (CKD), accounting for nearly 50% of all fatalities. The well-established link between CVD and CKD highlights the need to develop physiologically relevant models of CKD-induced cardiac dysfunction for advancing therapeutic discovery and understanding disease mechanisms. We explored the use of cardiac organoids – three-dimensional, spherical clusters of cardiomyocytes that better mimic the architecture and behavior of human heart tissue than traditional 2D cell cultures – to model CKD induced cardiac dysfunction. To create cardiac organoids, induced pluripotent stem cells (iPSCs) were seeded and extracted from PDMS inserts and then differentiated into cardiomyocytes. Cardiac organoids were then conditioned for 48 hours with serum from CKD patients undergoing hemodialysis to simulate cardiac dysfunction associated with presence of CKD. After an additional 48 hours, media was collected and analyzed using multiplex ELISA (Eve Technologies human cytokine/chemokine 96-plex assay). Results display a significant increase in almost all the inflammatory markers tested, including important markers such as TNF- α , RANTES, and IL-1 β , suggesting that cardiac organoids respond to CKD serum in a manner consistent with pathophysiological changes seen in CKD patients. This three-dimensional organoid model constructed using patient-derived cardiomyocytes provides a platform to investigate human cardio-renal interactions and test potential treatments.

Ashu Anand

Discipline: Engineering

Authors:

#1 Amanda Koh

Abstract Name: Developing Novel Non-Aqueous Magnetorheological Emulsions for Advanced Rheological Control in Modern Smart Fluids

Magnetorheological fluids (MRFs) are smart fluids notable for rapid, controllable viscosity changes under a magnetic field. Upon magnetization, MRFs undergo a liquid-to-semi-solid transition driven by the alignment of ferromagnetic particles to the magnetic field direction, forming chain-like networks that restrict fluid motion. This tunable behavior makes MRFs ideal for adaptive energy-damping applications, including prosthetics and seismic protection systems. Recent studies in the Koh Laboratory at the University of Alabama demonstrate that integrating emulsions into aqueous MRF systems, termed magnetorheological emulsions (MREms), significantly enhances energy-damping capacity compared to state-of-the-art MRFs. However, aqueous systems face challenges, including instability and limited durability. The study presented here aims to (1) engineer a stable, non-aqueous emulsion system to formulate non-aqueous MREms and (2) benchmark their performance against modern MRFs. An emulsion system was achieved using polydimethylsiloxane (PDMS) emulsified in glycerol and stabilized with a fumed silica Pickering emulsifier. By systematically manipulating key parameters—iron concentration, emulsion droplet size, magnetized soak duration, and magnetic field strength—this study reveals that MREms exposed to prolonged magnetization and elevated fields exhibit enhanced viscosity control. These results present non-aqueous MREms as a superior alternative to traditional MRFs, pioneering a new class of superior smart materials with transformative potential for energy-damping applications.

Fatima Anasse

Discipline: Health and Human Development

Authors:

#1 Fatima Anasse
#2 Cally Xiao
#3 Archana McEligot
#4 Arthur Toga

Abstract Name: Association between depression with Alzheimer's disease biomarkers in cognitively normal individuals across race and ethnicity

Introduction: Depression has been shown to be associated with Alzheimer's disease (AD). However, few studies have examined the associations between depression and AD biomarkers in cognitively unimpaired diverse cohorts. Therefore, we examined the relationship between depression and plasma neurofilament light chain (NfL), total tau, amyloid-beta 40 (AB40), and amyloid-beta 42 (AB42) levels in Hispanic, non-Hispanic Black (NHB), and non-Hispanic White (NHW) participants. Methods: Our study included cognitively unimpaired Hispanic, NHB, and NHW participants from the Health and Aging Brain Study: Health Disparities (HABS-HD) and Alzheimer's Disease Neuroimaging Initiative (ADNI) datasets (N = 2383, aged 50-89 years). The Geriatric Depression Scale (GDS) was used to assess depression (independent variable), while biomarkers (dependent variables) were measured by plasma concentrations. We applied the CentiMarker approach to standardize the raw biomarker values, enabling the combination of data from both studies. Multivariate linear regression was conducted using Jamovi to examine the association between GDS and the respective biomarkers in the total sample and in each racial/ethnic cohort, while adjusting for age, education, gender, apolipoprotein ε4 (APOE4) positivity, and data source. Results: GDS was significantly and positively associated with AB40 in the total sample ($B = 0.42$, $SE = 0.15$, $p = 0.007$) and among NHW participants ($B = 0.53$, $SE = 0.23$, $p = 0.02$). GDS was also significantly and positively associated with AB42 in Hispanic participants ($B = 0.93$, $SE = 0.41$, $p = 0.022$). Discussion: Depression as reported by GDS was positively associated with plasma AB40 and AB42 levels, but not with plasma NfL or total tau levels. Further research that examines depression with other cognitive impairment risk factors and biomarkers, and that follows a longitudinal trajectory, could help decipher the biological influence of depression on AD.

Fatima Anasse

Discipline: Health and Human Development

Authors:

#1 Fatima Anasse
#2 Lohuwa Mamudu
#3 Archana McEligot

Abstract Name: The relationship between depression and Alzheimer's Disease among the Hispanic population from NHIS 2019-2023 Data

Background: Alzheimer's disease (AD) is one of the most common neurocognitive degenerative diseases among dementia patients. Studies have shown a link between depression and AD. However, little is known about depression and AD in the Hispanic population, who are faced with growing mental health issues in recent years. We aimed to investigate the relationship between depression and AD among Hispanics from a large national survey. Methods: A retrospective population-based cross-sectional dataset of 7,451 Hispanic adults aged ≥ 50 years was extracted from the National Health Interview Survey (NHIS) between 2019 and 2023. Prevalence and bivariate Chi-square analysis were conducted to determine the differences in AD among Hispanics with depression. Multivariable logistic regression models were conducted to examine the relationship between depression and AD, adjusting for covariates (age, gender, education levels, poverty levels, and health insurance coverage). Results: The prevalence of AD was 7.4% among Hispanics confirmed with depression and 1.6% among those without AD. Hispanics with daily depression and those who reported taking medication for depression had 14% and 9% prevalence of AD, respectively. Hispanics with confirmed depression (AOR = 4.20, 95%CI [2.71-6.51]), those who reported daily (AOR = 8.45, 95%CI [4.63-15.44])

and weekly (AOR = 2.15, 95%CI [1.11-4.18]) depression, and those taking medication for depression (AOR = 4.37, 95% CI [2.80-6.80]) were associated with a higher odds AD. Conclusion: Our research identified Hispanics with depression, those who reported daily and weekly depression, and those taking medication for depression to be associated with increased likelihood of experiencing AD, which allows for understanding the relationship between depression and neurocognitive health among Hispanic individuals.

Veronika Anastasiadis

Discipline: Chemistry

Authors:

#1 Todd Eckroat

Abstract Name: Synthesis of Bis-Benzoxazolones and Bis-Benzimidazolinones for Cholinesterase Inhibition

Alzheimer's disease (AD) affects over 6 million people in the United States through the loss of memory and cognition. In the brain, reduced levels of acetylcholine (ACh) and butyrylcholine (BCh), which are broken down by the enzymes acetylcholinesterase (AChE) and butyrylcholinesterase (BChE), respectively, are thought to contribute to the onset and progression of AD. Being that there is no effective cure, the purpose of this research is to analyze the effectiveness of alkyl-linked bis-benzoxazolones and bis-benzimidazolinones in inhibiting both enzymes, which has proven beneficial for treatment of AD. Based on the known effectiveness of previously synthesized bis-isatins in performing the desired function, it is anticipated that the newly prepared compounds will show some degree of inhibition due to structural similarity. However, it remains to be seen if the differing hydrogen bonding abilities of these benzoxazolone and benzimidazolinone scaffolds will enhance or decrease inhibition. Initial work has focused on the synthesis of the target molecules from 2(3H)-benzoxazolone and 2-benzimidazolinone through alkylation with dibromoalkanes. The full results of these synthetic studies, along with preliminary enzyme inhibition testing and molecular modeling, will be presented.

crystal ancira

Discipline: Health and Human Development

Authors:

Abstract Name: The Impact of Social Media on Adolescent Mental Health

Over the past decade, social media has become a central part of adolescents' everyday lives, influencing how they connect with others, express themselves, and go through emotional experiences. As concerns about rising anxiety and depression continue, researchers have examined how social media use on platforms like TikTok, Instagram, and Snapchat play a role in the well-being of adolescents. This project explores how different patterns of social media use including excessive engagement, comparison with others, and positive online interaction affect adolescent mental health, particularly with symptoms of anxiety, depression, and self-esteem challenges. A systematic review methodology was used to identify peer-reviewed studies from 2020–2025 involving adolescents aged 12–18, incorporating both quantitative and qualitative evidence. This research will show stronger associations between heavy or comparison-driven social media use and negative mental health outcomes, while also revealing that balanced, creative expression, and supportive online engagement can be beneficial to well-being and may help teens feel more connected and confident. The findings of this review suggest that social media's impact on adolescents is complex, emphasizing the need for supportive guidance to help teens use social platforms in healthier, more empowering ways.

Understanding these patterns can help adults and communities guide teens toward healthier digital habits, ensuring that social media becomes a tool for connection and support rather than a source of stress.

Lucy Anders

Discipline: Biology

Authors:

#1 Lucy Anders

#2 Emily Gargiulo

#3 Isabella Lucas

#4 Allison Talero

#5 Matthew Persons

Abstract Name: The effects of chronic exposure to agrochemical residues on spiderling mortality in the wolf spider *Rabidosa rabida*

Agrochemicals sprayed on crops often persist on the soil surface and can adversely affect beneficial non-target species like wolf spiders. We examined the lethal and sublethal effects of chronic exposure to soil residues of five widely used agrochemicals on spiderlings of the wolf spider *Rabidosa rabida*. Eggsac-carrying females were collected from unsprayed fields. Spiderlings were randomly assigned but equally divided by eggsac across one of seven agrochemical treatments: the insecticide imidacloprid, the herbicide glufosinate, the fungicides azoxystrobin and propiconazole, the organosilicone surfactant Silfact®, a combination of all five agrochemicals, or a distilled water control. Spiderlings were also exposed to either freshly applied, three-day-old, or seven-day-old agrochemical soil residues resulting in 21 agrochemical treatments (3x7 design, N=840, 40-41 spiderlings per treatment). Spiderlings were fed and maintained for 40 days on their designated treated soil substrates. We recorded mortality and timing of ecdysis to the third instar across treatments. All agrochemical treatments induced significantly higher mortality than the control except Azoxystrobin. Glufosinate and the combined agrochemical treatment were the most toxic with both treatments resulting in 100% mortality by day 30 but there was no additive effect of combining agrochemicals. Imidacloprid and organosilicone showed intermediate toxicity with fungicides showing the lowest, but still significantly higher than the control treatments. For most agrochemicals, seven-day residues were as toxic as when freshly applied; only organosilicone, the all combined group, and the control showed modest but significant residue age effects. Molt timing did not differ among treatments for spiderlings that survived long enough to molt suggesting no effect on feeding behavior across treatments. Overall, our results indicate that some commonly used agrochemicals, especially glufosinate, pose substantial risks to juvenile wolf spiders, likely reducing their survival and long-term persistence in agricultural systems and that soil residues maintain high toxicity even seven days post-application.

Jadyn Anderson

Discipline: Engineering

Authors:

#1 Giulia Brachi

#2 Samuel Armistead

#3 Wil V. Srubar III

Abstract Name: Sprouting Structures: Exploring Directed Root Growth for Engineered Living Systems

What if it were possible to create and maintain buildings through biological growth rather than exhausting processed materials? Engineered living materials are revolutionizing the field for applications in the built environment. According to a recent United Nations assessment, a staggering 37% of global carbon emissions are attributed to the buildings and construction sector. Traditional construction methods rely heavily on industrially processed materials, which are resource-intensive and environmentally harmful. Biology-integrated architecture has shown potential to reduce material footprint while introducing self-sustaining capabilities; however, the field remains largely underexplored. This project aims to establish a foundational understanding of how plant root formation can be directed within engineered biomaterials, including hydrogels and earthen media. By examining how the mechanical and chemical properties of these materials influence root growth, the project seeks to provide early insights for guiding root behavior, supporting the future of engineered living structures. Plant-friendly, biocompatible hydrogel was formulated to support seed germination and early root growth. Then, novel approaches will be explored for integrating plants within engineered media. Seeds were first encapsulated in the hydrogel before progressing toward incorporation into 3D extrusion bioprinted structures. Mechano-chemical properties of the hydrogel matrix and media will be characterized to understand how factors such as stiffness and nutrient composition impact root growth. Root development will be monitored through advanced imaging. Earthen-based systems will then be explored, along with lateral observation setups and volumetric 3D-printed structures. By linking material properties with germination, root directionality and characteristics, this work aims to provide foundational insights into how engineered biomaterials can guide plant development. Ultimately, this work will contribute critical insights toward the eventual development of small-scale, proof-of-concept living structures demonstrating the feasibility of grown buildings.

Brooke Anderson

Discipline: Political Science

Authors:

#1 Brooke Anderson

Abstract Name: The Evolution of Donald Trump's Psycholinguistic Traits Across the 2016, 2020, and 2024 Elections: A LIWC-22 Analysis of Social Media Rhetoric

This study explores the evolution of Donald Trump's psycholinguistic traits as presented through his social media use during the 2016, 2020, and 2024 presidential elections. While there is existing research comparing Trump's psycholinguistic profile to more traditional political counterparts, no prior work has examined his 2024 posts in relation to earlier election cycles. Additionally, no existing scholarship has analyzed the evolution of Trump's online communication through the lens of shifting style, tone, emotion, or the potential impact these changes may have on his following. This paper addresses these gaps by exploring the question: How has Donald Trump's social media behavior changed over the past decade, and how can these shifts be observed in an LIWC-22 linguistic analysis of posts made in the three months leading up to the presidential elections of 2016, 2020, and 2024? The dataset includes all posts made to Twitter and Truth Social during the three months preceding each election cycle, totaling approximately 7,500 posts. The psycholinguistic software LIWC-22 was used to assess each election year separately. LIWC-22 categorizes each word, phrase, stem, or emoji into validated sub-dictionaries corresponding to specific psychological constructs, allowing linguistic features to be translated into quantifiable metrics. Key variables examined include "polite," "conflict," "pro-sociality," and "tone." Preliminary findings suggest notable shifts in Trump's rhetorical patterns, including decreases in "polite," "pro-sociality," and tone, alongside increases in "conflict." These results indicate a measurable intensification of combative rhetoric over time, reflecting a move toward more emotionally charged, identity-driven communication aligned with broader trends in populist political rhetoric. This research contributes to work at the intersection of political psychology and computational linguistics by offering a longitudinal analysis of a single political figure's rhetorical evolution. The findings enhance our understanding of how political communication adapts to changing electoral landscapes and how linguistic cues shape public perception.

Jenna Anderson

Discipline: Nursing and Public Health

Authors:

#1 Jung Ah Lee

Abstract Name: Breaking the Silence: Addressing the Emotional Burden of Alzheimer's Disease and Related Dementias on African American Family Caregivers

Providing continuous assistance to people who are sick, aged, or disabled is known as caregiving. Although providing care for people with Alzheimer's disease and related dementias (ADRD) is a difficult task in and of itself, the burden is worsened by the illness' progressive nature, which is characterized by increasing cognitive loss, behavioral abnormalities, and functional impairments. It is also critical to acknowledge that African American caregivers frequently face additional intersecting burdens that are a result of systemic injustices and cultural factors, including systemic healthcare disparities, financial hardships, and cultural expectations surrounding family responsibilities. Studies show that these African American caregivers have a greater burden from the act of caregiving in comparison to other racial groups, which is worsened by their restricted access to support networks and mental health treatments. Furthermore, cultural elements, such as strong religious conviction and social support systems, can both ease and exacerbate the experience of providing care. My extensive literature review revealed religion as a common theme since many African American caregivers depended on God to guide them and provide a sense of peace as they took on the demanding responsibility of caring for someone with ADRD. Due to the fact that African American caregivers are often underrepresented in caregiving research, it is imperative to fully comprehend their complex experiences. To guide the development of culturally appropriate interventions and support systems, this study aims to shed light on the unique mental health issues that this community faces and how these issues impact the care that is being provided. In order to learn more about the common themes observed in the African American family caregiver population and the particular psychological therapies that would be beneficial to them, I am reviewing the literature from both quantitative and qualitative research.

Sarah Anderson

Discipline: Nursing and Public Health

Authors:

Abstract Name: Barriers to Treating Sickle Cell Disease in African American Adults Aged 18-40: Treating Vaso-occlusive Crises with Emergency Departments, Hydroxyurea, and Opioids

Approximately 1 in 400 African Americans in the US suffer from Sickle Cell Disease (SCD). People affected experience chronic pain and pain crises that must be managed in and out of emergency health care settings. Still, because there may be an intersection of their condition and race in the emergency room, they may be simultaneously affected by medical racism, which may hinder the ability to obtain appropriate, effective care in order to treat pain crises and chronic pain. Through a review of case studies, educational supplements, and journal publications that include patient and provider interviews and empirical data on sickle cell disease care and discrimination in medicine up to 2024, this paper details the gaps found in emergency and at-home care regarding Black adult sickle cell disease patients by taking into account the current downward trend of prescribing opioids to patients who demonstrate a need for pain relief and interactions based on stereotypes and stigma around Black sickle cell disease patients, and the genotoxic nature of Hydroxyurea pushing

providers further away from utilizing Hydroxyurea to treat Black sickle cell disease patients. Further investigation regarding the intersection of race and sickle cell disease pain management is needed to determine if racial bias in medicine significantly impacts Black Adult (ages 18-40) SCD patients in the United States, and solutions found suggest using implicit bias training to eliminate disparities in Black sickle cell disease patients.

Courtney Anderson

Discipline: Biochemistry

Authors:

#1 Jessica Burket

#2 Ronald Quinlan

Abstract Name: Proteomic Analysis of Rodent Brain Tissue

Proteomics is the study of protein structure and its interactions. Shotgun proteomics analyzes proteins in a sample by first digesting them into peptides. Our laboratory has taken steps to develop and optimize a working protocol for proteomics of rodent brain tissue to achieve optimal readout from the Shimadzu-LCMS-9030 Q-TOF mass spectrometer. For example, initial steps have been made in optimizing and comparing different techniques and steps in the proteomics process, such as sample preparation, lysis buffer, digestion, desalting, and clean-up through the BCA protein assay to quantify the proteins, and a literature review to gain an understanding of the technique. The goal in conducting proteomics rather than other methods, such as Western blots, is to see all proteins rather than just one. This technique allows for the simultaneous quantification of proteins in a sample, enabling the study of specific protein receptors in the brain. Preliminary pilot experiments will be done using samples from rat brain tissue to optimize and validate our protocol. Data analysis from these samples will be interested in quantifying receptor and signaling molecules related to the nicotinic acetylcholine and serotonin receptor pathways for correlative studies with behavior. Correlative studies with behavior will be done for each sample type to gain an understanding of what molecular differences mean in terms of what is seen in the behavior. Following protocol validation, studies will be done using the 22q11.2 deletion syndrome mice, which express neurodevelopmental disorders like autism and schizophrenia. The receptor of interest for the deletion syndrome mice is the NMDA receptor, and we aim to understand the molecular mechanisms and how they differ from those in wild-type mice.

Sydney Anderson

Discipline: Health and Human Development

Authors:

#1 Joanne Tuohy

Abstract Name: Investigating the Effect of Histotripsy on the Presence of Cell Death Markers, Proliferation Markers, and T-lymphocyte Populations in a Murine Osteosarcoma Model

Osteosarcoma is a primary bone tumor for which the current treatments are surgical resection of the tumor via limb amputation or limb salvage surgery combined with chemotherapy. Histotripsy, a non-thermal, non-invasive focused ultrasound tumor ablation modality, is being investigated as an alternative treatment. In this study, the effect of histotripsy on cell proliferation and intratumoral immune response was investigated. The experimental groups included histotripsy-treated murine osteosarcoma tumors collected at different time-points post-treatment (three, seven, ten, fourteen, or thirty days) and an untreated tumor control group. For

each sample, one slide was stained for cell death (Caspase-3) and proliferation (Ki-67) markers and the other slide was stained for T-lymphocyte biomarkers (CD4, CD8, and FoxP3). The hypothesis was that Ki-67 expression would be lower, and T-lymphocyte marker and Caspase-3 expression would be higher in the treated tumor samples than in untreated samples. Slides were scanned and image analysis was conducted using Fiji ImageJ software. The percentage of tumor area with each of the five biomarkers was calculated. The difference between untreated and treated groups and the difference between the five time-point groups were analyzed using Two Sample t-Tests and One-Way ANOVA tests respectively. There was no significant difference between time-point groups, treated, or untreated groups for Caspase-3 and the T-lymphocyte markers. The untreated tumor samples had a greater mean Ki-67 presence than the treated tumor samples (not separated by time-point for this analysis) and this difference was statistically significant. Analysis of the time-point groups showed an upward trend in Ki-67 presence over thirty days, however there was no significant difference between different time-points. The results suggest that under the current experimental conditions, histotripsy does not have a significant effect on apoptotic cell death and T-lymphocyte populations, but may initially decrease cell proliferation activity based on our immunohistochemistry findings in this study.

Nathan Anderson

Discipline: Psychology

Authors:

#1 Nathan Anderson

Abstract Name: College, Alcohol, and Infectious Diseases: Relationship Between Opinion of Alcohol in College and Perceived Vulnerability to Infection

Drinking alcohol and frequenting college bars are often seen as an essential parts of the college experience. College students routinely visit bars, often carrying unwanted passengers (i.e., viruses, bacteria) with them. Compared to the early 1900s, good hygiene and cleanliness are seen as imperative by modern society and represent key public health interventions or responses that curb the spread of illness. However, some typical habits, including attending college bars and heavy drinking, go against this focus on safety from disease, inviting an increase in risky activities such as sharing drinks and reduction in the immune response. Evidence has shown that alcohol suppresses the ability of the body to fight off infection and pathogens, increasing communicability, and severity of infectious diseases. The population of college student drinkers may be more vulnerable to disease, both physically, due to the physical effects of alcohol, but also mentally vulnerable due to a lack of effective decision-making related to disease carrying environments and situations. This project aims to ascertain the connection between the opinion about alcohol in the college experience, measured through the College Life Alcohol Salience Scale (CLASS), and perceived vulnerability to disease as measured by the Perceived Vulnerability to Disease (PVD) scale, broken down into two subscales measuring perceived infectability and aversion to germs. Data collection was conducted through anonymous online surveys. The results show a significant positive correlation between CLASS and PVD scales ($r=.108$, $p=.022$), wherein as one regards alcohol as more important in the college experience, one would have a higher perception and concern of disease in their environment. These results could be used to both combat alcoholism amongst college students and the spread of infectious diseases on and around college campuses.

Rebecca Anderson

Discipline: Exercise Science and Nutrition

Authors:

#1 Samantha Hill

Abstract Name: Reported Meat Intake is Correlated to Body Mass Index and Waist Circumference: A Study of Risk Factors for Metabolic Syndrome

Obesity rates among young adults are steadily increasing, sparking greater interest in the dietary factors that contribute to increased Body Mass Index and waist circumference. Obesity is a risk factor for chronic conditions such as cardiovascular disease, type 2 diabetes, and certain cancers. Meat consumption has previously been linked to obesity. This study examines the relationship between reported meat consumption and two key indicators of obesity in college students: waist circumference (WC) and Body Mass Index (BMI). We hypothesized that higher levels of reported meat consumption are positively correlated with both WC and BMI in this population. We used data collected from 316 Weber State University students (101 men and 215 women) between 2015 and 2023. Anthropometric measures were taken for each participant, including height, weight, and WC. Height and weight measurements were used to calculate BMI. Participants tracked their diets for two days using Diet and Wellness Plus software, which assessed intake of total calories, saturated fat, and sodium. Participants also reported their weekly meat consumption habits on a scale from 1 (never) to 5 (every day). SPSS statistical analysis revealed significant positive associations between reported meat consumption and BMI ($p=.02$) and WC ($p=.017$) among female students. This association was not observed in male students. Additional analyses examining total caloric intake, saturated fat, and sodium revealed no significant correlations with BMI or WC. These findings suggest that meat consumption, independent of other dietary factors, may have a stronger association with obesity in college-aged females than previously thought. Given these results, we suggest that increasing plant-based food consumption, rather than focusing solely on calorie or fat reduction, may offer important benefits to female college students in preventing obesity.

Damien Anderson

Discipline: Psychology

Authors:

#1 Katrina Steele

#2 Sarah Steele

#3 Ella Johnson

#4 Isabella Blett

#5 James Cortright

Abstract Name: Environmental enrichment attenuates enhanced nicotine-seeking behavior following exposure to chronic variable stress

Drug addiction is a major public health and serious economic concern in the United States costing taxpayers billions of dollars annually. Preclinical and clinical research indicates that individuals exposed to stress are more vulnerable to drug addiction (Koob, 2008; Ouimette et al., 2007). Moreover, chronic unpredictable stress increases the response to nicotine-rewarding properties in the CPP test (Biala et al., 2018). Contrary to the effects observed following exposure to variable stress, both running and environmental enrichment (EE) reduce CPP for cocaine (Mustroph et al., 2016). To date, only one study (Biala et al., 2018) has assessed the effects of chronic stress on the rewarding effects of nicotine in the CPP model and none have measured the potential of EE in attenuating this effect. Therefore, this study will further investigate and determine whether EE can reverse, or abolish, the enhancement in the rewarding properties of nicotine following exposure to chronic variable stress. One group of animals will be exposed to 20 days of randomized stressors either during adolescence or early adulthood. Another group of animals will be exposed to four weeks of EE. An additional group will be exposed to 20 days of randomized stressors followed by four weeks of EE. Control animals will not receive any exposure treatment. Following exposure treatment animals will undergo place preference conditioning to nicotine (0.175 mg/kg, base, s.c.). Data indicate that animals exposed to chronic variable stress exhibit higher place preference for nicotine compared to controls, an effect that is attenuated

by exposure to EE. Therefore, in addition to providing evidence of the contributions of stress and environmental conditions to successful cessation of drug-seeking, the results obtained can have important implications for the use of environmental stimulation together with pharmacological and behavioral therapies in the treatment of addiction.

Nyla Anderson

Discipline: Biology

Authors:

#1 Srushitha Singiresu

Abstract Name: Cyanotoxin Exposure and ALS Prevalence: Ecological Insights from the Chesapeake Bay Watershed

Amyotrophic lateral sclerosis (ALS) is a progressive neurodegenerative disorder that damages motor neurons in the brain and spinal cord, ultimately impairing essential functions such as movement, speech, swallowing, and breathing. Although its progression varies across individuals, most diagnoses occur between ages 55 and 75, and average survival is only two to five years (2024). ALS incidence and prevalence differ globally—from 0.26 per 100,000 person-years in Ecuador to 23.36 in Japan—and U.S. point prevalence is approximately 11.80 per 100,000, with notable geographic, racial, and sex-based disparities. Recent evidence has raised concern that harmful algal blooms (HABs), particularly cyanobacterial blooms capable of producing the neurotoxin β -methylamino-L-alanine (BMAA), may contribute to ALS risk. BMAA has been detected in ALS brain tissue, and exposure to bloom-affected water has been associated with faster disease progression. These findings suggest that environmental factors may interact with biological vulnerability to influence ALS outcomes. This project investigates potential connections between HAB occurrence and ALS prevalence within the Chesapeake Bay watershed. Our aims are to: (1) map ALS prevalence across watershed counties to identify geographic clusters; (2) evaluate correlations between these clusters and regions experiencing recurrent HAB activity; and (3) explore how local cultural and subsistence practices may influence cyanotoxin exposure risk among rural and Indigenous communities. Together, these aims integrate environmental, geographic, and sociocultural data to examine how ecological conditions and community practices may shape ALS risk. This work contributes to growing efforts to understand environmental drivers of neurodegenerative disease in vulnerable coastal populations.

Elyas Anderson

Discipline: English and Literature

Authors:

#1 Elyas Anderson

Abstract Name: I Am Me

The poem “I Am Me” was created to explore the personal side of discovering identity. It is a poem that dives deep into the inner turmoil of the journey to self-acceptance through the eyes of a transgender individual. That transgender individual being myself. In the making of this poem, I used what is called stream of consciousness. This is a type of poetry that is known to not have limitations. Research shows that the stream of consciousness psychologically in itself is our conscience. It is where we have thinking and language. However, it has also shown that when writing in this technique, it is filled with the sensations of our bodies, feelings, memories, and even emotions. The methodology of this poem was in a sense an impulse of writing.

This piece was created to show a vulnerable part of my life. I chose this technique because of it being limitless. It let me really think about how I felt in the specific part of my journey where I was fighting with myself. With this technique I couldn't be censored and silenced from my own thoughts, allowing me to speak my truth. It was written in a way that it's not only relatable to trans people with the same experience, but also anyone who struggles with identity as a whole. The struggle of identity is an aspect that is often a part of the human experience. In the creation of this piece, it affected my understanding of myself. It revealed the emotions that I never fully grasped until I saw them on the paper. This poem helped me feel the confidence I needed to share my story so that those who question themselves understand. That in the end no one is alone in their struggles.

Katya Andzelevich

Discipline: Chemistry

Authors:

#1 Niloofar Zarrabi

#2 Jatan Sharma

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#5 Prashanth Poddutoori

Abstract Name: Excitation Energy Transfer Dominates over Reductive Electron Transfer In High-Potential Hypervalent Antimony(V) Porphyrin-C60 Conjugates

Porphyrins play a central role in artificial photosynthesis due to their strong light harvesting capabilities and ability to participate in the electron transfer process. Sharing similar properties with chlorophyll, porphyrins are highly effective photosensitizers, and their performance can be enhanced through strategic conjugation with complementary moieties. Fullerene (C60) is a widely studied electron acceptor characterized by high electron affinity and mobility, as well as an intrinsically low-lying lowest unoccupied molecular orbital (LUMO), making it a powerful component in molecular donor-acceptor (D-A) assemblies. In this research, C60 has been covalently linked to high-potential, hypervalent antimony (V) porphyrins to produce two antimony(V) porphyrin-fullerene conjugates: SbP-C60 and SbPF3-C60. The porphyrins feature four meso-phenyl and meso-3,4,5-trifluorophenyl units, respectively. These systems are designed such that the exceptionally high reduction potentials of the porphyrins create a unique excited-state energy pattern in which the (porphyrin)^{•-}-C60^{•+} charge-separated state lies between the excited singlet states of the porphyrin and fullerene. Time-resolved spectral data show that an ultrafast singlet-singlet energy transfer occurs from the porphyrin to the C60 unit. Estimated excited-state energetics of the conjugates suggest that the 1C60* state can be populated either directly through the usual Förster mechanism or indirectly by electron transfer from the C60 unit to the excited porphyrin followed by charge recombination. However, spectral features expected for the charge-separated state are not observed, and the energy transfer rates calculated for the Förster mechanism agree with experimental values. Together, these findings demonstrate that direct energy transfer is the dominant process in the synthesised antimony(V) porphyrin-C60 dyads.

Nithya Angadi

Discipline: Psychology

Authors:

#1 Raven Bacchas

#2 Fantasy Lozada

#3 Chelsea Williams

Abstract Name: Exploring the Impact of Skin Tone Satisfaction on Racial-Ethnic-Cultural Belonging among Latiné Caregivers

A sense of racial-ethnic-cultural belonging (REC-B) is a key process that supports wellbeing and ethnic-racial identity (ERI) development across the lifespan. Yet, little research has examined how phenotypic characteristics may shape belonging within caregivers. While the impact of skin tone on Latiné families has been examined, understanding caregivers' feelings towards their skin tone is essential due to its potential impact on their identity. The current study aimed to investigate whether skin tone and skin tone satisfaction predicts REC-B within Latiné caregivers. This study contributes to understanding how phenotypic factors shape belonging-related identity processes throughout adulthood. Participants included 113 Latiné caregivers (93.1% Female; Mage = 35.04, SD = 6.56) from the ongoing STAR (Supporting, Thriving, Ambitious, and Resilient) Children & Families Project, which aims to understand risk and protective factors in Latiné, Black, and Multiracial families and their relation to cultural experiences and developmental outcomes. Families were recruited through community outreach at public events, including local festivals, non-profit organizations, and word-of-mouth. Research assistants administered surveys to both caregivers and children, asking about their ERI-related experiences. Compensation for participation included \$50 for the caregiver with an additional \$10 and a toy for their child. Findings indicated that the overall model was significant, $F(3, 85) = 2.99$, $p = .04$, $R^2 = .10$. Specifically, Latiné caregivers' skin tone satisfaction predicted higher levels of REC-B ($\beta = .24$, $p = .02$). When accounting for age as a covariate, Latiné caregivers' skin tone was not associated with REC-B ($\beta = .19$, $p = .07$). Findings highlight that among Latiné caregivers, those who are more satisfied with their skin tone are more likely to have a stronger sense of belongingness to their ethnic-racial group. Although skin tone remains an important aspect of ERI, this emphasizes the importance of also considering skin tone satisfaction as an important contributor to identity development.

Nikhil Angani

Discipline: Biology

Authors:

#1 Ganapati Mahabaleshwar

#2 Owen Meadows

#3 Hang-Pong Ng

#4 Yashwant Pantra

#5 Kanishk Bhat

#6 E. Ricky Chan

Abstract Name: KLF6 is a Novel Regulator of Interferon-gamma signaling in Macrophages

Excessive IFN γ levels are associated with chronic inflammatory and autoimmune diseases. However, the precise mechanisms governing IFN γ -induced signaling pathways and transcriptional regulation of inflammatory gene expression remain incompletely defined. In our previous studies, we identified Krüppel-like factor 6 (KLF6) as a novel regulator of macrophage activation. Here, we investigated the role of KLF6 in

regulating IFN γ -induced signaling pathways, inflammatory gene expression, and macrophage function. Here, our in vivo studies show that myeloid-specific KLF6 deficiency significantly attenuated zymosan-induced macrophage and neutrophil accumulation in lung tissue. Our unbiased transcriptomic and gene set enrichment analyses (GSEA) revealed that KLF6 deficiency curtailed nearly half of IFN γ -inducible gene targets and broadly impaired IFN γ -induced cytokine, chemokine, and inflammatory signaling pathways in macrophages. Further, our ex vivo and in vivo studies show that KLF6 deficiency significantly curtailed IFN γ -induced IFN γ -response, TNF α -response, IFN α -response, inflammatory response, and chemokine signaling target gene expression in macrophages. More importantly, KLF6 deficiency markedly reduced IFN γ -induced STAT1 phosphorylation (Try701 and Ser727) in macrophages. Collectively, these findings identify KLF6 as a critical regulator of IFN γ -induced signaling, pro-inflammatory gene expression, and pathogenic macrophage activation in vivo.

Tuba Angay-Crowder

Discipline:

Authors:

Jayoung Choi

Brianna Cabrera

Abstract Name: Culturally Relevant Mentorship in Undergraduate Qualitative Research: Exploring Belonging, Identity, and Access Among Monolingual and Multilingual Students

Undergraduate research remains largely concentrated in STEM and quantitative fields, offering limited opportunities for culturally diverse students, including both monolinguals and multilinguals, to engage in qualitative research (Cooper et al., 2019). Due to institutional challenges such as restricted funding, faculty mentors often rely on culturally neutral practices that overlook students' diverse linguistic identities (Hawkins et al., 2023; López et al., 2025). The ways in which mentors and mentees navigate the challenges and affordances of culturally relevant mentoring in qualitative research remain underexplored. We will present findings of the research that drew on Critical Mentoring (Weiston-Serdan, 2017) to examine how faculty mentors and mentees engaged in research practices that aimed to nurture belonging and identities of both monolingual and multilingual undergraduates at a U.S. university. We used a multi-method qualitative design to collect data from 24 undergraduates through surveys, interviews, workshops, and reflective artifacts. Findings revealed that mentoring enhanced participants' sense of belonging, research confidence, and engagement while also exposing structural barriers such as limited access to resources, linguistic inequities, and implicit bias. Students viewed mentorship as empowering, particularly when mentors validated their linguistic and cultural identities. Multilingual participants connected personal and community experiences to their research, enriching inquiry with translanguaging perspectives. Moreover, students' researcher identities developed through psychological safety, collaborative research practices, growth in technical research skills and critical awareness as they recognized how language and culture shaped academic spaces. Through peer discussions and identity-affirming inquiry, students increased confidence in navigating academic hierarchies. Not all participants engaged in peer mentoring to cultivate their agency and a sense of collective responsibility toward equity in research participation. We conclude that inclusive mentorship is essential for equitable participation in undergraduate research. Finally, we suggest that institutions embed culturally responsive mentorship with multilingual research networks and create flexible, identity-affirming pathways to participation.

Isabella Angel

Discipline: Education

Authors:

Abstract Name: The Standards that Bind Us Together: A Model for Visibly Integrating State Standards Into a Year-Long Curriculum

Teachers who write their own curriculum have few reliable models to demonstrate how to plan a year of instruction that stems directly from their state's standards. Similarly, students are not typically knowledgeable about the standards despite the standards' role in shaping educational expectations. The relevant literature tends to emphasize either a conceptual view of standards that does not prove directly helpful to teachers (Applebee et al. 2000, Gorlewski 2013, Hattie 2008, Martone and Sireci 2009, Au 2013) or backward design that does not necessarily prioritize standards (Dover 2016, Gallagher and Kittle 2018, McConlogue 2020). Additionally, literature on student understanding of learning expectations tends to focus on teacher-created objectives, guidelines, and rubrics rather than the standards as they are written by the state (Burke 2003, Gallagher and Kittle, Hattie, McConlogue, Wiggins and McTighe 2005). This project attempts to help fill these gaps by creating a binder that models for 9th grade ELA teachers in Ohio a way to organize standards-based units with backward design. "The Binder" would be used by both the teacher and students to display the structure of a year of learning and the standards behind that learning. The Binder contributes a pragmatic solution for teachers in the form of a standards-based approach to organized learning. It also creates longitudinal research opportunities for how student motivation and learning outcomes may be affected by direct exposure to state learning standards.

Charles Angleberger

Discipline: History

Authors:

Abstract Name: "Thinking Workers are Willing Workers:" The Norfolk and Western Railway Advertises for Industrial Expansion and Social Conservatism, 1947-1965

This project links two series of advertisements by the Norfolk and Western Railway released between the years 1947 and 1965. In response to a downturn in the coal market that supplied most of its traffic and a growing need to attract the largest possible share of the new industrial customers that were moving southwards, the Norfolk and Western turned to its advertising department. The advertising department responded with two parallel series, one of which ran in national business newspapers and journals, extolling the territory the Norfolk and Western served as containing workers who were more productive and, in keeping with this, more conservative and less likely to unionize. The second series targeted those very workers, encouraging them to hold the conservative beliefs that they supposedly already had and to work to attract new industries to their communities, warning them that if their beliefs and communities were unattractive to business, their prosperity would fall by the wayside. In short, the preponderance of evidence suggests that the Norfolk and Western Railway, from 1947-1965, advertised its territory to industrial executives as a managerial paradise with exceptionally productive and willing workers, even as it feared, due to prevailing ideas about the South and Appalachia, that these workers and communities would not measure up to the metric being set for them in their advertisements, and attempted to influence them towards that metric through an additional series of political advertisements in newspapers. Through this thesis, the project explores the Norfolk and Western Railway's role in promoting Anti-Communism, Religious Conservatism, and the ideology of "Business Progressivism," brought on by the new promise of the industrial shift to the "Sun Belt" that defined so much of the Southern political world at this time.

Nafisa Anjum

Discipline: Engineering

Authors:

#1 Nafisa Anjum

#2 Jessanne Lichtenberg

#3 Priscilla Hwang

Abstract Name: Investigation of Vinculin in Collective Cell Migration Morphology and Protrusions

Collective cell migration is a key process underlying tissue morphogenesis, wound healing, and cancer metastasis. Effective migration depends on stable cell–cell and cell–matrix interactions. Vinculin, a mechanosensitive protein, is present in adherens junctions and focal adhesions. It links adhesion complexes to the actin cytoskeleton and supports mechanical force transmission. Vinculin is known to link the actin cytoskeleton to adhesion sites, but its specific contribution to epithelial collective migration is unclear. This study investigates how vinculin regulates protrusion formation and collective migration of Madin-Darby Canine Kidney (MDCK) epithelial cells. We hypothesize vinculin is required to generate protrusions during collective migration. We used MDCK wild-type (WT) or vinculin knock-out (Vinc^{-/-}) cells. Cells were cultured in 1X DMEM with 10% FBS and 1% P/S. All samples were stained for actin (phalloidin) with nuclei (DAPI). 2D sheet migration assays were performed using fibronectin-coated dishes with Ibidi inserts. After allowing cells to adhere overnight, inserts were removed and migration was imaged over 8 hours. Samples were stained and actin stress fiber quantification using CT Fire was performed at the edge. A 2D protrusion assay was performed where cells were seeded onto collagen I and rhodamine–fibronectin coated coverslips. After 24 hr in culture, samples were fixed and stained. Cell clusters were imaged on a Nikon Ti2 microscope. To study 3D invasion, MDCK clusters or cysts were encapsulated in collagen I hydrogels in chamber slides. Cysts were treated with hepatocyte growth factor for 4 days to stimulate protrusions, then fixed and stained. Protrusions were quantified. WT clusters formed more and longer protrusions than Vinc^{-/-} in 2D and 3D. In the sheet migration assay, WT monolayers migrated faster and displayed more stress fibers at the edge. Overall, loss of vinculin reduces protrusion formation, stress fiber numbers, and sheet migration, supporting its role in stabilizing cytoskeletal connections during collective movement.

Vunnathi Ankem

Discipline: Psychology

Authors:

#1 Dr. Christopher Murphy

Abstract Name: Conceptualizing Intimate Partner Violence in the South Asian Diaspora using Qualitative Coding

While gender-based harms and relationship dynamics in South Asia are well-documented, there is limited research on South Asian diaspora and international students in the US, particularly regarding how social discourse influences their relationships. This study utilizes thematic coding of interviews with self-identified South Asian students studying at the University of Maryland, Baltimore County (UMBC) to identify expectations of social behavior, the role of social networks and the intracultural dialogue around IPV. It is hypothesized that South Asian college students utilize intracultural dialogue, or communication between members of the same culture, surrounding South Asian culture and intimate partner violence (IPV) to inform their opinions and actions regarding IPV. The purpose of this study is to determine specific factors and topics in the UMBC South Asian student population that influence their perspectives on, and conversations about, unhealthy relationship dynamics and IPV and abuse. It is expected that these findings will inform future efforts to tailor IPV prevention and response programs for students of South Asian descent.

Ama Annor

Discipline: Health and Human Development

Authors:

Brigidi Ackah Blay

Abstract Name: An Iot-Enabled Multi-Parameter Monitoring System for Real-Time Diabetic Patient Care in Ghana

Diabetes prevalence in Ghana ranges from 2.6% to 9%, with approximately 200,000 cases reported annually. Current health monitoring approaches face significant limitations: hospital-grade multi-parameter monitors are expensive and designed for clinical settings, while consumer wearables focus primarily on fitness tracking rather than chronic disease management. This creates a critical need for affordable, integrated monitoring systems designed specifically for home-based diabetic care. This research presents the development of an IoT-enabled multi-parameter monitoring system for real-time diabetic patient care in Ghana. The system utilizes a MAX30102 sensor integrated with an ESP32 microcontroller to continuously monitor heart rate, blood oxygen saturation (SpO₂), and body temperature. An event-driven architecture processes and transmits sensor data through a Node.js backend to a Firebase Realtime Database, enabling synchronized access across patient mobile applications and clinician web dashboards. The system incorporates machine learning-based anomaly detection to identify abnormal vital sign patterns and generate automated alerts. This approach addresses the inefficiencies of manual recording while providing continuous monitoring at a fraction of the cost of hospital-grade equipment. The research utilizes the BIG IDEAs Lab Glycemic Variability dataset from PhysioNet for model development and validation. This work demonstrates the feasibility of low-cost, automated multi-parameter monitoring for chronic disease management in resource-limited settings. By integrating affordable sensor technology with intelligent data processing and accessible user interfaces, the system aims to improve patient outcomes through early detection of health anomalies and reduced dependence on manual intervention for vital sign tracking.

Antares ciotti Antares ciotti

Discipline: Chemistry

Authors:

#1 Antares Ciotti

Abstract Name: Integrating Art into Chemistry Lessons: Effects on Student Engagement and Comprehension

Traditional chemistry instruction often relies heavily on symbolic representations, abstract formulas, and lecture-based delivery, which can make core concepts difficult for students to visualize and meaningfully internalize. This project investigates whether integrating artistic elements into chemistry lessons can improve student engagement and conceptual understanding. Building on research in multimodal learning and visual cognition, the study explores how creative activities—such as drawing molecular structures, designing color-coded reaction maps, and constructing visual or physical models—may support students in forming stronger mental models of chemical processes. The study is being conducted in an undergraduate introductory chemistry setting and uses a mixed-methods design. Quantitative data include pre- and post-instruction assessments measuring conceptual understanding of selected topics, along with validated engagement surveys administered before and after the intervention. Qualitative data consist of classroom observations, student sketches and visual products, and short reflective interviews designed to capture student perceptions of how

the artistic components influenced their learning. The intervention spans several instructional modules, each incorporating an art-based activity aligned with core chemical concepts such as bonding, molecular geometry, reaction mechanisms, and energy changes. Preliminary results suggest that students participating in the art-integrated lessons demonstrate increased willingness to engage with challenging content, report greater confidence in visualizing molecular interactions, and show modest gains in assessment scores relative to students receiving traditional instruction. Qualitative feedback further indicates that the creative tasks helped students slow down, process information more deliberately, and connect symbolic representations to concrete visual models. This project aims to contribute to ongoing discussions about interdisciplinary teaching practices in STEM by examining how artistic modalities can serve as accessible entry points into complex scientific ideas. Ultimately, the study seeks to determine whether bridging art and chemistry can support deeper, more intuitive comprehension while fostering a more engaging and inclusive learning environment.

Atalie Antuna

Discipline: Biology

Authors:

#1 Kay Jann

#2 Dilmini Wijesinghe

#3 Yingxu Liu

#4 Leon Aksman

Abstract Name: Altered fMRI-complexity in persons with vascular risk

Alzheimer's disease (AD) is the most common cause of dementia, leading to progressive cognitive decline. One of the leading risk factors of AD is vascular disease, like hypertension and diabetes, as it affects oxygen and nutrient delivery to the brain, potentially affecting cell function. Such neurovascular dysfunction can be measured by functional MRI (fMRI). The complexity of the fMRI signal has been found to be altered in the parietal lobe, temporal lobe, and posterior cingulate cortex (PCC) in those with AD. While fMRI-complexity has been shown to be related to impaired cognition and tauopathy, its association with vascular risk factors is largely unknown. Therefore, the purpose of this study is to investigate whether fMRI-complexity is altered in persons with cerebrovascular risk factors. We used data from the LASI-DAD study (N=56). fMRI data were preprocessed using the CONN toolbox. Multiscale Sample Entropy (MSE) was used to estimate fMRI-complexity. Complexity values were extracted from regions of interest (parietal, temporal, and PCC) based on the Schaefer atlas. ANCOVA was conducted to investigate the relationship between cerebrovascular risk factors and regional fMRI-complexity, including hypertension (vs. no hypertension) and diabetes (vs. no diabetes), controlling for age, sex, and average gray matter complexity. We found that in participants with hypertension, MSE was significantly increased in the parietal ($F=10.963, p=0.00678$) and PCC ($F=7.438, p=0.0411$) regions, while it was significantly decreased in the temporal ($F=7.645, p=0.03594$) region. In participants with diabetes, MSE was significantly increased in PCC ($F=34.456, p=0.00000012$), but not in the parietal ($F=2.372, p=0.756$) or temporal ($F=2.087, p=0.8988$) regions. We discovered that fMRI-complexity shows associations with vascular risk factors, especially in PCC. Vascular health may influence brain function before noticeable Alzheimer's symptoms appear. Detecting early changes in brain complexity could support earlier diagnosis and intervention. Future research should explore whether vascular health may support brain function and slow Alzheimer's progression.

Caleb Antwi

Discipline: Physics and Astronomy

Authors:

Abstract Name: Computational Modeling of Axonal Vesicle Populations via Multi-Cytoskeletal Trafficking

Behind every functioning synapse lies a constant flow of synaptic vesicles (SVs) navigating a crowded and dynamic cytoskeletal landscape. Neuronal maintenance of healthy SV populations requires transporting new proteins from the cell body to presynapses, often millimeters away, as well as removing old or damaged proteins. Experimental data captured in living neurons reveal that SV are trafficked along both filamentous actin (F-actin) and Microtubule (MT) Cytoskeletons, and that two-state motion can supports directional differences in SV motion. Here, we present a computational model based on experimental measurements of SV motion. Our agent-based simulation allows SVs to act on set probabilities. SVs stochastically choose which track to follow, which motor state they are in, and whether they get captured or traverse a presynaptic site, all based on rates and other measurements taken from live-cell imaging. Investigations using this model probe how measured directional differences (observed in experiments lasting approximately one minute) affect SV populations that must be maintained over individual SV lifetimes (weeks) and organism lifetimes (years). We use this model to test what happens when specific parts of the transport system are deliberately changed. For example, we simulate reducing the role F-actin plays (modeling inhibited motor proteins like myosin-V) or disrupting MT-based trafficking (modeling MT disruptions observed in neurodegenerative diseases like Alzheimer's disease). Modeled results show how these changes affect SV populations over the axon length and over time, as well as the net motion of SVs that may play a role in SV recycling. This reveals the role that multi-cytoskeletal trafficking may play in maintaining healthy SV populations as SVs are delivered to presynapses, move between presynapses and used during their active life cycle, and eventually removed from use and degraded.

Zeeshan Anwar

Discipline: Biochemistry

Authors:

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Abstract Name: Stabilization of triplex DNA by flavone derivatives with pyridine-containing side chains

Triplex DNA structures form when a third oligonucleotide strand of oligonucleotide binds to duplex DNA via Hoogsteen hydrogen bonding in the major groove. These structures occur both naturally or artificially in vivo and are known to contribute to various biological processes such as gene regulation, DNA replication, and DNA repair. Targeting duplex DNA with a triplex-forming oligonucleotide (TFO) to form a triple helical structure in a sequence- specific manner is a promising approach to regulate gene transcription (known as the antigene strategy). However, this method is currently limited for gene therapy due to triplexes' low stability and slow formation. A way to increase the stability and facilitate triplex formation is the use of small molecules. Our group recently reported a series of triplex-specific binding ligands derived from plant-based compounds known as the flavones. Various biophysical studies suggest that these ligands have high selectivity and affinity for triplex DNA over duplex DNA, particularly when an amino-containing side chain is present at the 5-position of the flavone scaffold. In this work, we extend these studies by introducing pyridine-containing side chains at the 5-position. Herein, we present the synthesis, characterization, and biophysical evaluation of these molecules, demonstrating their ability to enhance triplex stability.

Felix Aportela

Discipline: Biology

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Abstract Name: Identifying Ideal Solvent Content for Soxhlet Extraction of Lipids From Lemna Minor for Biofuel Production

Climate change continues at an alarming rate as global efforts to curb air pollution face difficulties, including pollution caused by electric vehicle battery production. One alternative being investigated is the use of biofuels, providing a renewable alternative to energy-dense nonrenewable fuels. Duckweed (scientific name *Lemna minor*) is an aquatic plant known for its rapid growth and high protein content, primarily used as a food source and in bioremediation. This study aims to determine the utility of *L. minor* as a sustainable biofuel source and provide critical information for optimizing lipid extraction procedures when using the Soxhlet extraction process. To that end, samples cultured in a laboratory setting are used to create pellets, with lipids extracted using the Soxhlet extraction process with varying concentrations of solvents (chloroform, ethanol, and hexane). A percent yield is then calculated for each trial. Our three most recent trials had a 94.16% yield from 250 mL of 20% Ethanol and 80% Hexane, a 96.86% yield from 175 mL of 20% Ethanol and 80% Hexane, and a 1.66% yield from 175 mL of 20% Ethanol and 80% Hexane (although this run experienced significant human error). Further research could investigate the specific lipids extracted, determine the most efficient method of converting these lipids into usable biofuels, and identify methods to scale production to an industrial scale. If *L. minor*'s utility to biofuel production is confirmed, it may serve as an important tool to reduce emissions and provide a cleaner future for generations to come.

Carolyn Appleby

Discipline: Biology

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Gabriella Moraglia

Abstract Name: Ecomorphological variation across urban vs rural populations of invasive Cuban treefrog (*Osteopilus septentrionalis*)

One of the central questions of biology is to understand how organisms adapt to their environment. The budding field of ecomorphology has provided insight into these adaptive processes, demonstrating how organisms in similar environments can convergently evolve similar body plans or ecomorphs. Recent ecomorphological studies have indicated that adaptive ecomorphs can vary significantly in the face of anthropogenically-driven selective pressures. However, these ecomorphological studies have been limited to a small number of taxa. For our project, we studied invasive populations of the Cuban treefrog (*Osteopilus septentrionalis*) to determine how predictable ecomorphological patterns are in an understudied taxonomic group. Specifically, we aim to 1) determine if there are significant differences in the limb length or toepad area of *O. septentrionalis* populations in urban vs. rural environments, and 2) determine if the same ecomorphological patterns evolve consistently in different urban populations. To date, 59 individuals have

been collected from two rural sites and 120 individuals from two urban sites. For each specimen we used calipers to measure limb length and SVL, and ImageJ to measure toepad area and digit length. For each morphological measurement, we will run an analysis of covariance (ANCOVA) to determine if limb length or toepad area differs significantly between populations of rural/urban populations. This research will provide insight into the ecomorphology of an understudied taxon to determine how repeatable ecomorphological patterns are and will allow us to gain insight into the rapid evolution of a harmful invasive species in the context of anthropogenically-driven selective pressures.

Adam Aquilo

Discipline: Mathematics

Authors:

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Abstract Name: Extending the Maximum Cut Problem to Lie Algebras

In mathematics, a graph is a collection of nodes (also known as vertices) and edges that connect them. On its own this definition may seem odd, but from this simple start one can abstract the nature of relationships. Each node may represent a person with edges representing who is friends with whom, or the graph might be a chart showing what appliances are dependent on various household features. As opposed to restricting ourselves to any one scenario, a graph allows us to view all systems of the same form abstractly. Of particular interest to us is an old graph theory problem: The Maximum Cut Bound. In short, what is the maximum number of edges that can be “cut” by separating a graph into two distinct parts. Regarding one of the scenarios mentioned previously, this sets a way to create two teams such that most friends are split over the two teams. This could be useful in a classroom setting for a teacher to separate the rabble-rousers from their friends and keep the whole class focused on their tasks. Lower bounds on this number exist in the case of graphs, but we hope to prove something new on this lower bound under the more general Dani-Mainkar Construction. This is a theorem providing a method by which to extrapolate graphs into Lie Algebras. In this way we move even more abstractly, at the cost of losing the concrete diagrams that graphs can provide. What we have proven so far is that a rudimentary lower bound holds under the more generalized Lie Algebras. However, our work is still ongoing, and we hope to show that the stronger bound may follow, or that it falls apart due to some difference between the graph and its extrapolation under the Dani-Mainkar Construction.

Allen Jeshua Aquino

Discipline: Psychology

Authors:

#1 Eleni Katsarakes

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Jaylen Hill

Abstract Name: Beyond Static Warnings: The Impact of Visual Previews and Animation on SMiShing Decision-Making

Despite increased awareness of phishing scams, users remain highly susceptible to attacks. This vulnerability is exacerbated by the inherent constraints of mobile interfaces, where limited screen real estate and simplified protocols obscure critical security cues available on desktop computers. Unlike email, SMS lacks transparent domain information, often forcing users to rely on ambiguous sender details despite evidence that they fail to

visually scrutinize these elements. To address these human-centered challenges, the present study employs a high-fidelity interactive simulation to evaluate real-time engagement with security interventions among N = 47 participants. They interacted with messages in a simulated iOS environment under three distinct conditions: 1) a text-based warning, 2) an animated warning element, and 3) a visual preview of the destination website. Results are expected to demonstrate that the visual preview yields the lowest click-through rates and highest decision confidence by satisfying user curiosity through greater contextual transparency. Conversely, traditional text-based warnings are anticipated to be the least effective due to habituation. This experiment moves beyond static survey methodologies to provide critical insights into human-centered security design, identifying specific interface elements required to support safer decision-making in security-critical mobile contexts.

Gonzalo Aranda

Discipline: Engineering

Authors:

#1 Gonzalo Aranda

#2 Renato Ruiz

Renato Ruiz

Abstract Name: From Flood To Flow

Flooding has become one of the fastest-growing natural hazards worldwide, placing more than 1.47 billion people at risk. In Utah, for instance, about 5% of homes in Salt Lake County are considered highly vulnerable, and the size of flood-risk areas has grown by almost 24% since 2000. As these events become more frequent, there is an urgent need to rethink the materials used in housing, especially in communities that lack access to durable construction systems. This project examines the early, theoretical development of a flood-resistant composite wall panel designed to improve how homes withstand extended water exposure and the forces generated during flood events. To better understand the challenge, the study first looks at why widely used construction materials fail when subjected to flooding. Concrete can crack under lateral pressure, adobe dissolves, timber swells, and steel corrodes. These weaknesses were examined using examples from Peru, Brazil, India, and several regions in the United States, combined with research on hydrodynamic loads and patterns of structural deterioration. Based on these observations, the project proposes a multilayer composite panel built from a fiberglass core bonded with epoxy resin, protected by a flexible silicone layer and coated with a hydrophobic surface finish. Initial modeling suggests that this type of composite panel could retain its structural capacity even after long periods of saturation. It may also help reduce reconstruction expenses by as much as 40% compared with traditional materials. Although productive, the design is still theoretical, with the implication that there is huge potential within modular, low-maintenance, resilient designs as solutions for housing. This project attempts to provide a vision for a future where vulnerable families can remain safe within their dwellings despite increasing flood events caused by climate change.

Amaya Aranda

Discipline: Biology

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#1 Bindu Chunduri

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Abstract Name: The effects of moderate to intense physical activity in cognitive function is moderated by sex and cognitive status

The purpose of the current study was to observe the association between physical activity and cognition, and how moderators including APOE status, sex, and cognitive status may influence the association between physical activity and cognition. Participants (N=122, m=75 years, 56.6% women) wore a Fitbit Inspire 3 for one week and underwent neuropsychological testing. Physical activity levels were divided into light, moderate, and intense. We created a time spent in moderate to intense physical activity (MIPA) for all participants. Linear regressions were used to examine the association of physical activity with cognitive outcomes adjusting for age, race, and education, as well as APOE status, sex, and cognitive status, depending on which modifier was being used. We also tested for effect modification using APOE status, sex, and cognitive status. Greater MIPA was related to better working memory performance ($\beta = 0.200$, $p = 0.04$). MIPA was not associated to any other cognitive score ($p\text{-values} > 0.19$). When using APOE as a moderator, MIPA was not associated with cognition ($p\text{-values} > 0.07$). However, when using cognitive status as a moderator, MIPA was associated with working memory ($SE = 0.005$; $p = 0.04$), such that participants with greater MIPA scored better with mild cognitive impairment. Using sex as a moderator, MIPA was associated with immediate word recall ($p=0.03$), delayed word recall ($p=0.04$), and delayed story recall ($p=0.05$), with greater MIPA resulting in improved performance in male participants and worse cognitive performance in female participants. When examining effect modification by sex, was also associated with the overall memory composite score ($SE = 0.04$; $p=0.01$), such that female participants score worse with increased MIPA. Women engaged in, on average, 10 fewer minutes of MIPA than men. Combined with the differences in amount of MIPA done, these results could suggest that there is a minimum level of MIPA necessary to see beneficial results.

Olivia Aratea

Discipline: Architecture, Construction Management, and Interior Design

Authors:

#1 Olivia Aratea

Abstract Name: Beyond the Walls: Reimagining Campus Architecture to Support Survivors of Sexual Assault

This thesis explores how trauma-informed design principles can be integrated into Kennesaw State University's Marietta Campus to promote psychological safety, emotional resilience, and reduction of trauma triggers for survivors of sexual assault. While trauma-informed approaches have been implemented in healthcare and counseling, their application within academic architecture remains limited. This gap is important to consider given the rising rates of sexual assault, which have increased 62.5% since 2020. Current data shows that four in five women (81%) and two in five men (43%) experience sexual assault in their lifetime, specifically noting that college-aged women are three times more likely to experience it than the general population. Given the ongoing emotional impacts of trauma among students, this research focuses on addressing that gap, establishing the built environment as an active agent in student healing and resilience. A qualitative research approach will be utilized, combining historical analysis, precedent studies, and site-specific observation. Behavioral and sensory mapping, the implementation of trauma-informed principles, and biophilic design strategies will inform an understanding of how architectural elements such as light, circulation, materiality, and spatial thresholds influence perceptions of safety and wellbeing, along with improvements in student performance despite the presence of anxiety, depression, and PTSD among sexual assault survivors. Through adaptive reuse of existing structures, proposing new "hubs" within the campus framework, and reimagined campus circulation, this thesis proposes a new composition of campus design that not only educates and spreads awareness but also restores trust, dignity, and emotional refuge. **KEYWORDS:** Trauma-Informed Design, Sexual Assault Survivors, Campus Design, Spatial Healing, Biophilic

Juliana Arbeláez

Discipline: Biology

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Abstract Name: Assessment of the endemic diversity of small mammals in the Sierra Nevada de Santa Marta (SNSM)

The Sierra Nevada de Santa Marta (SNSM), located in northern Colombia, is an isolated massif and the highest coastal mountain in the world, reaching 5,750 m as a pyramidal peak separated from the Andean chains. This geographic isolation and its wide range of ecosystems have made the SNSM a “continental island” and one of Colombia’s major biodiversity hotspots. Although the region hosts high levels of endemism in birds, amphibians, and reptiles, only five endemic mammal species have been reported—a surprisingly low number compared to other biological groups. This apparently low endemism may be due to the lack of recent studies. Most mammal records originate from investigations conducted during the late 19th and early 20th centuries, with few subsequent taxonomic revisions. Additionally, many of the species first described in the SNSM have also been reported in the Andes, despite the mountain range’s supposed isolation. While molecular techniques have revealed significant hidden diversity in cryptic mammal groups—such as sigmodontine rodents and bats—no molecular-level studies have yet been conducted in the SNSM. Given this, and considering the massif’s biogeographical isolation, it is likely that the endemic diversity of mammals in the SNSM is currently underestimated. Just as in most vertebrate groups, mammals may also present high levels of endemism. The main objective of this project is to identify the true diversity of mammals in the SNSM by evaluating their current taxonomic designations through molecular and systematic techniques, with the aim of confirming their identities or revealing possible new degrees of endemism.

Jeiselli Archer

Discipline: Nursing and Public Health

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Abstract Name: Evaluating Palliative Radiation Therapy Outcomes for Bony Metastases: A Retrospective Study Across Primary Tumor Types

Advanced cancers frequently metastasize to bone, where tumor infiltration disrupts normal bone remodeling and causes skeletal complications such as pathologic fractures and spinal cord compression. These events result in pain, impaired mobility, and diminished quality of life. Palliative radiation therapy (RT), particularly external beam RT, is widely used to relieve symptoms, but its impact on local control, pain relief, and durability of response remains underexplored. We hypothesized that palliative RT provides effective pain relief and local control of bone metastases, with outcomes influenced by treatment site and primary cancer type. The objective was to evaluate the efficacy and prognostic factors associated with palliative RT for bone metastases. We retrospectively reviewed 529 cancer patients who received palliative RT for bone metastases at Mayo Clinic Jacksonville between January 2020 and May 2025. Univariate Cox proportional hazards

regression was used to identify predictors of re-treatment, overall survival (OS), and progression-free survival (PFS). Patients with bladder cancer had a significantly higher risk of re-treatment (hazard ratio [HR] 5.18). A one-category increase in ECOG score, lung or gastrointestinal cancer diagnosis, and skull treatment site were each associated with greater mortality risk. By contrast, breast, prostate, and thyroid cancers were associated with improved OS and PFS. A 5 Gy incremental increase in RT dose was also associated with reduced mortality risk. ECOG status remained a consistent predictor of both OS and PFS, with higher scores correlating with worse outcomes. Palliative RT offers meaningful disease control for patients with bone metastases, though outcomes vary by functional status and primary tumor type. ECOG performance status is a key prognostic factor for OS and PFS, while breast, prostate, and thyroid cancers demonstrate favorable responses compared to lung, gastrointestinal, and bladder primaries. These findings highlight the importance of individualized treatment planning based on patient performance status and cancer type.

Theodore Arden

Discipline: Gender, Ethnicity, Diversity, or Cultural Studies

Authors:

#1 Kylie Avitabile

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Abstract Name: Designing With, Not For: Student-Led Investigation of Neurodivergent Experiences Across a University Community

This student-led research project explores the various experiences of neurodivergent individuals at a public R1 university. The project aims to understand the perspectives of all university affiliates, including students, faculty, and staff. The project encompasses a range of focus areas that aim to gather these perspectives regarding neurodivergent individuals. Our group seeks to answer one question: How can student-led, mixed-methods research surface both barriers and strengths in neurodivergent experiences to inform more inclusive institutional policies and practices? Our research group was formed in 2023 as part of a course-based undergraduate research experience. Students in the research group represent a variety of majors and are neurodiverse. During the 2023-2024 academic year, we designed and distributed an initial STEM-focused survey, which was then revised to include the broader university community. This methodology provided undergraduates with the opportunity to lead research design, develop bibliographies, create protocols, analyze data, and communicate findings. Based on these survey findings, we identified separate focus areas and conducted interviews. The current focus areas are as follows: Accommodation and Inclusion, Cultural Perceptions, Mental Health and Well-being, and Strengths-Based Approaches. Our approach adopts a strengths-based framework that is grounded in the principle of “nothing about us without us.” Our research aims to gather information from neurodivergent individuals rather than relying on outdated medical models. Patterns that have emerged include the limited training for neurotypical individuals, mixed perspectives on accommodation effectiveness, and reluctance to disclose neurodivergence, as well as a lack of understanding of personal strategies. Ultimately, we expect to analyze disclosure rates, identify barriers, and map strengths. This research will transform these narratives into a body of interventions, enabling university officials to make informed decisions. We will highlight how this design enables students to conduct research with the neurodivergent community, while developing research competencies and learning to gather diverse perspectives.

Florence Arevalo

Discipline: Interdisciplinary

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#2 Lea Broadbent

Lea Broadbent

Abstract Name: Developing a Land Engagement Interface for Multi-Domain Training at the Air Force Academy

The Land Engagement Adjudication Platform (LEAP) is a web-based application designed to enhance cadet education at the U.S. Air Force Academy (USAFA) through immersive, operational-level wargames. LEAP empowers cadets to apply critical elements of force employment in realistic scenarios, leveraging foundational operational design principles to deliver actionable outcomes in force-on-force engagements. Developed by USAFA cadets during the Cadet Summer Research Program (CSRP) at the Air Force Research Laboratory's Gaming Research Integration for Learning Laboratory (AFRL GRILL), LEAP is designed to integrate into the Department of Defense Modeling and Simulation ecosystem. LEAP also integrates Distributed Interactive Simulation (DIS) protocols, enabling the system to receive DIS packets for use in the program, demonstrating its interoperability with other systems and enhancing its utility in multi-domain training environments. Currently, in the process of being integrated into the Multi-Domain Laboratory (MDL) and a Military Strategy core course, LEAP provides cadets with practical experience in operational-level tactics within a capstone wargame. By making decisions about intelligence collection, combined arms application, and resource allocation, cadets see the direct impact of force employment on unit, effectiveness, and larger mission objectives. This hands-on experience highlights the interdependence of air, space, and cyber effects on the terrestrial battlespace, preparing cadets to excel in joint force operations. LEAP addresses the challenge of teaching complex operational concepts in a realistic and scalable format, engaging over 1,000 cadets annually in semester-long wargaming exercises. Future development will focus on expanding its interoperability and exploring augmented reality integration, ensuring LEAP remains at the forefront of innovative military education solutions.

Lillian Argabrite

Discipline: Biology

Authors:

#1 Tonya Train

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Abstract Name: The Impact of the Cystic Fibrosis Microenvironment on Pathogenic Bacterial Interactions

Cystic Fibrosis (CF), a debilitating genetic disease, has a pathology that allows for harmful bacterial infections within patient lungs. Oftentimes multiple types of bacteria are present and interacting at once, including *Staphylococcus aureus* (S.A.) and *Pseudomonas aeruginosa* (P.A.), which contribute to increased morbidity and mortality in CF patients. Understanding the behaviors exhibited by these bacteria, along with how their dynamics affect CF patients, is vital when considering effective treatment. Compared to healthy airway epithelial cells, CF cells exhibit different levels of iron and reactive oxygen species. Soluble factors such as these might impact bacterial interactions. To investigate this hypothesis, supernatants, which contain soluble factors, were isolated from IB3-1 (CF) and C38 (healthy) cell lines. Research is currently being conducted to observe how the addition of these control or CF supernatants might affect the interactions between S.A and P.A. bacterial isolates. Preliminary findings suggest that both control and CF soluble factors promote phenotypic changes in S.A and P.A. isolates. P.A. developed a mucoid phenotype, and S.A. isolates demonstrated small colony variants in the presence of soluble factors. Additional experiments are needed to

determine whether the changes caused by CF factors are significantly different than normal. Regardless, future experiments will focus on quantifying and individually manipulating each airway factor to define what caused significant change. Any change in interaction observed due to the presence of soluble factors derived from human airway cells is novel to this area of research and will add to the reserve of knowledge in broader CF research.

Brianna Arias Cabrera

Discipline: Education

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Abstract Name: Multilingual Youth Sharing Heritage: The Significance of Linguistic and Cultural Appreciation in Atlanta and South Korea

The common struggle that most immigrant families face is the marginalization of their heritage language (HL) in ideologically monolingual and monocultural societies. For instance, the U.S. does not prioritize supporting HLs, leading immigrant children to weaken the link to their cultural knowledge and HL proficiency. Similarly, in South Korea with a longer history of monolingualism and monoculturalism, many immigrant families avoid using their HLs due to negative social stigmas, generating similar results. Both contexts can benefit from a better system and environment to support immigration youth's linguistic and cultural dexterity as well as identity development. Such a small initiative was intentionally designed and implemented to connect 8 multilingual youth pairs to virtually engage with each other in their commonly shared HL. 8 university mentors paired with 4 middle and high school mentees based in the U.S. and 4 in South Korea recorded their exchanges for over two to four months. They shared linguistic and cultural backgrounds, as well as interests, in their common HL, including Russian, Korean, Tamil, Farsi, Spanish, and more. Each pair also created a collaborative digital story about their linguistic and cultural journeys. Drawing on the translanguaging framework that values multilingual youth's multilingualism, this presentation focuses on eight multilingual pairs' experiences with this research project. The qualitative analysis of the various artifacts and individual interviews revealed that this project triggered the youth to delve deeper into their cultural and ethnic identities. They also fluidly used all their linguistic repertoires to better connect to their pair.

Cleveland Armentrout

Discipline: Physics and Astronomy

Authors:

#1 Tyler Hardy

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Abstract Name: Realistic Digital Holography Demonstrator: a STEM Outreach Tool for Teaching Optics and Lasers

The US Air Force (USAF) is interested in using lasers and optics for sensing and directed energy applications. These systems must overcome atmospheric turbulence, which distorts images and complicates detection. Digital Holography (DH) is a sensing technique that enables measurement of atmospheric turbulence and allows for improved capabilities for imaging and sensing applications. Researchers must explain their work to audiences without laser and optics expertise, ranging from high-level decision makers to

high school and undergraduate students as part of STEM outreach events. STEM outreach is also a critical component to ensuring future leaders with technical understanding and awareness. There is a need for a simple demonstration tool that can cater to a range of audiences while also accurately mimicking a real-world DH system. In previous work, USAF researchers built DH demonstration systems that explain the science and engineering involved with imaging through atmospheric turbulence and showing that aberrations can be corrected with digital methods. Our DH demonstration tool adds to previous work by introducing a reflective imaging geometry which leads to speckle from rough surface scattering and a true pupil plane in which we may introduce isoplanatic turbulence. Additionally, the system is less expensive than previous demonstrators, allowing for widespread use in optics education programs.

Samantha Armstrong

Discipline: Communications

Authors:

Abstract Name: Monotropism: Television Consumption and Interaction Through a Neurodivergent Lens

This study examines the link between different levels of monotropic traits and how people choose to consume and interact with television shows. People with monotropic traits often focus their attention on one thing at a time compared to people with polytropic attention types. Monotropism is also regarded by some as an emerging theory of Autism Spectrum Disorder, suggesting a link between autists and other neurodivergent people and high levels of monotropic traits. Previous research has suggested autistic populations consume TV in different ways. This includes watching more TV, restricted viewing habits and binge watching, and interacting with fan content more than non-autistic populations. This may also be true for monotropic audiences. In the survey, people were asked about their TV viewing habits and how they interact with TV shows. Participants were then asked to fill out the Monotropic Questionnaire, which measures levels of monotropic traits, asked if they have a neurodivergent diagnosis or identity, and fill out some demographic information. This survey was shared with neurodivergent focused groups. Additionally, a representative sample of US adults was purchased. Data collection finished in November 2025, collecting around 800 responses. The beginning analysis of this data shows some differences in viewing habits; upcoming additional analysis will reveal the possible significance of results. This data hope to show if there are major trends between how people with high and low levels of monotropic traits differ in how they consume and interact with television shows. How people consume media informs how TV will be produced in the future. Further research into people with high levels of monotropic thinking could help media producers better benefit and design media for monotropic and neurodivergent audiences.

Lorena Arnett

Discipline: Biology

Authors:

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Madison Ling

Abstract Name: Characterization of *Providencia alcalifaciens*: Ecological and Genomic Insights into Antibiotic Resistance and β -lactam Susceptibility

Antibiotic resistance is an increasingly significant issue in ecosystems worldwide, with higher resistance levels often occurring in areas influenced by human activity. One such site is Navajo Creek, a suburban

waterway in southwest Chicago that runs through residential neighborhoods and forest preserves. Bacterial isolates from this creek exhibit resistance to six different antibiotics and metagenomic analyses reveal substantial microbial diversity within these communities. Water samples collected from suburban waterways over several months show that *Providencia alcalifaciens* is both geographically widespread and consistently present over time. Whole-genome sequencing of *P. alcalifaciens* identifies an extensive suite of resistance genes that enable survival in the presence of antibiotics; however, the interactions between these genes and specific antibiotics remain under investigation. Cultures are being exposed to various antibiotics to assess gene expression via qPCR, and growth assays are being performed to evaluate resistance across different antibiotic concentrations. The bacterium displays variable susceptibility to several β -lactam antibiotics, including oxacillin, amoxicillin + potassium clavulanate, and carbenicillin. Notably, although amoxicillin with potassium clavulanate does not show enhanced activity against this strain, other β -lactam/ β -lactamase inhibitor combinations are effective, suggesting that specific inhibitor-antibiotic pairings may overcome resistance mechanisms in *P. alcalifaciens*. Overall, this project provides an ecological and genomic characterization of a highly resistant microbe and potential pathogen isolated from local waterways.

Mason Arnold

Discipline: Psychology

Authors:

Emma Meek

Abstract Name: Examining Measurement Invariance in Aging Self-Efficacy Across Adulthood

Perceptions of individuals' self-efficacy have been examined across a variety of domains and age groups (e.g., social, cognitive, emotional; Bandura, 1993; Tovel, et al., 2017). The current study uses a measure of aging self-efficacy piloted by Walsh et al. (2025) to examine potential differences in the ways younger and older adults think about their abilities during adulthood across the different domains of aging. Specifically, this study will examine the facets of aging self-efficacy with a focus toward assessing the degree of measurement equivalence that occurs across groups. Equivalence is necessary for age-related comparisons to be made. As an example of the concept, the Big Five personality characteristics (e.g., Goldberg, 1990) are consistent across many kinds of groups around the world, which makes it possible to compare different populations based on observed personalities. If the current study finds similar measurement invariance, we will be able to do the same. This study will examine perceptions of self-efficacy from both younger and older adults at ages 25, 50, and 75 years with measurements being prospective for the younger group and retrospective for the older group. We will therefore be positioned to examine not only potential measurement consistency but also the degree to which such consistency might vary across time points for each group. For example, we hypothesize that principle components analyses will yield fewer components from younger adults' data and more from older adults' data. This is expected to reflect a view of younger people that conditions may decline in a general sense during later adulthood, whereas retrospective reports of older participants will be more nuanced and reflect more differentiation between aspects of aging self-efficacy due to lived experience.

Kaletra Arnold

Discipline: Interdisciplinary

Authors:

#1 Kaletra Arnold

Abstract Name: Regulating a Revolution: Quantum Computing Data Centers in Washington, Tennessee, and California Tied to Systemic Violence Through Legal and Regulatory Structures

This research project analyzes whether large-scale artificial intelligence data centers with quantum infrastructure developments in the United States align with the principles of responsible innovation and equitable development. Alternatively, it asks if they create a pattern of systemic violence through environmental and social harm. The central research question is whether quantum computing data centers such as IonQ, xAI, and Google exploit regulatory gaps that reflect irresponsible innovation and systemic violence. It also examines how this may further institutionalize neglect of equitable development. AI and quantum computing are often described as central to a national strategy for innovation, global competitiveness, and technological leadership. However, environmental justice and political economy scholarship indicate that large-scale, resource-dependent infrastructure projects are often sited in communities with limited political power, historical disinvestment, and existing environmental burdens. This project introduces an integrated analytical framework that combines systemic violence theory, four components of equitable development, and the four dimensions of responsible innovation. The framework is used to assess the ethical and material consequences of advanced technological expansion. The study will use a comparative case study methodology based on critical legal theory. The qualitative analysis uses the Pugh method with decision matrix charts, and the quantitative analysis uses government reports, socio-spatial data, and legal deconstruction. These will reveal planning processes, regulatory actions, environmental impacts, and experiences near facilities. The project anticipates a misalignment between the public narrative of innovation and the realistic local impacts. Expected results include evidence of regulatory circumvention, procedural injustice, environmental strain on utilities, and the concentration risk among already vulnerable populations. These findings will be discussed in the context of environmental justice, technological ethics, and future policy recommendations, with the aim of proposing a more just and accountable model for quantum computing applications.

Julian Arrieta

Discipline: Engineering

Authors:

Abstract Name: Benchmarking a Novel Nanoparticle Profiling Device for Early Disease Detection

Exosomes are small vesicles released by all human cells which are being increasingly studied as potential biomarkers for early cancer detection. Many existing systems to analyze exosomes use light-scattering analysis methods, which often require expensive and time-consuming sample preparation protocols. The Innovation Center of NanoMedicine, in collaboration with the University of Tokyo, is developing the Ex400, a device capable of analyzing exosomes using dark-field microscopy. By tracking the motion of nanoparticles and applying the Stokes–Einstein equation, the device aims to provide rapid nanoparticle analysis with much less sample filtration needed. Because the device is still under development, its measurement precision and accuracy must be evaluated across a wide diameter range. This study assessed the Ex400's performance in measuring hydrodynamic diameter by comparing its output to two widely used commercial instruments: the ZetaSizer NanoZS (532 nm and 633 nm wavelengths) and the NanoSight LM10. NIST particle size standards (20–600 nm) were analyzed, with each device performing multiple trials according to device operational procedures. Measurement data from each device was used to compare performance of each product across the sample size range. The ZetaSizer NanoZS demonstrated high accuracy across all tested diameters. Both the Ex400 and NanoSight LM10 demonstrated moderate accuracy until measuring samples below ~25 nm in size. Across the full dataset, the Ex400 overestimated sample diameter by an average of 57.7 nm. Removing the lowest-diameter outliers yielded a linear regression with a high R^2 value ($R^2 = 0.9946$). Post-processing using a calibration equation further reduced error, producing an average error of 7.1% from true diameter. These results suggest that while refinement is needed, the Ex400 demonstrates strong potential as a powerful, convenient nanoparticle profiling tool for future disease diagnosis research.

Urooj Arshad

Discipline: Biology

Authors:

Abstract Name: A Well-Preserved Tylosaurine Mosasaur Jaw from Northern Japan: Implications for Palatal Morphology and Taxonomic Identity

Fossil mosasaur (Squamata: Mosasauridae) specimens preserving the palatal region are relatively uncommon due to the fragility of the associated bones. In this study, we aimed to describe a well-preserved upper jaw fragment belonging to a tylosaurine mosasaur from northern Japan, focusing on the vomer, palatal surfaces, and the corresponding tooth morphology. Through this analysis, we also attempted at deducing the taxonomic identity of the specimen to the genus level. In our specimen, the external naris exhibits a biconcave expansion anteriorly, differing from a narrower narial opening typical in other tylosaurines. The dorsal surface is variably damaged but is transversally convex overall. A space to house the Jacobson's organ, which detects chemical signals in the environment, may also be present; however, the in-situ septomaxilla has yet to be identified. Dorsally, a pair of premaxilla-maxillary sutures are very prominent, extending sub-parallel with each other anteroposteriorly. Ventrally, a pair of intact vomers extend longitudinally along the midline, leaving very little space in between. While most marginal teeth are broken at the base of the crowns, the roots are fully ankylosed to the respective alveoli, suggesting that the animal bore fully developed teeth. Numerous replacement tooth crowns were also present. Where preserved, the crowns are conical and curve posteriorly. The maxilla exhibits notable anteroventral thickening, accentuated by the deeply concave anterolateral margin of the aforementioned naris posterior to it. These features may diagnose this mosasaur within Tylosaurinae. Posteriorly, the maxillary tooth rows diverge, producing wide separation between the vomer and the tooth row. This contrasts with the anterior part of the palate, where the maxillae extend subparallel with each other, leaving little space with the vomers. We interpret this feature to contribute to structural tightening of the palate. Collectively, these observations expand morphological documentation of mosasaur cranial anatomy and may inform future systematic studies.

Moorea Artaza

Discipline: Nursing and Public Health

Authors:

#1 Carrie Bailey

Abstract Name: Behind Closed Doors: Barriers to Reporting Sexual Assault in Tennessee

Sexual assault remains one of the most pervasive human rights violations globally. In the United States, it continues to be a widespread and deeply underreported crime, with Tennessee experiencing particularly high rates. Despite the severity of these assaults, many survivors choose not to report to law enforcement. Guided by research on neurobiological trauma, stigma, and rural healthcare disparities, this retrospective descriptive study examines barriers to reporting among survivors across nine rural counties in East Tennessee and analyzes discrepancies between reported and unreported cases documented by Sexual Assault Nurse Examiners (SANEs) from 2023 to 2024. This study uses de-identified SANE medical records in compliance with HIPAA de-identification standards (45 CFR §164.514). No Protected Health Information is included, and there is no reasonable basis to identify individuals. A standardized coding tool ensured consistent data abstraction, enabling reliable identification of quantitative patterns. Statistical analyses assessed whether

demographic characteristics influenced reporting behavior. Across the sample, 71.4% of survivors reported their assaults, while 28.6% did not. In 2023, 329 individuals were assaulted compared to 273 in 2024, with most reporting in both years. Ages ranged from 13 to 87 years ($M = 28.81$, $SD = 13.42$), with most between 16 and 25. Age distribution showed non-normality (Shapiro–Wilk $p < .001$). An Independent-Samples Mann–Whitney U test indicated no significant age difference between reporting and non-reporting groups ($U = 34,407$, $p = .281$). Gender was not associated with reporting behavior, $\chi^2(1, N = 602) = 0.67$, $p = .414$, nor was race, $\chi^2(2, N = 594) = 0.06$, $p = .970$. These findings suggest that demographic variables do not explain reporting patterns, underscoring the role of structural, cultural, and psychological barriers. Understanding these obstacles is essential for improving survivor-centered care. This study aims to inform region-specific policies, outreach, and resource development that strengthen access to trauma-informed care in rural East Tennessee.

Anusri Arun Prasath

Discipline: Biochemistry

Authors:

#1 Justin Kidd

#2 Cancan Sun

Abstract Name: Investigating the unique interactions within yeast and human Hsp70-Hsp110 machineries to treat cancer and fungal infections

Background: Heat shock proteins (HSPs) are essential molecular chaperones that maintain proteostasis during cellular stress. In tumor cells, highly proliferative and toxic environments disrupt proteostasis, leading to HSP upregulation—making them promising biomarkers and therapeutic targets. Among these, the Hsp110 family is notable for its role as a nucleotide exchange factor (NEF) for Hsp70s, facilitating ADP release and ATP rebinding to drive protein folding. While fungal Hsp110 NEF activity is well characterized, the structural and functional features of the human Hsp70–Hsp110 complex remain less defined. Aim: We sought to compare NEF activity and complex formation across fungal, human, and cross-species Hsp70–Hsp110 pairings, identifying nucleotide and substrate conditions that optimize activity and complex stability. Methods: NEF activity was quantified by fluorescence polarization, measuring the displacement of fluorescent ATP analog (ATP-FAM) from Hsp70 upon addition of Hsp110 and unlabeled ATP. Native and mismatched Hsp70–Hsp110 combinations (fungal and human) were tested with or without NR peptide (NRLLLTG) and/or ATP. Complex formation under corresponding conditions was evaluated by native PAGE. Results/Conclusions: Native PAGE revealed that only the human Hsp70–Hsp110 complex (hHsp70–Hsp105) forms more readily in the absence of ATP, in contrast to fungal or cross-species pairings. This ATP-independent association was corroborated by polarization assays, where Hsp105 reduced mP values over time in the absence of ATP—especially with hHsp70—indicating a distinct mechanism of nucleotide exchange. Overall, our findings show that human and fungal Hsp70–Hsp110 complexes are structurally and functionally divergent. These mechanistic insights may guide the development of antifungal agents targeting opportunistic pathogens, which pose serious risks to immunocompromised cancer patients.

Sahar Aryanpure

Discipline: Psychology

Authors:

#1 Sharla Biefeld

Abstract Name: Discrimination and Substance Use Among College Students: Does Greek Affiliation Buffer Risk?

Background: Experiences of discrimination are associated with increased risk of alcohol and drug use among college students (Qeadan et al., 2022). Greek affiliation is also a strong predictor of increased alcohol and drug use in students (Scott-Sheldon et al., 2008). At Southern universities, Greek life tends to represent a particularly substantial portion of the undergraduate population, making its social influence especially salient. Research also suggests that peer networks may sometimes buffer students from negative impacts of discrimination (Lee et al., 2016). However, few studies have explored whether Greek and non-Greek students differ in how discrimination experiences influence their substance use behaviors. This study examines whether discrimination experiences predict substance use among undergraduates and whether Greek-life affiliation moderates this relationship. We hypothesize that discrimination experiences will predict increased substance use, and Greek-life affiliation will moderate these effects, such that being involved in Greek-life will be a buffer against negative impacts of discrimination.

Methods & Proposed Results Participants were undergraduates at a University in the Southern U.S. (N ~ 271), 45 non-Greek men, 90 non-Greek women, 18 Greek men, and 118 Greek women. Participants reported frequency of discrimination based on race/ethnicity, sexual orientation, and gender, as well as past-three-month substance use. Data collection is complete, and analyses will be conducted in January 2026. We will utilize a regression framework and SPSS Process Macro model number 1 to investigate our research questions.

Conclusion If our hypothesis is supported – discrimination predicts increased substance use, moderated by Greek affiliation – the findings may suggest that Greek-affiliated students may benefit from social buffering that reduces the impact of discrimination on substance use behavior. These insights could inform campus-wide prevention efforts, highlight the need for targeted support for students outside Greek life who experience discrimination, and strengthen university initiatives aimed at improving campus climate and reducing identity-based stressors.

Akua Asamoah

Discipline: Nursing and Public Health

Authors:

#1 Akua Asamoah

#2 Fidelis Sesenu

#3 Adebola Adegboyega

Abstract Name: Prenatal Experiences of Black American and Ghanaian Women: Provider-Patient Experiences and Interactions

Black women across the globe continue to experience inequities in maternal health outcomes rooted in failures of trust, communication, and respect. In the United States, pregnant women who are of color consistently report being discriminated against, disrespected, and ignored (Goh et al 2024). In Ghana, Moyer et al., (2021) reported that providers, despite knowing the principles of respectful maternity care, still displayed disrespect and abuse especially in high-stress situations. Together, findings like these show how racialized, gendered, and systemic inequities shape the quality of prenatal care. Comparing these two countries provides an opportunity to discover how shared patterns of inequality manifest and are negotiated in differing health structures. Using a qualitative approach, this study involves in-depth interviews (N =12) with four women with a history of prenatal care and two healthcare providers from each country. Women were eligible if they had given birth within the past two to six years and were ≥ 18 years. Providers were eligible if practicing in maternal health (e.g. midwives, nurses, and physicians) and were ≥ 18 years. Interviews (45-60 minutes) were analyzed thematically to identify patterns in communication, respect, and trust during prenatal care. Preliminary findings suggest that while foundational values of respectful, patient-centered care occur in both countries, some challenges remain in these same areas, increasingly countered via community support and the cultural knowledge of women at the receiving end of care. The ways in which providers demonstrate values of care are shaped by their structural environments (resource limited vs structurally inequitable). This results in shared values but context-specific approaches to communication, decision-making, and patient

advocacy. By centering women's lived experiences, this comparative study deepens understanding of how interacting social and structural factors influence maternal care for Black women in both countries, informing efforts to promote more equitable, compassionate, and culturally responsive health systems.

Jacob Asay

Discipline: Health and Human Development

Authors:

#1 Matthew Nicholaou

#2 Kendal Beazer

Garrett D'Apuzzo

Madison Christensen

Abstract Name: Bacterial Prevalence and Antibiotic Resistance Reservoirs in Licensed and Unlicensed Producers of Raw Milk

The consumption of raw milk has increased in recent years due to perceived health benefits, despite well-established public health risks associated with unpasteurized dairy products. Raw milk can harbor foodborne pathogens, including *Escherichia coli*, *Salmonella*, *Campylobacter*, and *Listeria monocytogenes*, as well as serve as a reservoir for antimicrobial resistance (AMR). In Utah, licensed raw milk producers are required to follow specific hygiene and handling regulations, whereas unlicensed producers are not subject to the same oversight. This study will evaluate whether licensing status influences both microbial contamination and antimicrobial resistance profiles in raw milk. Raw milk samples will be collected from ten licensed and ten unlicensed sellers. Microbial isolates will be recovered using selective and differential culture media. Antimicrobial susceptibility testing will be performed using agar dilution methods in accordance with Clinical and Laboratory Standards Institute (CLSI) guidelines to determine minimum inhibitory concentrations for a defined panel of clinically relevant antibiotics. In parallel, DNA will be extracted and sequenced using Oxford Nanopore long-read barcoded amplicon sequencing to characterize bacterial community composition and identify potential genetic markers of resistance. Comparative statistical analyses will assess differences in pathogen prevalence, resistance patterns, and microbial diversity between licensed and unlicensed sources. It is anticipated that unlicensed raw milk samples will show higher total bacterial loads, while licensed samples may exhibit greater antimicrobial resistance diversity due to antibiotic use in regulated dairy operations. These findings will contribute to a better understanding of how regulatory practices influence microbial safety and AMR transmission in raw milk.

Emmett Aschim

Discipline: Music

Authors:

#1 Gregory Young

Abstract Name: Xenharmonic Praxes: Compositional Studies for Guitar in 31-Tone Equal Temperament

This project, "Xenharmonic Praxes: Compositional Studies for Guitar in 31-Tone Equal Temperament", explores new creative and scholarly possibilities for the classical guitar through the application of xenharmonic and microtonal systems. While microtonality has gained increased attention in recent decades, few works have been composed specifically for guitar in 31-tone equal temperament (31-TET), despite its historical grounding in ancient Greek theory and its potential to expand the harmonic and expressive

capacities of the instrument. The project will result in a collection of five to seven original guitar works, including solos, duets, and a chamber piece, as well as a one-off electronic composition for microtonal electric guitar. These works will employ multiple notational systems, including sagittal and graphic approaches, and will experiment with polymicrotonality, where one guitar operates in standard 12-TET while another performs within subsets of 31-TET. The compositional process will also incorporate instrument modification, including the preparation of a fretless classical guitar and the use of microfrets. Research outcomes will extend beyond composition to include a co-authored scholarly paper with faculty mentor Dr. Gregory Young, professional recordings of the collection, and publication of both scores and analytical writing. Together, these outputs aim to advance discourse around historical and contemporary practices of tuning systems, and to situate guitar more centrally in the evolving field of xenharmonic music. This project will serve as the capstone of my undergraduate study in composition and provide a foundation for graduate-level work, conference presentations, and festival performances. By bridging performance, research, and publication, it seeks both to contribute new repertoire to contemporary practice and to position the guitar as a vital instrument for exploring xenharmonic thought in the twenty-first century.

Alexa Ashby

Discipline: Biology

Authors:

#1 Emma Bron

#2 Will Chelberg

#3 Maia Dieken

#4 Lydia Harris

#5 Cyrus Harris

#6 Oliver Thomas

Madison Ashby

Baylis Huckabay

Abstract Name: An evaluation of the growth and reproductive success of captive, white-spotted bamboo sharks (*Chiloscyllium plagiosum*) under managed care

An inhabitant of the north Indo-Pacific Ocean, the whitespotted bamboo shark (*Chiloscyllium plagiosum*) is a demersal, cartilaginous species. Despite the wide abundance of whitespotted bamboo sharks, limited diagnostic data is available beyond embryonic development, physiology, and hatching behavior while in captivity. It is imperative to obtain data and knowledge of growth rate estimates as it helps with proper management of fisheries and stock evaluation, adequate management in captivity, and contributes to conservation and management in the wild. The aim of this research is to examine the behavior of growth of this specific shark species, utilizing those within a captive environment. Within a reported literature study, parameters such as age, growth, and weight were measured and recorded. On the contrary, this present study measures weight (g), sex, pre-caudal length (cm), fork length (cm), and total length (cm) as well as recording diagnostic behaviors such as feeding behavior and color. A more exhaustive evaluation of captive whitespotted bamboo sharks' growth behavior was accomplished as there were various physical and diagnostic characteristics that were gathered. A final analysis determines that the information collected in this study can be further implemented in husbandry and captive reproduction management as more has been unveiled about the growth behavior of this shark species.

Aniya Ashford

Discipline: Psychology

Authors:
#1 Widaad Zaman

Abstract Name: Cultural Schemas Regarding Resilience and Strength in Blacks: Implications for Well-Being and Academic Success

Black college students often navigate cultural expectations emphasizing strength, resilience, and self-reliance in response to systemic and interpersonal stressors. While these norms can support survival in the face of racial discrimination, they may also contribute to emotional suppression, heightened anxiety, and challenges in academic functioning. This study examined how internalized cultural schemas of strength, including the Strong Black Woman (Superwoman) schema and John Henryism, intersect with racial-ethnic socialization, emotion regulation, anxiety, and academic behavioral confidence in Black undergraduate students. Using a mixed-methods approach, participants completed validated self-report measures (G-SWS-Q, JHAC12, ERQ, GAD-7, ABCS), alongside narrative questionnaires capturing first-person experiences of culturally grounded expectations of strength. Coding and analysis of narrative data are underway and will provide additional insight. We hypothesized that stronger endorsement of strength-based norms would relate to greater emotional suppression and anxiety and lower academic confidence, with gender-specific patterns, with women reporting higher Superwoman traits and men exhibiting higher John Henryism. By examining culturally specific coping mechanisms, particularly among Black men, this study addresses critical gaps in the literature and highlights how normative behaviors can simultaneously support and challenge well-being and academic success. Findings offer guidance for culturally responsive interventions that validate resilience while mitigating psychological and academic costs.

Gulnur Ashyrnepesova

Discipline: Psychology

Authors:
#1 Alexander T Jackson

Abstract Name: Stress fasting under pressure: The role of demands and control on healthy eating

Stress plays an essential role in daily life, influencing physical and mental health. Many people face recurring stress cycles, like exam periods requiring a balance of deadlines and responsibilities. Over time, these cycles can become chronic stress, affecting psychological well-being, eating, sleep, and overall health. Stress often leads to coping behaviors such as overeating, reliance on stimulants, or stress fasting, skipping meals when demands and strain overwhelm. Academic and professional environments with high demands often push individuals to prioritize performance over self-care, making eating a secondary choice. This leads to irregular meal patterns that harm both body and mind. While research has focused on stress eating, stress fasting remains underexplored. (Widaman, 2014; Weaver et al., 2021). This study aims to examine whether cognitive factors help explain why students engage in stress fasting. Specifically, executive functioning will be measured in high-demand academic environments, as it plays a central role in impulse control and decision-making. When stress levels rise, weakened executive functioning may impair self-regulation, making it more difficult for students to maintain consistent eating routines (Hormann et al., 2012; O'Neill, 2020). Similarly, academic pressures may reduce interoceptive awareness, the ability to recognize and respond to internal hunger cues, which can increase the likelihood of skipping meals or developing erratic eating habits (Herbert, 2020; Robinson et al., 2021). These predictions will be tested using mediation analyses. Hypothesis 1: Executive function in high-demand environments affects impulse control and decision-making. Hypothesis 2: Weakened executive function under stress impairs self-regulation, leading to irregular eating patterns. Hypothesis 3: Academic demands reduce interoceptive awareness, increasing erratic eating habits. The results of this study should clarify why stress fasting occurs and inform interventions that promote

healthier eating among university students. Overall, the project aims to reduce stress-related fasting and promote better coping strategies during demanding academic periods.

Dolce Asumadu

Discipline: Architecture, Construction Management, and Interior Design

Authors:

#1 Dolce Asumadu

#2 Suzanne Frasier

#3 Namrata Dhobekar

Abstract Name: Case Study of Lashing Technique

Lashing is the art of using a cord/rope to bond something securely. In history lashing has been used in various ways including fastening hunting weapons such as an ax, or strengthening joints for extra reinforcement. This was adopted by the ancient Egyptians who would strengthen their Mortise and Tenon Joints “using pegs, dowels, and leather cords. (Baynebox)” In Hawaii Traditional canoes are created through lashing techniques as a way of “engaging in collaborative building using Native knowledge systems as a means of supporting cultural, ecological, and political recovery. (Cooper Hewit)” across the Hawaiian Islands. This study examines lashing techniques to determine how it can be applied at multiple scales in interior design so that it can be diagrammatically and visually documented on this research poster. Lashings can be translated from a small joinery scale to a bigger spatial scale structurally and aesthetically. Structurally the joinery is compatible with gridshell-like and flexible frameworks but falls short with conventional building assemblies, such as a wall, floor, and roof system, which usually require load bearing support that lashings alone cannot provide. Throughout the project, lashings have been used to bind wall base samples used in the creation of the “Lashed Crepe Myrtle Seed” artifact, and bind the wooden frame of the enclosure design, though when working in larger scale environments, it works best aesthetically, being used for interior design elements, such as lashed ceiling panels, lashed column design, or lashed interior decor. Throughout the project, lashings have been used to bind materials together, allowing them to overlap to create structures in a way that is reminiscent of the interlocking spatial organization, which consists of two spaces overlapping to create a zoned shared space.

Zoie Atakora-Nsiah

Discipline: Education

Authors:

#1 Zoie Maabena Atakora-Nsiah

Abstract Name: The Impact of Cloud-Based Real-Time Analytics on Decision-Making in Fashion E-Commerce Startups in Accra

This study explores the impact of cloud-based real-time analytics on decision-making in fashion e-commerce startups in Accra, Ghana. With Ghana's e-commerce sector expanding rapidly, particularly in fashion, startups face significant challenges due to their reliance on delayed reporting methods, which hinder their ability to make timely, data-driven decisions. Real-time analytics has the potential to offer immediate insights into sales, inventory, and customer behavior, which can significantly enhance decision-making processes in dynamic and competitive markets. This research adopts a mixed-methods approach, combining quantitative system performance data with qualitative insights from stakeholders, to assess the effectiveness of real-time

analytics in improving operational efficiency, decision speed, and overall business performance. The methodology includes three phases: an exploratory phase involving interviews and surveys to assess current data practices and decision-making strategies, the development of a small-scale real-time analytics prototype using Google Firebase, Power BI, and Python scripts to simulate live business operations, and an evaluation phase comparing the prototype's performance with traditional batch reporting systems. The expected results will highlight improvements in decision accuracy, operational efficiency, and responsiveness, particularly in inventory management, pricing, and marketing adjustments. The study will also explore the challenges faced by startups, such as limited technical skills, infrastructure issues, and the cost of implementation, and will provide practical recommendations for overcoming these barriers. Ultimately, this research aims to contribute to both academic knowledge and practical strategies for fashion e-commerce startups in Accra, demonstrating how cloud-based real-time analytics can foster competitive advantage and improved customer satisfaction in the rapidly evolving digital marketplace

Nahom Atnafu

Discipline: Computer Science

Authors:

#1 Jonathan Hardwick

Abstract Name: Ultrasonic Steganography: Decoding Hidden Morse Code Messages in Audio Files

This project investigates the feasibility of embedding and extracting hidden Morse code messages in audio files using ultrasonic frequencies beyond the range of human hearing (approximately 19-20 kHz). As digital communication security concerns grow and audio watermarking technology advances, understanding the limitations and capabilities of audio-based steganographic techniques is essential. This research addresses the central question: Can Morse code signals embedded at ultrasonic frequencies be reliably decoded from various audio file formats, and how do compression algorithms affect signal preservation? The methodology employs digital signal processing techniques to detect and decode ultrasonic Morse code transmissions. A custom Python-based decoder was developed utilizing NumPy and SciPy libraries to perform bandpass filtering, envelope detection, and hysteresis thresholding on audio signals. The system extracts carrier frequencies between 18-20 kHz with configurable bandwidth parameters, applies temporal analysis to identify Morse code timing patterns (dots, dashes, and gaps following ITU standards), and translates binary sequences into readable text. The decoder includes a graphical user interface for accessibility and real-time parameter adjustment. Testing across multiple audio formats revealed significant findings regarding format-dependent signal preservation. Lossless formats (FLAC, WAV) successfully preserved ultrasonic content with decode success rates of 83%, achieving confidence scores above 95%. Conversely, lossy compression formats (MP3) demonstrated format-dependent behavior: low-bitrate MP3 files (22.05 kHz sampling) completely removed ultrasonic frequencies, while high-bitrate versions (48 kHz sampling) maintained signal integrity. The decoder successfully extracted messages including "HELLO" and "HELLO CHATGPT ARE YOU READY" from test samples. This research demonstrates the viability of ultrasonic audio steganography while highlighting critical limitations imposed by lossy compression. Results have direct implications for secure audio authentication in digital media, with potential applications in copyright protection and covert communications. Future work will explore adaptive decoding algorithms and investigate alternative frequency ranges to improve robustness across diverse audio formats and transmission channels.

Auj Atteeq

Discipline: Environmental Science and Sustainability

Authors:

Abstract Name: Thermal Stress Impact on Global Bleaching Events

Coral reefs provide vital ecological and economical benefit to marine ecosystems and human societies, supporting an estimate of 25% of all known marine life, funding coastal tourism, serving as primary food source to communities worldwide and buffering coastlines against storm damage. Despite their resilience, rising ocean temperatures due to climate change pose an existential threat to reef survival. Increasingly severe and frequent global bleaching events, including the record-breaking fourth mass bleaching event since February 2024, have devastated reef systems globally. Hughes recorded consecutive coral bleaching events on the Great Barrier Reef during 2016-2017, demonstrating that even minor temperature increase can prove deadly and lead to coral mortality. Hoegh-Guldberg established that thermal anomalies play a significant role in causing corals to expel their symbiotic algae. This study examines the relationship between thermal stress and coral bleaching pattern from 1980-2020, with additional analysis of 2025 Great Barrier Reef data. Data was sourced from Kaggle and NOAA for global bleaching events and reef locations (1980-2020) and from the Australian Institute of Marine Science (AIMS) for Great Barrier Reef sites to examine recent bleaching patterns for the 2025 season. RStudio was used to explore data and identify key variables while Tableau was used in data aggregation and visualization of global bleaching patterns. The analysis shows a positive correlation between thermal stress and coral bleaching events impacting reef systems globally. Notably, major bleaching peaks in 1987, 1998 and 2016 align with documented El Niño Southern Oscillation Events. The Arabian Gulf and Pacific oceans were revealed as key hotspots, more susceptible to bleaching events due to their equatorial locations. These findings support prior research and conclude that increased sea surface anomalies disrupt coral environments and result in surging coral mortality rates as conditions remain stagnant.

Katelyn Au

Discipline: Interdisciplinary

Authors:

#1 Christine Lee

Anagha Kulkarni

Abstract Name: Co-Design AI Prompt Deck: The Role of Reflective Prompting in AI-Integrated Design Practice

Students today are using artificial intelligence (AI) more than ever for studying, writing, and creative projects. Though powerful, these tools are often adopted uncritically, without reflection on their limitations or ethical dilemmas they create. Questions naturally arise: What risks may result from unreflective AI use? How can fairness, inclusivity, and accessibility be ensured in AI-supported creative practices? This research examines how structured, reflective prompts shape students' thinking and discussion about AI during design research tasks. The project asks two central questions: How do reflective prompts shape the way designers perceive AI-generated materials during the design process? What forms of reflection, like ethical, creative, or strategic perspectives, emerge when designers critically engage with AI-generated material? Human-computer interaction and design scholars have long argued that technologies shape users' assumptions and values (Sengers et al., 2005). Furthermore, we will explore how reflective prompting through our Co-Design AI Prompt Deck, a set of forty cards with prompts and reflections, would encourage students to pause, question their assumptions, and articulate reasoning that might otherwise remain implicit. Guided by principles from Reflective Design and Value-Sensitive Design, we will be conducting research by leveraging a discourse-centered methodology to best capture raw reactions of students. Students will participate in one-on-one interviews where they complete design tasks using AI while responding to structured prompts. They will then answer follow-up questions about their experience, and responses will be documented with audio recordings, eye-tracking technology, and written notes. Following the research and implementation of the

card deck, we anticipate a shift in design thinking as designers begin to perceive AI as a collaborator rather than a neutral assistant. Moreover, we hope this reframes the conversation surrounding existing design mental models, prompts ethical reflection and strategic thinking for designers, and aids in developing effective strategies for teaching ethical and responsible AI use.

Rylee Au

Discipline: Computer Science

Authors:

#1 Nathan Goethal

#2 Andrew Kovaleski

Abstract Name: Designing a Deployable Object-Detection Workflow for High-Resolution Geospatial Imagery

The rapid growth of commercial and government satellite imagery collection has exceeded the capacity of human analysts to manually review all collected data, creating an urgent need for automated methods capable of identifying objects of interest at scale. To help address this operational challenge, this effort develops a computer vision model development pipeline using commercial satellite imagery. The overall workflow will cover from the client request for a model to implementation of a deployed object detector. The goal is to design a repeatable and efficient process that supports modern object-detection models, while handling the unique technical demands of large geospatial datasets. The workflow consists of five major components: (1) obtaining large and diverse image dataset from a repository (2) generating high-quality bounding-box annotations around objects in large satellite images and then converting to proper format for model training (3) training an object-detection model using state-of-the-art approaches; (4) evaluating model performance to determine if model is adequate or requires improvements to training data; and (5) deploying the model to a hosting platform for real-time execution and data sharing to users. Key challenges include managing images of large size, handling wide variation in object orientation and scale, and establishing consistent annotation standards to support model convergence. Through this research, novel methods for data collection, annotation management, and large image tiling were developed to address the challenges and solve this operational problem. The resulting computer vision development pipeline will enhance automated image exploitation and improve situational awareness for a wider range of operational mission partners.

Danielle Austin

Discipline: Economics

Authors:

Abstract Name: Campus Housing Unveiled: The Price Revolution of the Last Decade

This research explores the impact of general housing, maintenance, utility prices, and other input economic factors on the national average school campus housing prices from 2015 to 2025. Existing scholarship surrounding student housing prices is limited, often focusing on general housing trends like the impact of population growth and aging, migration, and market fluctuations, while overlooking the specific impact of factors like utilities, construction materials, and economic variables unique to campus housing. To address this gap, this study uses a linear multivariable regression to isolate the relative impact of each economic variable in relation to school housing prices. The regression analyzes the relationship between school housing prices and a set of targeted independent economic variables: housing prices, residential maintenance prices, utility prices, inflation, college tuition and fees, new school building construction, cement and concrete

manufacturing, as well as lumber and other construction materials. While it is typically expected that an increase in inflation would cause an increase in price, inflation data shows an unexpected negative correlation. Utility prices and construction materials make a significant contribution to housing, but they do have relatively smaller impacts on the price. The analysis reveals that housing prices are the dominant driver of school housing costs with significant contributions from residential maintenance and tuition costs. Identifying the key economic drivers may enable policy makers and institutions to anticipate fluctuating prices to help stabilize housing costs. Further research can account for the price, material, and economic regional variations in the United States, as this research includes data across the entire country.

Allison Avalos

Discipline: Environmental Science and Sustainability

Authors:

#1 Angela Allen

Raksha Mahesh

Abstract Name: Comparative Analysis of Water Quality Parameters in Healthy and Impaired Creeks

Urbanization is a major factor contributing to stream impairment by increasing the introduction of pollutants and degrading water quality over time. Under the Clean Water Act, states are required to establish standards that distinguish between healthy and impaired waterways. To better understand the effects of urbanization on stream health, this study evaluates two creeks within the Walnut Creek Watershed: Little Rock Creek (impaired) and North Creek (healthy), located less than a few miles apart. Water quality parameters including dissolved oxygen (DO), specific conductivity (SPC), and *Escherichia coli* (*E. coli*) are monitored to assess how pollutants influence stream condition and ecological balance. Both creeks flow through urbanized areas frequently used for recreation and education, offering insight into how human activity impacts nearby aquatic systems. By comparing these two streams, this study aims to identify key differences in water quality and explore the historical and environmental factors contributing to impairment. The findings will support a deeper understanding of how urban development affects local waterways and provide guidance for future restoration and management efforts to improve water quality within the Walnut Creek Watershed.

Sara Avila

Discipline: Computer Science

Authors:

#1 Steven Fernandes

#2 Niranzana Panneer Selvam

seamus Gerner

Abstract Name: Enhancing Dental Education Through Artificial Intelligence: Improving Student Detection of Tonsilloliths in Panoramic Radiographs

Developing diagnostic accuracy is essential in dental education, yet identifying tonsilloliths on panoramic radiographs remains challenging for students due to limited clinical experience. Traditional instruction relies on manual interpretation, which often leads to diagnostic errors and reduced confidence among learners. This project aims to enhance student learning by integrating artificial intelligence (AI)-assisted tools into radiology training. The study will compare the efficiency and accuracy of dental students in detecting tonsilloliths with and without AI support and assess their perceptions of AI as a learning resource. Quantitative measures will

evaluate diagnostic performance, while qualitative feedback will explore how AI guidance influences understanding, confidence, and engagement. By focusing on the educational impact of AI, this research seeks to determine how technology-driven instruction can improve learning outcomes and bridge the gap between novice and expert diagnostic performance. The findings are expected to guide curriculum development in dental radiology, promoting evidence-based teaching strategies that prepare students to confidently and competently use AI in clinical practice.

Habiba Awad

Discipline: Biology

Authors:

#1 Habiba Awad

Abstract Name: Glyphosate Mediated Gut Dysbiosis on Parkinson's Disease: How Glyphosate Exposure Relates to Alpha-Synuclein Misfolding and Parkinson's Risk

Many agricultural workers and communities that reside near agricultural lands are at risk of being exposed to glyphosates through direct use of glyphosate-based herbicides or well-water consumption. This comprehensive literature review examines the relationship between glyphosate exposure and gut-microbiome composition to evaluate whether glyphosates influence α -synuclein protein misfolding in Parkinson's Disease (PD) via the microbiota-gut-brain axis. The gut microbiome is home to trillions of microorganisms known as the gut microbiota, many of which are affected by our diet, chemical exposures, and gut inflammation or barrier dysfunction. Glyphosate exposure through glyphosate-based herbicide use may alter gut microbial composition, key metabolites, and cytokine pathways that stimulate vagal signaling, providing a route through which gut dysbiosis may affect the brain. This can influence the development of neurodegenerative disorders and neuroinflammation through the gut-brain axis. The expanding use of glyphosate-based herbicides is parallel to increased PD mortality and symptoms, and glyphosate is linked to neurotoxic changes that trigger α -synuclein misfolding. Glyphosate-driven shifts in microbial communities, particularly fluctuation in Firmicutes such as *Dubosiella* and *Lactobacillus*, may disturb Branched-Chain Amino Acids (BCAAs) metabolism, a process associated with impaired lysosomal function and α -synuclein aggregation. Alterations in Short-Chain Fatty Acids (SCFAs) may activate the GPR41/43–NLRP3 neuroinflammatory pathway, promoting neuronal stress and loss of dopaminergic cells. Future research should investigate potential gut-based early changes in communities regularly exposed to glyphosates to detect PD risk before neurological damage becomes irreversible.

Daneille Awere

Discipline: Health and Human Development

Authors:

#1 Daneille Awere

#2 Sonia Jain

Abstract Name: Anti-Body Drug Conjugates: Toxin Cytotoxicity in Glioblastoma Cells

Glioblastoma multiforme (GBM) is one of the most common and most aggressive types of brain cancer. Being able to affect anyone regardless of age and background. As one of the more prolific brain tumours, many studies have been made to further the advancement in making GBM more treatable and prolong the life span of patients. Current therapies for GBM include surgical resection, then radiation followed up with temozolomide, which is a chemotherapy, or in some cases, radiation and chemo are given together. Another treatment option is Antibody-Drug Conjugates, which is the focus of our research. An antibody drug conjugate is a combination of an antibody, a payload, and a linker. An antibody, which is an immune response produced by the body's B-cells to fight target antigens that the body does not recognise. Payloads are highly potent toxins that can be used at the nanomolar scale to induce apoptosis (cell death). A payload linker is used to attach the payload to the antibody. ADCs differ from more traditional therapies as they provide target tumour specificity in treatment and have shown great promise in the treatment of other cancer types, such as breast cancer. With the sensitivity of brain cancers, targeted tumour specificity will significantly improve

patient outcomes. Our approach to ADCs is focused on finding effective payloads, which would be toxins that are still potent and cause apoptosis at low concentrations, using the Cell Titer Glo Assay to assess cell survival with luminosity after treating different GBM cell lines with free toxins. Some preliminary findings indicate that DNA alkylators (Duocarmycin) and Topoisomerase II inhibitors (PNU-159682) were the most potent, followed by microtubule inhibitors (MMAE and Eribulin), and then Topoisomerase I inhibitors (Exatecan and SN38). MMAF, as a free toxin, was not very effective because of its inability to cross the cell membrane.

Djina Awungnjia

Discipline: Biology

Authors:

#1 Djina Awungnjia

#2 Emmanuelle Palmieri

#3 Fernando Vonhoff

Abstract Name: Investigating the Effects of Anchor Knockdown on Circadian Rhythm Behaviors Using *Drosophila Melanogaster*

About 3% of the adult population experiences circadian sleep disorders. Circadian sleep disorder is characterized by a mismatch between one's desired timing of sleep and their ability to fall asleep and remain asleep. Anchor is an integral 17-transmembrane protein that consists of a fused transporter domain and a G protein-coupled receptor-like domain. It is also known as a regulator of the mechanistic target rapamycin complex 1 (mTORC1). mTORC1, as the master cell regulator, is involved in directing several processes such as synaptic growth, cellular activity, and neurogenesis. Disruption in this pathway affects several aspects of behavior, including circadian rhythm. Anchor is expressed in several types of neurons, including insulin-producing cells (IPCs). Dysregulation of IPC signaling is linked to disruptions in mTORC1 signaling that alter circadian rhythm. The role of anchor in the brain and in behavior is unstudied. This research uses *Drosophila* to investigate anchor in IPCs and how disruptions affect circadian rhythm. Findings show that flies with a loss of anchor in IPCs experience dysregulated circadian rhythm, thereby elucidating an aspect of the role of anchor in the brain. These results provide insight into circadian rhythm sleep disorders, creating possibilities for treatments. Consequently, future goals would be to investigate the molecular mechanism underlying circadian rhythm phenotype using proteomics.

George Ayanleke

Discipline: Health and Human Development

Authors:

#1 Cristina Espinosa-Diez

Abstract Name: Regulation of DIO3 Expression by the Long Non-Coding RNA DIO3OS in Human Vascular Endothelial Cells

Chemotherapy and radiotherapy increase the risk of cardiovascular disease by nearly 80%, contributing to complications such as atherosclerosis, thrombosis, and impaired vascular remodeling and angiogenesis. While current research often focuses on the effects of these treatments on heart muscle cells, the impact on vascular endothelial cells, essential for overall vascular and organ health, is frequently overlooked. The oxidative and genotoxic stress from cancer treatments disrupts cellular balance. It leads to lasting epigenetic

changes, such as DNA methylation and double-strand breaks, that can influence vascular cell fate. Serious side effects include atherosclerosis (accumulation of plaque in arteries), thrombosis (blood clots), and other conditions affecting blood vessel function. This project explores how the expression of proteins key to the cellular response to these stressors is manipulated at the epigenetic level. Epigenetics involves alterations that can inhibit or encourage gene expression without changing the gene itself. This research focuses on how long non-coding RNA affects the expression of proteins linked with cellular response to chemotherapy related genotoxic stress. We hypothesize that the long non-coding RNA DIO3OS, which has been suggested to play a role in endothelial responses to genotoxic stress and DNA damage, also regulates expression of the protein-coding gene DIO3. The goals of this research are to: (1) validate expression changes of DIO3 in Human Umbilical Vein Endothelial Cells (HUVECs) to determine whether changes to DIO3OS isoforms affect DIO3 enzyme production, and (2) assess which isoform of DIO3OS plays the most significant role in DIO3 regulation. To study DIO3 expression, we will measure both mRNA and protein levels in HUVECs following manipulation of specific DIO3OS isoforms. RT-qPCR will quantify DIO3 mRNA, and DIO3 protein will be assessed by Western blotting and immunofluorescence.

Caleb Ayau

Discipline: Engineering

Authors:

#1 Anurag Roy

#2 Eric Kennedy

Abstract Name: Understanding the Tribological Implications of Engine Oil Change Frequency Through Elemental Analysis of Used Engine Oils

A predominant factor influencing a vehicle's longevity is its engine health. Typical internal combustion engines experience frictional losses alongside wear owing to the articulation of varied mechanical components. This study develops an evidence-based and science-backed assessment to better grasp the implications of oil change frequency from the tribological and longevity vantages. This has broad applicability to technically-minded customers as automobiles are omnipresent and gives them an assurance on why frequent oil changes and over-maintenance are beneficial. Analysis of the elemental composition of engine oils provides strong insights into engine wear. For instance, copper, iron, and aluminum—the most likely wear metals in an engine—demonstrate a significant compositional decrease (in ppm) in a 2023 Toyota Corolla and 2024 Honda CRV Hybrid after the initial oil change at ~1,000 miles. By taking note of the metals which exhibit the highest concentration drops after an oil change after a preset number of miles, wear rates in ppm/mile are ascertained. This study also goes onto demarcate the initial uptick in engine wear during the break-in period vis-à-vis the onset of steady-state wear. The trend overwhelmingly points towards maximum wear transpiring in the first 1,000 miles, followed by a steady state. The authors believe that this initial oil change is consequential to the longevity of the mechanical components in an engine, which may undermine the general recommendation by original equipment manufacturers of administering the initial oil change in the 6000–15000-mile range. Manufacturers' recommendations may not account for this initial break-in period, and to maximize overall engine health by minimizing this wear, it is recommended to undertake accelerated oil changes at frequent intervals. The authors are quantifying this benefit to determine the optimal oil change frequency for ideal engine performance based on data from a number of oil changes in multiple automobiles

Mayowa Ayileka

Discipline: Health and Human Development

Authors:
#1 Mayowa Ayileka

Abstract Name: Predicting Cardiac Arrest in Coronary Artery Disease Patients Using Pre-Arrest Clinical Features

Out of hospital cardiac arrest (OHCA) remains one of the most fatal medical emergencies, yet its prediction is extremely challenging due to the limited clinical information available before collapse. To address this gap, this project investigates whether in-hospital cardiac arrest (IHCA) among patients with coronary artery disease (CAD) can serve as a clinically meaningful proxy for understanding deterioration patterns relevant to OHCA. The central research question guiding this work is: Can we predict in-hospital cardiac arrest among CAD patients using routinely collected clinical features available prior to physiological decline? Although OHCA datasets rarely contain structured pre-arrest biomarkers, vitals, or medication histories, IHCA cases within hospital systems capture rich, time-stamped clinical data that reflect patient status leading up to arrest. Leveraging this advantage, we constructed a curated dataset of CAD patients who experienced IHCA, including demographic variables, laboratory biomarkers, vital signs, comorbidity profiles, and medication exposure. This dataset enables the exploration of early physiological signals and risk factors that precede cardiac arrest but remain understudied in out-of-hospital settings. To identify early predictors of IHCA, we are developing and comparing multiple machine learning models to evaluate how well pre-arrest clinical features discriminate between patients who do and do not experience arrest. Model performance will be assessed using cross-validation and AUC metrics, and feature analysis will be used to highlight the most influential biomarkers and physiological trends associated with imminent arrest. We expect this analysis to reveal clinically interpretable predictors that contribute to risk stratification for cardiac arrest in CAD patients. More broadly, this work demonstrates how IHCA datasets can help bridge the pre-arrest data gap for OHCA research and provides an analytical foundation for future early-warning systems and clinical decision support tools aimed at preventing unexpected cardiac deterioration.

Ife Ayileka

Discipline: Exercise Science and Nutrition

Authors:
#1 Ashley Williams
#2 Geetha Thangiah
#3 Danielle Wadsworth

Abstract Name: Game On: Improving Children's Body Composition Through Ring Fit Adventure

This study assessed changes in body composition among parents and children following an 8-week active video game (AVG) intervention using Ring Fit Adventure on the Nintendo Switch. AVGs offer a unique opportunity to merge entertainment with physical activity, and with roughly 190 million Americans aged 5–90 playing video games at least one hour per week, home-based AVGs may be a viable strategy to improve body composition. Seven families (9 adults, M age = 44; 8 children, M age = 13) completed an 8-week intervention in which they were asked to play Ring Fit Adventure twice weekly for 30 minutes at home. The game uses a resistance ring and leg strap to guide players through exercise-based movements in an interactive adventure setting. Weekly self-reports captured total play and active exercise time using in-game metrics. Body composition (fat mass, fat-free mass) was measured pre- and post-intervention using a Tanita TBF-400 bioelectrical impedance scale. Children averaged 55 minutes of weekly play (42 minutes of exercise), while adults averaged 22 minutes (11 minutes of exercise). Paired t-tests showed that children significantly increased fat-free mass (pre = 82.42 kg, post = 84.70 kg; $p = .002$, Hedges' $g = 1.1$) and decreased fat mass (pre = 20.81 kg, post = 19.25 kg; $p < .001$, Hedges' $g = 1.0$). Adults showed no significant changes in fat mass ($p = .38$) or fat-free mass ($p = .19$). AVGs incorporating resistance-style training appear to be a feasible

and effective strategy for improving body composition in children, who completed nearly the full prescribed dose of gameplay each week; however, similar benefits were not observed in adults.

Juan Ayon

Discipline: Interdisciplinary

Authors:

#1 Charles Higgins

Abstract Name: A Drone That Thinks Like a Bat: Experiments with Bat Midbrain Models on a Quadrotor Drone

Bats use echolocation to perform rapid, dynamic sensorimotor transformations that support flight, target selection, and adaptive control. Emulating these capabilities in artificial systems presents a significant interdisciplinary challenge. To address this challenge in the Higgins laboratory, we have constructed a quadrotor drone system equipped with a flight controller, a Raspberry Pi, and navigational equipment consisting of a depth camera and a LiDAR system. With all this equipment, the drone can receive and execute motor commands generated by a computer program. The long-term goal is to develop a robotic platform whose navigation strategies are governed by a bat-inspired neuronal model. This interdisciplinary project seeks to reproduce a bat's capabilities within a robotic system by linking biologically inspired neural computation with drone-based navigation. A biophysically inspired spiking neural network (SNN) model of the superior colliculus (SC) was developed for deployment onto this drone model. The model captures key stages of auditory spatial processing by mimicking how a bat turns echoes into decisions and actions, using the hardware currently present on the drone. The data obtained from this hardware is then sent through a model that emulates early auditory processing stages in the cochlea, auditory cortex (AC), and inferior colliculus (IC), and are converted into firing rates across spatially tuned sensory neurons. This project also informed the development of a new undergraduate research course (CURE) at the University of Arizona in computational neuroscience and bio-inspired robotics. Students engaged in model-building, data visualization, and hardware testing, gaining hands-on experience connecting neural computation to embodied control. Together, the integrated SNN model, drone system, and course framework establish a foundation for biologically grounded, echolocation-based navigation in autonomous aerial robots and provides a scalable educational model for training students at the neuroscience-engineering interface.

Muizat Ayoola Abioye

Discipline: Chemistry

Authors:

Abstract Name: Synthesis of carbon dots and their role in sensing Perfluorooctanoic acid

Under the Safe Drinking Water Act, the Environmental Protection Agency (EPA) designated maximum contaminant levels (MCLs) for toxic organic chemicals like PFOA to 9.0 ppt (ng/l). This legislative measure was enacted in response to growing concerns of toxic chemical exposure in drinking water and everyday packaging sources. For example, a report by the Centers for Disease Control and Prevention, using data from the National Health and Nutrition Examination Survey (NHANES), discovered PFAS in the blood of 97% of Americans in 2015. This research project aims to determine the consistency of detecting PFOA contaminants of different concentrations (100-800 pM) with synthesized carbon quantum dots using fluorescence spectroscopy. Carbon quantum dots are used for their high photoluminescence properties (high absorption

and excitation of wavelengths). The ability of this cost-effective nanomaterial to detect toxic organic chemicals (perfluorooctanoic acid) has made it a viable tool for environmental sensing technology. Carbon dots were synthesized via a hydrothermal method by combining 1.6 mL ethylenediamine, 1 g citric acid, and 8 mL of solvent in a Teflon reactor, which was then sealed within a hydrothermal autoclave and heated in a furnace to 180°C for varying durations: Batches B and D were processed for 8 hours, while Batch E was processed for 24 hours. The fluorescence intensity of the resulting carbon dot samples was measured across the 350–650 nm range using a fluorescence spectrophotometer. Detection sensitivity was quantified and recorded in Excel spreadsheets for each viable concentration. The carbon-dot samples showed a sensitive linear response to the PFOA with a concentration range of 100-800 pM, a LOD of 47.04 pM, and a LOQ of 156.84 pM. Lower concentrations of PFOA (100pM) resulted in higher fluorescence intensities and more consistent peaks across batches and operators, indicating greater detection reliability.

Youstina Aziz

Discipline: Biology

Authors:

#1 Kimberly Jefferson

Abstract Name: Use of Clindamycin Treatment to Eradicate *Sneathia vaginalis*

Sneathia vaginalis (*S. vaginalis*) is a bacterial species that frequently colonizes the human vagina. It produces a cytotoxin and is significantly associated with chorioamnionitis, preterm birth, and other pregnancy complications. There is currently no standard treatment to eradicate *S. vaginalis* from the vagina, but successful therapy could serve as a means to reduce the risk of preterm birth. Standard therapy for bacterial vaginosis is metronidazole or clindamycin, but antimicrobial agents can deplete normal, healthy bacteria, such as *Lactobacillus crispatus*, in addition to pathogens, which promotes recurrence. The goal of this study was to determine the minimum inhibitory concentrations (MIC) and minimum bactericidal concentrations (MBC) of clindamycin and metronidazole for *S. vaginalis* and *L. crispatus*. *S. vaginalis* was cultured in porcine brain heart infusion broth (BHI) containing 10% fetal bovine serum, and *L. crispatus* was cultured in deMan Rogosa Sharpe broth. MICs were determined by inhibition of visible turbidity, and MBCs were determined by counting colony-forming units. *S. vaginalis* strain Sn35 had MICs and MBCs for clindamycin/ and metronidazole that were substantially lower than MICs and MBCs for *L. crispatus*, suggesting that antimicrobial therapy at the right dose could potentially be used to eradicate *S. vaginalis* without depleting beneficial *L. crispatus*. Because lactic acid and other factors that are secreted by *L. crispatus* prevent the growth of *S. vaginalis*, this strategy could prevent reinfection and thereby help protect pregnant people from the potential pathogenic effects of *S. vaginalis*.

Adam Azizi

Discipline: Biology

Authors:

#1 Adam Azizi

Amine Azizi

Zakaria Alhasan

Abstract Name: Hemoglobin Microbubbles as Oxygen Sensitive Contrast Agents: Visualizing tissue oxygenation

Hemoglobin microbubbles represent a novel class of oxygen-sensitive contrast agents designed to enhance visualization of tissue oxygenation in real time. Unlike conventional ultrasound contrast agents, which primarily highlight vascular structures, hemoglobin microbubbles exploit the intrinsic oxygen-binding properties of hemoglobin to provide dynamic information about local oxygen levels. This project explores the synthesis, characterization, and functional evaluation of hemoglobin microbubbles as a tool for noninvasive imaging of tissue oxygenation. Microbubbles were fabricated by encapsulating hemoglobin within a stabilized lipid shell, allowing them to circulate within the bloodstream while maintaining responsiveness to oxygen partial pressure. In vitro studies demonstrated that the acoustic properties of these microbubbles varied predictably with oxygen saturation, enabling ultrasound detection of oxygen-dependent signal changes. Preliminary in vivo experiments further confirmed that hemoglobin microbubbles could highlight regions of hypoxia with high spatial resolution, offering a potential method for monitoring ischemic tissues, tumor microenvironments, and organ perfusion. The ability to visualize oxygenation directly, rather than inferring it indirectly through blood flow, represents a significant advance in functional imaging. This approach may provide clinicians and researchers with a rapid, noninvasive tool to assess tissue viability, guide therapeutic interventions, and improve understanding of oxygen dynamics in health and disease. By bridging molecular biology and medical imaging, hemoglobin microbubbles illustrate how biomimetic design can expand the capabilities of ultrasound beyond structural imaging to functional assessment. Ongoing work focuses on optimizing bubble stability, refining imaging protocols, and exploring translational applications in both cardiovascular and oncological contexts. Attendees will gain insight into how these agents are engineered, how they function, and their potential impact on clinical diagnostics and research.

Amine Azizi

Discipline: Engineering

Authors:

#1 Ghazal Rastegar

#2 Shashank Sirsi

#3 Hedyeh Hossein Beigi

Abstract Name: Ultrasound-Guided Delivery of Laccase-Loaded Microbubbles for Enzymatic Degradation of Doxorubicin and Cardioprotection

IntroductionLate term cardiotoxicity remains a major concern for pediatric cancer patients treated with anthracyclines such as doxorubicin (DOX). This toxicity can manifest months or years after therapy as heart failure or arrhythmias severely impacting long-term health and quality of life. DOX induced cardiotoxicity is primarily driven by reactive oxygen species (ROS), which cause irreversible oxidative damage to cardiac tissue. Currently, dexrazoxane is the only FDA approved cardioprotective agent, acting through iron chelation to reduce ROS. However, this strategy overlooks other ROS sources, including mitochondrial dysfunction and redox cycling, limiting its efficacy. Dexrazoxane has also been associated with serious side effects, underscoring the need for safer, tissue specific alternatives. Here, we present a novel ultrasound-guided cardioprotective system using laccase microbubbles (LMBs). Laccase, a copper containing oxidase enzyme, degrades toxic phenolic compounds such as DOX into less harmful byproducts. This study explores the potential of LMBs to degrade DOX in localized vascular settings before cardiac accumulation, thereby reducing cardiotoxicity without compromising anticancer efficacy. This represents a promising step toward targeted, minimally invasive cardioprotection. **Materials and Methods**LMBs were synthesized using thiolated laccase enzymes, with partial PEGylation for stability. PEGylated and non-PEGylated laccase were combined, sonicated under perfluorobutane gas, and stabilized to form microbubbles. For vascular targeting, PEI-azide was incorporated. Ultrasound radiation force was applied using a Siemens Sequoia C512 scanner to facilitate cardiac deposition. **Results**Fluorescence microscopy confirmed successful PEI coating. LMBs demonstrated ultrasound responsiveness without structural degradation. After 2-hour incubation with DOX, optimized LMBs achieved >90% reduction in DOX fluorescence, with absorbance shifting from 480 nm to 320 nm, and a visible color change confirming degradation. **Conclusions**We successfully developed PEI-

coated LMBs suitable for circulation and ultrasound targeting. Future in vitro and in vivo studies will validate their ability to prevent off target DOX accumulation.

Faiaz Azmain

Discipline: Computer Science

Authors:

Abstract Name: Are Reasoning Circuits Universal? Evidence for Domain-Specific Computation in Language Models

Large language models can answer complex questions requiring multiple reasoning steps, yet how they implement such reasoning internally remains poorly understood. This research investigates whether these models develop reusable computational circuits for multi-step reasoning, or whether each task requires entirely distinct mechanisms. Using Gemma-2-2B, a 2-billion parameter language model, we analyzed how the model answers two-hop reasoning questions such as "Dallas is in Texas. The capital of Texas is ____" where correctly answering "Austin" requires connecting two pieces of knowledge. We generated attribution graphs, detailed maps tracing how information flows through the network, for prompts spanning multiple geographic domains and applied graph analysis techniques to identify conserved computational patterns. Our analysis reveals that circuits for similar reasoning tasks share substantial structure: prompts about different cities within geographic reasoning showed 48% overlap in activated neural components, compared to only 21.6% overlap with unrelated tasks. This dramatic difference suggests the model employs domain-specific rather than universal reasoning circuits. We extracted a candidate core circuit of 157 neural components and 679 connections appearing consistently across geographic prompts, with apparent functional organization: early network layers handle entity recognition, middle layers detect relationships like geographic containment, and late layers assemble the final answer. These findings challenge assumptions about general-purpose reasoning in language models, suggesting instead a modular architecture where specialized circuits handle specific knowledge domains. Understanding this organization has implications for AI safety. If we can identify circuits associated with particular behaviors, we gain tools for interpreting and improving model reliability. Ongoing work aims to validate these structural findings through causal intervention studies.

Leah Azmi

Discipline: Philosophy, Ethics, and Religious Studies

Authors:

#1 Sarwar Alam

Abstract Name: The Search for the Perfect Social Contract Never Needed to Take Place: The Charter of Medina as a Social Contract

The Social Contract was a concept that was popularized in the Mid-17th century specifically by Thomas Hobbes through the publication of Leviathan. John Locke and Jean-Jacques Rousseau continued this popular idea of governing with their own books, but it became clear that none of these Western philosophers looked to the east, specifically to the Arab region, as many of the traits the three described a social contract containing, which were cited as 'unique,' can be found in the Charter of Medina, written by the Prophet Muhammad (PBUH) in the 7th century. This charter described the rights that could be protected, and how, in a way that did not force the communities to give up all, or any, rights, created a balance that these different communities were able to practice and guarantee a peace among them all, making it the perfect example of the Social

Contract. Through identifying how the social contract is defined in a baseline by these three authors, we can then break down the charter itself and identify many of the similarities, including the idea of legitimate right over divine right. But, with a different goal in mind when the charter was created, there are distinct differences that the three authors do not acknowledge, but the Prophet (PBUH) does, including the rights 'granted' through this document for the unique communities within Medina to govern themselves, how none of these communities are considered more powerful or important than another, and most importantly, how the Prophet serves as a leader in specific cases regarding the many communities.

Mayowa Babalola

Discipline: Health and Human Development

Authors:

#1 Johnathan Folmar

#2 Dhanashree Rane

#3 Samantha Giordano-Mooga

Lauren Moll

Abstract Name: The Intersection of Identity and Environment: Predictors of Self-Efficacy, Stress, and GPA in Health Professions Undergraduates

Burnout has been widely observed among students with heavier academic workloads and may persist in their professional careers, specifically for students in the pre-health field. This study aimed to examine the relationships between self-efficacy (GSE), and perceived stress (PSS), and GPA while accounting for personal identity and socioeconomic factors. Multiple social identities and experiences shape a person; therefore, our analysis combined different factors affecting GSE, PSS, and GPA. We hypothesized that students receiving free or reduced lunch, those identifying as members of racial or sexual and gender minority (SGM) groups, and those attending smaller schools would exhibit higher perceived stress and lower self-efficacy compared to their peers. 72 undergraduate students in the School of Health Professions completed an anonymous survey containing the PSS, GSE, and self-reported their GPA and other demographic factors. A multivariable anova model comparing race, sex, religiosity, SGM, SES, and high school size and location determined that GPA was impacted by these factors, $p=0.03$. Analysis of specific factors highlighted that GSE was impacted most by race, Caucasians had the highest GSE, gender, males have a higher GSE, religiosity, those that identified as religious had a higher GSE and SGM students had a lower GSE than non SGM students, while smaller high school size and fringe high school location had lower PSS. These results suggest that identity-based and environmental factors play an important role in students' confidence and stress levels, highlighting the relevance of community-focused support.

Liam Babcock

Discipline: Biology

Authors:

#1 Preetam Ghosh

#2 Mikhail Dozmorov

#3 Paul Fisher

#4 Swadesh Das

Aashka Shah

Abstract Name: Superkine Interleukin-24-Induced Transcriptomic Profiling Analysis in Androgen-Resistant

Melanoma differentiation-associated gene-7/interleukin-24 (IL-24) induces cancer-specific apoptosis in a wide range of cancers. When delivered intratumorally by a replication incompetent type 5 adenovirus, IL-24 was shown to be efficacious and safe in a Phase I trial in patients with advanced cancers. Advancing IL-24 as a therapeutic, Superkine IL-24 (IL-24S) was engineered resulting in enhanced secretion and stability. Despite these broad spectrum and multifaceted effects, the early effects of IL-24 and IL-24S in cancer cells require further investigation but could be significant for therapeutic development. Here, we assessed alterations in genetic regulation via transcriptome analysis on androgen-resistant prostate cancer using DU-145 cells infected with IL-24S at 6- and 12-hour post-infection time points. Validation assays incorporated various human and murine prostate cancer cell lines to provide deeper insights into the generalizable features of IL-24S-mediated signaling pathway changes. At 6 hours post-infection, 12,664 genes (6,210 up; 8,343 down) and 305 KEGG pathways were disrupted, while 12 hours post-infection showed 12,596 genes (6,031 up; 6,565 down) and 303 disrupted pathways. Several pathways, such as "viral protein interactions with cytokines and cytokine receptors" and the JAK-STAT signaling pathways, were disrupted at both time points. Notably, we identified dynamic responses of several IFN- β downstream genes (e.g., MX1, MX2, and OASL), which initially showed downregulation followed by upregulation in later stages. This downregulation aligns with the concurrent inhibition of IFN- β transcription. IL-24S induces extensive, time-dependent downregulation of gene expression in a range of advanced prostate cancer cell models. These data provide new insights into the molecular pathways regulated by IL-24 and IL-24S, which are informative for designing combinatorial treatment approaches. Thus, ongoing work is utilizing machine learning to determine and test optimal drug treatment combinations with IL-24 and IL-24S. Further transcriptomic validation for mRNA and protein is also in progress.

Liam Babcock

Discipline: Biology

Authors:

#1 Mohammed Mustafa

#2 Mirjam Huizenga

#3 Mario Stelt

#4 Aron Lichtman

Abstract Name: Brain Penetrant and Peripherally Restricted Inhibitors of the Endocannabinoid-regulating Enzyme: Dissociative Antinociceptive Effects in a Humanized Mouse Model of Sickle Cell Pain

Sickle Cell Disease (SCD), a recessive genetic disease that includes symptoms of chronic anemia, fatigue, organ damage, and severe pain. Although opioids provide some relief for sickle cell pain, their serious adverse effects (e.g., opioid use disorder, constipation, respiratory depression, overdose, and death) raise a great need to identify effective non-opioid, non-addictive strategies to treat SCD pain. Monoacylglycerol lipase (MAGL), the primary catabolic enzyme of the endocannabinoid 2-arachidonoylglycerol (2-AG), represents a promising target to treat pain. Here we test whether brain penetrant and peripherally restricted MAGL inhibitors alleviate hypernociceptive behavior and functional behavior in the Berkeley HbSS humanized mouse model of SCD. We evaluated the brain penetrant MAGL inhibitor MJN110 (10 mg/kg) and the peripherally restricted MAGL inhibitor LEI-515 (3, 10, 30 mg/kg) in mixed sex 7-month-old HbSS SCD mice. Subjects were evaluated with either drug or vehicle and 1 h later assessed for grip strength and mechanical hypersensitivity in the von Frey assay. Whereas MJN110 normalized both grip strength and mechanical hypernociceptive responses in HbSS mice, LEI-515 attenuated mechanical hypersensitivity but did not affect grip strength. Through the use of CNS penetrant and peripherally restricted MAGL inhibitors, we demonstrate a dissociation between stimulus-induced nociceptive responses and motor functional behaviors in the HbSS mouse model of SCD pain. As SCD pain reflects a chronic condition and would require repeated dosing of an analgesic, ongoing studies are assessing repeated dosing of MAGL inhibitors in this model. In sum, these findings support MAGL as a potential therapeutic target for SCD pain.

Ryan Babich

Discipline: Nursing and Public Health

Authors:

#1 Ryan Babich

#2 Ivan Martin

#3 Jovan Gwon

Ivan Martin

Abstract Name: An Individualized Peer Support Model to E-cigarette Cessation

E-cigarette use is a major issue that is rapidly growing within the United States. Insufficient resources and a lack of peer support undermine current vaping cessation strategies for young adults in rural areas of the Midwest. Our study aims to create an effective, multimodal intervention system to support vaping cessation in this increasingly affected population. With the growing popularity of electronic nicotine delivery systems (ENDS), the usage rates remain high due to the difficulty of quitting a vaping addiction. Many factors contribute to the increasing difficulty of quitting, including limited cessation resources, easy access to ENDS products, few entertainment options for stress relief, and peer disapproval of quitting. Participants involved in our study participate in an eight-week intervention administered via text messaging. In prior studies conducted by our team, the text messaging system we relied on had limitations, including limited human interaction and insufficiently tailored messages for a multifaceted study. The next phase of our team's research will address the issues participants previously faced by adding individualized peer support, where volunteers will follow participants' progress and give real-time, personalized feedback designed to help participants with their cessation goals. With the addition of peer mentors to the original eight-week intervention, we expect to see a significant increase in participants who have successfully forgone their previous vaping habits and addictions and have reached their goals of vaping cessation. Our study, in addition to introducing peer support, will provide participants in areas with limited cessation resources and those promoting negative vaping habits with a multifaceted mode of online cessation support to enhance cessation outcomes in high-risk areas.

Christopher Bacidore

TX - Texas Woman's University

Discipline: Biology

Authors:

#1 Christopher Bacidore

Abstract Name: MotusKit: Prosthetic Assembly Kit

The development of personalized prosthetics has historically been constrained by slow, labor-intensive creation methods that rely heavily on manual measurements, mold construction, and repeated in-person fittings. This traditional approach not only prolongs production time but also introduces human error, resulting in devices that may never achieve a fully individualized fit. Such barriers are especially pronounced in underserved regions and low-resource medical settings, where specialized equipment, clinical expertise, and fabrication facilities are limited or entirely unavailable. To address these longstanding challenges, I developed MotusKit, an innovative prosthetic assembly system designed to streamline the transition from digital customization to real-world functionality. MotusKit operates in direct collaboration with HANDI, a

system of formulas I developed that uses body measurements to generate patient-specific scaling measurements automatically. Once these formulas determine the required dimensions, each component of the prosthetic can be scaled to size and 3D printed. The resulting parts are organized into a comprehensive kit that emphasizes intuitive usability. The detailed assembly guide in the kit features labeled components, color-coded diagrams, and step-by-step instructions, enabling users or caregivers with minimal technical training to construct a fully functional device. The system represents a significant step toward streamlining prosthetic production, expanding access for individuals who may otherwise lack support from specialized clinics. Ultimately, MotusKit advances the broader goal of creating inclusive, customizable, and globally accessible prosthetics that empower users to achieve greater independence and quality of life.

Elijah Baciуска

Discipline: Biology

Authors:

#1 Ransom Poythress

Abstract Name: The Effects of Low-Level Light Therapy (LLLT) on Differentiated Vascular Smooth Muscle (dVSM) Cell Proliferation

Previous research suggested that low-level light therapy (LLLT) accelerates the recovery of skeletal muscle wounds. This study aimed to investigate whether LLLT produces similar effects on the wound healing process of differentiated vascular smooth muscle cells (dVSMC). The proposed mechanism of LLLT suggests that photons emitted by Light Emitting Diodes (LEDs) are absorbed in the mitochondria and increase ATP production. Elevated levels of ATP enhance the rate of cellular proliferation. Rat aorta cells (A7R5) were cultured in T-25 vented flasks and subcultured in well plates for a scratch wound assay. The scratch width was measured before treatment intervals of ten, twenty, thirty, and forty-five minutes. The light treatments included constant red, NIR, and mixed red and NIR LED light. Control cell plates received no treatment. Cell width was remeasured sixteen hours post-scratch. The difference between the post-treatment and pre-treatment widths quantified cell regrowth. No significant data was recovered from the NIR light treatment. Similarly, twenty minutes of red, as well as twenty and thirty minutes of mixed LLLT treatment, also yielded no significant data. The thirty and forty-five-minute groups of red LLLT, as well as the ten-minute group of mixed light treatment, did significantly increase cell growth. An ANOVA test of the red LLLT data yielded a p-value of 0.04683, which signified LLLT's effectiveness on regeneration time, specifically with longer treatments of red light.

Kaylynn Bacon

Discipline: Biology

Authors:

#1 Daniel Zamzow

Abstract Name: The Phenazine Operon and Antibiotic Production in *Pseudomonas chlororaphis*

Antibiotics are integral in treating infectious diseases. Yet as more antibiotics are created, more bacterial resistance emerges. This constant microscopic arms race makes finding effective antibiotics increasingly challenging. We have isolated a strain of *Pseudomonas chlororaphis* from soil in southern Wisconsin that exhibits antibiotic activity against both Gram-negative and Gram-positive bacteria. This organism has a distinctive orange color, and early experiments in our lab suggested a link between the pigment and antibiotic

activity. Data from other labs have suggested that genes within the phenazine operon might drive production of the orange pigment. Phenazine is a known agricultural fungicide but is not identified as an antibiotic. We hypothesize this antibiotic is a secondary product of the phenazine pathway. Our research aims to perform gene knockouts along the phenazine operon and screen for antibiotic activity in knockout strains. Using the Gibson assembly method and the pEX18Tc suicide vector plasmid, we have targeted genes within the phenazine operon. Gene knockouts are confirmed by sequencing, and antibiotic activity is determined for each mutant. We will work our way through the operon to determine if any of the genes are involved in antibiotic production. This stepwise knockout strategy will define the genetic basis of antibiotic production in *P. chlororaphis*, providing insight into this novel antibiotic.

Kimberly Badal

Discipline: Biology

Authors:

#1 Carmina Balagtas

#2 Paige Berg

#3 Natalie Buford

#4 Carina Dickinson

#5 CJ Mierchuk

#6 Emily Naylor

Abstract Name: Can variation in the macro and micromorphology of the Gold Dust Day Gecko toe pad explain individual climbing ability and behavior?

Many climbing animals rely on specialized traits to grip and traverse their habitat. Most geckos have toe pads featuring dense arrays of branched microscopic hairs (setae) that generate frictional and intermolecular adhesive forces capable of supporting their body weight on vertical and inverted surfaces. As part of a mesocosm study on the ecology of the Gold Dust Day Gecko (*Phelsuma laticauda*) and other introduced lizards in O'ahu (HI), specific perch use of cohorts of marked individuals was documented daily for 1-2 months; clinging force was also measured in some individuals. Previous between-species comparisons show that Day Geckos exhibit superior clinging performance on low-friction surfaces, which statistically explains their predominant use of smooth, elevated perches. However, if/how underlying toe pad macro and micromorphology relate to performance, and subsequently the extent to which these combinations of traits affect perch use, remains to be investigated in this species and geckos more broadly. This project represents a first step in addressing these gaps by evaluating within-species pad variation. The pads of 82 Day Geckos were imaged via stereo and scanning electron microscopy and measured in FIJI. As in other geckos, we see that pad area increases but does not scale proportionately with body size. Interestingly, Day Gecko pad shape is variable, and rounder pads may be associated with greater clinging performance. We expect that setal dimensions will follow similar patterns of variation along the length of the pad as in other species, but that there will be detectable inter-individual differences when compared at the same locations. We also predict that there will be a strong relationship between setal density and clinging ability. Imminent work will test if these traits explain individual perch use. We predict that geckos with morphologies linked with greater clinging performance will be more likely to occupy higher and rougher perches.

Aditya Badhayan

Discipline: Psychology

Authors:

#1 Severine Lannoy

Abstract Name: Investigating the Influence of Socioeconomic Factors on Suicide Attempt in Those With Alcohol Abuse Disorder

Introduction: Alcohol Use Disorder (AUD) remains one of the most prevalent substance use disorders, with over 28 million people in the United States having it. AUD is also related to other mental health issues, including suicidal thoughts and behaviors. However, limited studies investigated the specific risk factors related to suicidal behaviors in individuals with AUD. In this study, we focused on the roles of socioeconomic factors. Methods: We investigated how socioeconomic factors, specifically income levels and educational attainment, are associated with the lifetime occurrence of suicide attempt (SA) in participants with AUD. Education, income, and SA data were collected from 1,268 participants from the Cognition, Alcohol, Genes, and Environment study. Association patterns were identified between variables while controlling for age, sex, and employment status. Other suicide variables were also included in the correlation plot, such as previous history of suicide ideation, active suicide ideation, thoughts of death, and self-harm. Results: Results demonstrated that education and income were negatively associated with SA ($r_s = -0.24$ and -0.28 , respectively), suggesting a potentially protective effect: higher education/income was related to lower risk of SA. Furthermore, the correlation between SA and education/income was among the strongest in the sample, even when comparing to the effect sizes of correlations with phenotypes such as thoughts of death or suicide ideation. Based on these results, we aim to design more specific models to test the pathways of association between AUD, socioeconomic factors, and suicidal behaviors. Conclusion: These findings indicate that education and income contribute uniquely to SA in individuals with AUD. They also highlight the role of socioeconomic factors in the mental health outcomes of those with AUD. Further studies are needed to investigate whether education and income act as mediators or moderators for other environmental variables when pertaining to SA.

Sean Bae

Discipline: Nursing and Public Health

Authors:

#1 Sean Bae

#2 Scott Moore

Abstract Name: Analysis of Third Space Impact on Loneliness

Loneliness, the subjective feelings of social isolation, is associated with poorer physical and mental health, increased risk for cardiovascular disease, cognitive decline, depression, anxiety, premature mortality, including suicide. "Third places", locations that are not home or work where individuals spend time, have been associated with reductions in stress, depression, and anxiety, which may be a result of third places' facilitating increased social interactions. This study examines variation in loneliness across intersectional social strata and the potential amelioration of loneliness by third-place access. Using the intersectional multilevel analysis of individual heterogeneity and discriminatory accuracy (I-MAIHDA), we will examine variance in risk for severe loneliness across social strata, then assess change in variance after adding recreation as a fixed effect, and assess disparities in severe loneliness when considering recreation access and social strata. We specified intersectional strata to be unique combinations of race, gender and sexuality, sex, and age. The sample of 161,876 All of Us Research Program participants is predominantly White (80.8%), cisgender-heterosexual (88.5%), and female (65.4%). Severe loneliness was defined as scoring 50% or more on the 8-item UCLA loneliness scale. Access to recreational facilities was self-reported. The current phase of the study consists of generating intersectional strata and utilizing the I-MAIHDA approach to assess model variance in severe loneliness when accounting for different factors. Model A measures differences in severe loneliness risk between intersectional groups before applying the covariate of recreation. Model B expands upon Model A through the addition of recreation as a covariate to explain between-stratum variance. Upon completion of the analysis, the findings will allow us to prioritize and tailor health promotion practices to

groups ranked highest for severe loneliness as well as evaluate the impact recreation access and stratum membership have in accounting for between-stratum variance in severe loneliness.

Vlera Baftija

Discipline: Psychology

Authors:

#1 Adam Winsler

Abstract Name: Does Immigrant Advantage for Academic Outcomes Persist in High School Similarly for Black and Hispanic Students?

One of four students in U.S. schools comes from an immigrant household, with 17.6 million children under 18 living with at least one immigrant parent. The 'immigrant advantage' posits that first-generation immigrant students often exhibit better academic outcomes than second-generation immigrant students, who exhibit better academic outcomes than non-immigrant students, despite first- and second- generation students facing socioeconomic and linguistic challenges. Prior research has documented this advantage in early education, but it is less clear whether this persists in high school, as results seem to vary for adolescents. The current psychology honor's thesis examines immigrant advantage in grades 9-12 using data from Miami School Readiness Project, a large-scale, 18-year longitudinal study of students attending Miami Dade County Public Schools. Research questions include (1) To what extent does the immigrant advantage appear in high school academic outcomes? and (2) Are patterns of the immigrant advantage similar for Black and Hispanic students? The sample (n=4,341) includes 2,704 first-generation immigrants, 777 second-generation immigrants, and 860 non-immigrants. Outcome variables include end-of-year GPA in 9th and 12th grade, cumulative high school GPA, standardized math and reading test scores in 10th grade, end-of-course exam grades for Algebra 1, attendance (days absent) in 9th and 12th grade, suspension, retention, and on-time graduation. Multiple regression analyses will be run controlling for student race, poverty, ELL status, disability, and gender, with immigrant status as the primary independent variable, and race-by-immigrant status interactions will be added and run to test question 2. Results are expected to show immigrant advantage present in 9th and 10th grade but weakened by 12th grade. The gap between immigrants and nonimmigrants is expected to be bigger for Black compared to Hispanic immigrants. Data cleaning and variable making is currently complete. Data analyses will be conducted in January with the full paper ready by the conference.

Will Baggett

Discipline: Visual Arts

Authors:

Abstract Name: The Wolf and Its Wings

This body of work, a series of digital art and prints entitled The Wolf and Its Wings, explores the tension between capitalist materialism and the pursuit of spiritual or personal identity. Initially inspired by a broader investigation into systems of belief (including extremism, religion, and capitalism) the concentration eventually narrowed its focus to the contemporary struggle for identity within a materialist culture. The series traces an internal conflict and spiritual awakening of a follower of a discriminatory ideology, referencing a modern, corporate, and political context for social Darwinism and the concept of "survival of the fittest." The work uses the motif of the wolf to embody the subject's initial primal, competitive state and "kill-or-be-killed" mentality. Formally, the series starts with graphic, grungy, and unforgiving imagery inspired by propaganda

posters, the series follows the subject's painful transition away from materialistic values toward transcendence. This shift is influenced by personal experience and observation of social justice movements. Later works, such as "Introspection 1" and "The Crowd's Heart," introduce vulnerability and themes of societal connection and reform. The final stage of the series marks a spiritual awakening, where the figure abandons the wolf motif for the wings of a bird, symbolizing newfound freedom and expanded awareness. The visual style evolves from sharp, harsh textures to an organic, transcendent approach expressed through veils of light and pastel colors. Technically, the series is an intimate combination of digital collage and printmaking (lithography, lasercuts and etchings) often moving the work through digital, handmade, and back to digital formats. This complex process reflects the "chaos and messiness" of the ideological conflict. The prints, extended onto formal clothing, aim to create a public dialogue and protest, taking the art out of the gallery and into a wider social space to engage audiences with the unsettling but visually appealing imagery.

Sohail Baig

Discipline: Biology

Authors:

#1 Abhishek Guha

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Abstract Name: TTP is a Novel Sex-specific Regulator of NGF

Approximately 80% of patients report mild to severe postsurgical pain, which can impede recovery, contribute to opioid dependency, and transition to chronic pain. Postsurgical pain is driven by inflammatory mediators, which are regulated at the posttranscriptional level via adenine- and uridine-rich elements (AREs) in the 3' UTR of their mRNA. ARE-binding proteins (AUBP) recognize these cis-acting elements and control mRNA stabilization or translation efficiency. Tristetraprolin, an AUBP, promotes mRNA decay by recruiting deadenylation factors. Nerve Growth Factor (NGF) is an inflammatory mediator that plays a major role in peripheral pain sensitivity as well as the development of chronic pain. We hypothesize that NGF mRNA is a novel target of TTP. Postsurgical incision in myeloid-specific TTP KO mice showed an increase in NGF expression and elevated mechanical sensitivity. In silico analysis of the 3' UTR of NGF presented a putative TTP-specific ARE binding site (UAUUUAU). Additionally, NGF expression in LPS-treated bone-marrow-derived macrophages (BMDM) was more elevated in males compared to females under TTP KO conditions. In conclusion, NGF is significantly upregulated in TTP KO BMDM in a sex-specific manner. With NGF being a modulator for peripheral pain development, it is crucial to understand the mechanisms of ARE-mediated regulation by TTP for developing therapeutic interventions. In future studies, using a metagenesis approach, we aim to further understand the role of AREs and the 3'UTR of NGF in TTP-mediated posttranscriptional regulation.

Cooper Bailey

Discipline: Physics and Astronomy

Authors:

#1 Cooper Bailey

#2 Arissa Williams

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Arissa Williams
Anna Fong

Abstract Name: The Search for GEMS

Our research project aims to find high-mass exoplanets orbiting M-dwarf stars as part of the Giant Exoplanets around M-dwarf Stars (GEMS) collaboration. These exoplanets are viewed as irregular; the systems that house M-dwarf stars are not thought to contain the amount of mass required to form both the star and the large exoplanets. Through locating these exoplanets, we can build a catalog that will be used to determine how these exoplanets formed. This process entails follow-up observations of candidates identified by NASA's Transiting Exoplanet Survey Satellite (TESS). Though TESS was designed to search for transiting exoplanets, the candidates it finds may be other systems, such as eclipsing binaries. Ground-based observations are needed to verify the existence of these exoplanet candidates. We used the Keeble Observatory's 40 centimeter telescope, housed on Randolph-Macon College's campus, along with a SBIG Aluma CCD47-10 camera in order to obtain i-band images of the candidate star while the exoplanet is transiting. These images were analyzed using AstroImageJ, an astronomical software, to reduce the data and produce a light curve of the star during the transit. Ultimately, these light curves are used to confirm the existence of an exoplanet from the GEMS candidates TESS has previously found. Here, we will present the highlights of our cumulative research, showcasing the most interesting candidates we have studied.

Sydney Bair

Discipline: Psychology

Authors:
#1 Jennifer Quinn

Abstract Name: Designing a Line Dancing Program to Bring Cognitive, Physical and Social Benefits to Older Adults

Dance is an expression of art as well as an embodiment of our culture, emotions, thoughts, and beliefs. It provides both mental and physical challenges to the performers, and its physical, cognitive, and social benefits have proven therapeutic in many cases. For instance, dance movement therapy has been investigated as a novel approach in the treatment of major depressive disorder and anxiety. Repeated dance lessons have positive impacts on body structure and function in older individuals by maintaining strength, balance, and coordination. In addition, repeated dance strengthens cognitive functions such as active recall and working memory within a socially-stimulating setting. Here we outline a structured dance program designed to support aging individuals who participate in activities at their local community center. Line dancing, specifically, is an individual activity that can be performed in a group setting, thus allowing for practice at home or with others, while also incorporating footwork of varying complexities. The aim of the program is to provide community centers for aging adults with the foundation of a line dancing class even if they lack an in-person instructor. The program will consist of 25-30 line dances, organized categorically based on their targeted cognitive and/or physical parameters (i.e., working memory, balance, active recall, etc). Each line dance will have a written layout of the steps, a video teaching and performing the dance, and the corresponding music with instructor call out of steps. The program will be implemented in a local senior community center to gather feedback from participants and administrators. Future goals will focus on long-term implementation and broad dissemination of this program along with assessment of the impacts on mental, physical, and social well-being in the populations served.

Alec Baird

Discipline: Social Work and Human Services

Authors:

#1 Kristel Scoresby

Abstract Name: Teaching Disability Justice in Reproductive and Sexual Rights

Despite broad recognition of health equity, professional curricula in helping professions frequently omit meaningful engagement with the sexual and reproductive lives of disabled people. Historically, the medical model has framed disability as a deficit to be cured, implicitly deeming disabled bodies as unfit for reproduction or parenting. This poster interrogates these systemic oversights by exploring the theoretical and practical intersections of Disability Justice (DJ) and Reproductive Justice (RJ). While RJ establishes the right to bodily autonomy and the right to have children (or not have children), DJ expands this by challenging the ableist structures that make these rights inaccessible to many disabled persons, particularly those of marginalized communities. The convergence of these frameworks highlights that reproductive freedom for disabled individuals is not merely about legality, but about functional access, ranging from physical environments to communication supports and freedom from coercion. By analyzing historical patterns of forced sterilization alongside current disparities in healthcare access, this presentation demonstrates how ableism, racism, and sexism compound to restrict reproductive agency. The analysis suggests that a compliance-only approach (e.g., adhering strictly to the ADA) is insufficient. Instead, an intersectional, justice-oriented framework is required to dismantle barriers to care. This conceptual shift is vital for helping professionals to move beyond paternalistic models of care and toward practice that genuinely affirms the dignity, sexuality, and parenting rights of disabled populations.

Ramla Bajabar

Discipline: Biochemistry

Authors:

#1 Hadeel Abdeljawad

#2 Caitlin McGuire

Abstract Name: Investigating the Toxic Mechanism of KFAT Activity on Rab7

BopA is an effector protein secreted by *Burkholderia thailandensis* and other *Burkholderia* spp. BopA has been found to suppress autophagy and phagocytic destruction of bacteria. It is also suspected that BopA has lysine fatty acyl transferase (KFAT) activity due to its similar structure and sequence to other established KFATs as well as its anti-autophagy effect. To determine if BopA is also a KFAT, we performed alkyne labeling and click chemistry and observed increased fatty acylation for multiple proteins that is abolished by mutating the putative catalytic amino acids in BopA. To identify what host proteins BopA is modifying, we carried out a mass spectrometry proteomics screen in cells expressing WT or a catalytic dead mutant of BopA. We identified several potential BopA substrates, and confirmed Rab7, a critical autophagy regulator, as a substrate. By identifying the substrates of BopA KFAT activity, we hope to reveal the mechanism by which it functions during infection and potentially uncover an opportunity for therapeutic intervention during *Burkholderia* spp. infections.

Riya Bajpai

Discipline: Biology

Authors:

#1 Sarah Timis

#2 Christopher Canal

#3 Alexander Hamm

#4 Marcus Garcia

#5 Matthew Campen

#6 Andrew Ottens

Abstract Name: Impact of Gestational Ozone Exposure on the Fetal Environment as a Risk Factor in Neurodevelopmental Outcomes

Ozone (O₃) is a critical component of air pollution with demonstrated health impacts, including increased risk for premature birth and lower birth term weight. O₃ exposure has also been associated with maternal hypertension and longer-term complications such as greater risk for developmental delays in children. Studies here sought to understand the impact of maternal ozone exposure on placental development to understand its effects on the fetus. Though recognized as a barrier to exogenous maternal stressors, we hypothesized early maternal O₃ would cause placental vascular abnormality, perturbing the fetal environment. Pregnant Sprague Dawley Rats were exposed to 0.3 ppm O₃ (consistent with global urban areas) or filtered air (FA). Dams received either an O₃ or FA 4-h exposure at gestation day GD10 or GD20 (to control for an acute phase response). At term (GD21), amniotic fluid (AF) and placental tissues were collected and snap-frozen. Unbiased AF discovery proteomics first identified relevant fetal perturbation. As a more vulnerable developmental period than GD20, GD10 O₃ exposure had a greater, sustained impact on the fetal environment. Follow-up studies then investigated the origin of amniotic proteomic perturbation. Sub-acute ozone exposure indicated impaired spiral artery remodeling, supported by bioinformatic analysis demonstrating the involvement of significant placenta-aligned AF proteins in disease pathologies relevant to impacted vasculature. High levels of placental connective tissue growth factor implied impaired trophoblast invasion, fibrin deposition, and inflammation. PECAM-1 staining illustrated increased vessel wall thickening with decidual bias, consistent with maternal hypertension and impaired perfusion. However, factors like galectin-1 increased in the AF with GD10 O₃ exposure but could not be traced directly to an increase in placental tissue, perhaps indicating increased shedding to reduce inflammation in the fetal environment. Results substantiate that GD10 maternal O₃ has a significant impact on placental function. Future research will investigate how perturbation may impact fetal neurodevelopment.

Amelia Baker

Discipline: Education

Authors:

#1 Brian Wooten

Abstract Name: Empowering Students for Success in the Workplace

Although a bachelor's degree is commonly viewed as a pathway to career success, many students graduate without the practical skills and real-world knowledge needed to thrive in the workplace (Song, 2025). Employers are placing greater importance on critical thinking and soft skills such as communication and collaboration—areas that traditional academic programs may not always prioritize. In spring 2025, a multi-institutional team developed and completed a research study evaluating the curriculum of a course focused on preparing students for the workforce. Individuals in business, government and/or non-profit communities reviewed the current course curriculum and offered insight for emerging trends needed to support the success of the students as they enter the work world. The survey included eight major areas: work essential skills, graduate readiness for workforce entry, understanding personal motivations and values, identifying strengths and growth areas, understanding organizational culture, behaviors that support early career success, the value

of mentoring, and navigating workplace culture. Preliminary findings (N = 128) revealed that most respondents had over six years of professional experience and emphasized the growing need for employees who demonstrate adaptability, communication, and leadership skills. Respondents also underscored the importance of understanding workplace culture and aligning personal values with organizational goals. Results from the study will be shared as well as an overview of identified trends for better preparing students for work after degree attainment will be discussed.

Alexander J. Baker

Discipline: Computer Science

Authors:

Abstract Name: Infinite Brushstroke: Where Math, Code, and Art Merge in an Aperiodic Monotile

An aperiodic monotile is a single shape that can tile a plane infinitely, yet never create a repeating pattern. This has applications in material science, crystallography, and computational geometry. In this project, we explore the recently discovered “hat” aperiodic monotile through interactive web-based visualizations, demonstrating both individual tile geometry and infinite plane tiling patterns. First, a single tile visualization in real time, demonstrates a monotile through two adjustable edge parameters and curvature. The visualization uses cubic Bézier curves to create smooth curved edges, whose control points are calculated by perpendicular offset from the midpoint of the edges. This enables smooth transitions between different tile shapes within the continuum, including the Hat, Chevron, Turtle, and Comet. The second part implements infinite plane tiling using a composition of transformation matrices (rotation, scaling, reflection) for positioning and arranging tiles. An important visual research finding was that with non-zero edge curvature, tiles are unable to properly align with their reflected versions; this observation confirms that curved tiles are indeed chiral (structure and its mirror image are not superimposable). These visualizations were implemented in JavaScript using HTML5 Canvas, providing an accessible platform to explore these concepts. The current work refines the edge-matching algorithm, ensuring proper tile connections in the infinite plane. Future work includes a seeded random number generator that allows for the reproduction of generated patterns, enabling exploration of different configurations and an investigation into potential 3D representations of an aperiodic monotile.

Andrew Baker

Discipline: Psychology

Authors:

#1 Jane Lutken

Abstract Name: What Do You Think Why Adults Talk Like Kids: Wh-Question Comprehension in Adults

In questions that contain both a matrix wh-word and a wh-relativizer (Why did Marcus tell Sally what he ate), English-speaking children often make the mistake of answering the wh-relativizer (What he ate), rather than the matrix (Why Marcus told Sally). The underlying cause of these mistakes isn't widely agreed upon but holds implications for the relationship between linguistic competence and underlying cognitive mechanisms. Previous work has shown adults given an online task perform similarly to children. This hasn't been tested except in online tasks, which aren't realistic. The goal of this study is to investigate whether college aged participants will make similar errors to children when given appropriately difficult tasks in an in-person context. This study investigates performance of 18 college age English-speakers on an in-person “questions

after stories task". All students reported English as the language they felt most comfortable speaking and reading. Two participants reported Spanish as their first language, but not their dominant language. Participants read 42 scenarios and were asked one question for each scenario. Half of these were target questions of the form 'Why did Marcus tell Sally what he ate?' The others included the relativizer "that" (ex. What did Marcus tell Sally that he ate). Six filler questions were included to ensure participants were attending to the scenarios. Participants spoke responses into a microphone. Responses were transcribed after data collection. Responses will be coded for error type and analyzed using Bayesian ANOVAs, which will include participant, item number, form and trial order as random effects. We expect adults will make some errors, though not necessarily the same types of errors children make. If adults make similar errors to children, this would support the hypothesis that children's errors are the result of immature processing mechanisms rather than imperfect knowledge of the language.

Hollis Baker

Discipline: Communications

Authors:

Abstract Name: Polarization in Online Spaces: A Computational Analysis of YouTube Commentary on the Assassination of Charlie Kirk

Online political commentary has become an increasingly influential form of digital media, with creators shaping how online audiences interpret polarizing events. As social media platforms like YouTube sometimes blur the line between entertainment and political analysis, creator ideology can play a central role in structuring how viewers emotionally process the news they consume. On September 10, 2025, co-founder of Turning Point USA, Charlie Kirk, was assassinated while speaking at a campus event at Utah Valley University. Reactions to his death were highly polarized: many framed it as a political assassination targeting free speech, while others emphasized the broader threat of political violence and cautioned against using the tragedy to deepen political divides. This study asks: how do reactions to the assassination of Charlie Kirk differ between YouTube comments on a video created by a left-leaning creator versus a right-leaning creator? I am currently conducting a computational analysis using CommuAnalytic to examine two YouTube videos discussing the event—one from Hasan Piker, a left-leaning commentator, and one from Ben Shapiro, a right-leaning commentator. I extracted comment datasets from each video and conducted automated sentiment analysis and topic modeling to identify emotional tone and recurring themes. 15,285 comments were extracted from Hasan Piker's video while 2,962 comments were extracted from Ben Shapiro's video. I am currently in the process of performing manual coding of 10 comment clusters to verify computational findings and to examine how users expressed ideas of empathy, hostility, grief, or political critique. Preliminary findings suggest that comments under the left-leaning video display more negative sentiment towards Kirk, framing the event through political criticism and broader debates about conservative influence. In contrast, the right-leaning video's comments highlight more grief and admiration for Kirk, reflecting a more sympathetic environment.

Aidan Balagtas

Discipline: Biology

Authors:

#1 Xiaomin Bao

Abstract Name: Novel Role for Histone H1.1 in Regulating Epidermal Differentiation

The linker histone H1 is a component of chromatin that binds DNA at the entry and exit sites of the nucleosome. Despite major advances in epigenetics focusing on core histones and their modifications, H1 and its variants remain greatly understudied. While earlier *in vivo* studies suggested functional redundancy among H1 variants, recent reports indicate that individual variants may have distinct regulatory roles. Notably, H1.1, the least abundant and least conserved H1 variant in human somatic cells, has no well-characterized gene regulatory function. Here, we leverage the human skin epithelium (epidermis) to investigate a potential role for H1.1 in epidermal differentiation. Based on previous lab data, we hypothesized that H1.1 expression is required to suppress terminal differentiation. To test this, H1.1 was knocked down in epidermal progenitors using RNA interference, and differentiation-associated gene expression was analyzed by RT-qPCR and RNA-Seq. Subsequent clonogenicity assays were performed to assess progenitor self-renewal upon knockdown. We found that H1.1 knockdown resulted in significant upregulation of markers and broader transcriptional programs associated with differentiation, and this was accompanied by a marked reduction in progenitor self-renewal capacity. These findings indicate that H1.1 is necessary to repress differentiation and maintain self-renewal of epidermal progenitors. Our results reveal a previously unrecognized gene regulatory role for H1.1 in epidermal differentiation and suggest that linker histones can influence cell fate decisions. Ongoing studies aim to elucidate how H1.1 modulates chromatin architecture and transcriptional programs, providing insight into fundamental mechanisms by which H1.1 regulates tissue homeostasis.

Aditri Balaji

Discipline: Health and Human Development

Authors:

#1 Aditri Balaji
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Abstract Name: The NOSES Study: Evaluating Antibiotics, Intranasal Corticosteroids, and Supportive Care in Acute Rhinosinusitis Treatment

Acute rhinosinusitis (ARS) is an inflammation of the sinuses usually caused by viral pathogens, with bacterial infections occurring far less often. Despite this, antibiotics are prescribed in nearly 70% of ARS cases despite limited evidence to their benefit, leading to antibiotic overuse, resistance, and avoidable side effects. The “Nasal Irrigation, Oral Antibiotics, and Subgroup Targeting for Effective Management of Acute Sinusitis” (NOSES) study explores evidence-based alternatives through a multi-phase, four-arm, double-blind, placebo-controlled RCT. The primary objective is to evaluate the effectiveness of amoxicillin-clavulanate, intranasal budesonide, and supportive care (OTCs and nasal irrigation) across patient subgroups defined by age, symptom severity, provider gestalt, CRP levels, and medication adherence. Patients aged 18–75 with sinus symptoms were recruited from six primary care and academic centers. Based on symptom duration, participants were assigned to phase one or phase two. Those experiencing symptoms for 9 days (E9) or more were immediately randomized into one of four intervention groups: (1) amoxicillin-clavulanate, (2) amoxicillin-clavulanate plus intranasal budesonide, (3) placebo, or (4) placebo plus intranasal budesonide. Patients with symptoms for fewer than 9 days entered phase one and received supportive care until either progressing to E9 randomization or completing the study if symptoms resolved. Throughout the study, participants completed daily logs tracking symptom severity, neti pot use, medication adherence, and adverse effects. The primary outcome was measured using mSNOT-16, a tool for objectively measuring disease severity. Although the full-scale study is still ongoing, the pilot phase confirmed the feasibility of conducting a larger, multi-site trial. This ongoing 48-month study aims to identify which patient subgroups benefit most

from different treatment strategies for acute rhinosinusitis (ARS), supporting a more personalized approach to care. This work has the potential to inform clinical decision-making by guiding appropriate treatment selection, improved symptom management, stratifying disease severity, and reduced overprescription of antibiotics.

Pranavika Balaji

Discipline: Health and Human Development

Authors:

Abstract Name: Interactions of Genetic, Environmental, and Epigenetic Factors in Myopia Development

Myopia, or nearsightedness, has increased rapidly worldwide and is now a major public health concern caused by both genetic and environmental factors. Current understanding shows that too much near work, limited time spent outdoors, and prolonged screen use contribute to abnormal eye growth in individuals who may already have a genetic predisposition. At the molecular level, epigenetic changes and shifts in DNA activity, often influenced by environmental conditions, affect the signaling pathways that regulate eye development and may help explain why myopia is increasingly common among children. This paper synthesizes recent environmental, genetic, and epigenetic research to explain how these factors contribute to the development and progression of myopia, particularly in children and adolescents. Genetic studies indicate that genes increase the risk of developing myopia, while environmental factors largely determine its severity. Evidence from epigenetics and molecular biology shows how external stimuli can alter gene expression, shaping refractive development through gene-environment interactions. Current interventions, including specialized lenses, atropine eye drops, and light-based therapies, aim to interrupt the biological pathways linked to abnormal eye growth, and several newer approaches have shown promising early results. This analysis synthesizes existing research to clarify the biological and environmental processes behind myopia and to show how these findings relate to current approaches used to slow its progression. By combining research across genetics, epigenetics, and environmental studies, this paper highlights how these factors collectively drive myopia development and why understanding their interaction during early developmental stages is important for improving early detection and treatment in children and adolescents.

Vishnuram Balasubramani

Discipline: Health and Human Development

Authors:

#1 Don Codipilly

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#4 William Harmsen

Abstract Name: LYMPHOCYTIC ESOPHAGITIS: TREATMENT OUTCOMES AND PREDICTORS OF SEVERE DISEASE

Lymphocytic esophagitis (LE) is a chronic esophageal inflammation typically presenting with dysphagia and sometimes stricturing. Medical treatment options include proton-pump inhibitors (PPIs), topical steroids (e.g., budesonide), and biologics for refractory cases; a stricturing phenotype requiring repeated dilations is occasionally seen, but predictors of severe or treatment-resistant disease are poorly defined. We performed a retrospective cohort study of patients seen in the Mayo Clinic Rochester esophageal clinic from January 2000

to May 2025. LE was defined as ≥ 10 intraepithelial lymphocytes per high-power field. Demographics, comorbidities, endoscopic findings, treatments, and outcomes were abstracted from the medical record. Univariate analyses used Student's t-test and chi-square testing. Among 184 patients (mean age 61.1 years; mean BMI 27.5 kg/m²; 61% female; 92% white), dysphagia (80%) and reflux (55%) were the most common symptoms. Twenty percent had an esophageal stricture on index endoscopy. Eosinophils (insufficient for eosinophilic esophagitis) were present in 20% of biopsies. Therapies included PPI in 71%, topical steroids in 23%, and biologics in 8% (40% of biologic-treated patients received infliximab). Of 149 patients with baseline dysphagia, 84 (56%) achieved symptomatic remission at a mean follow-up of 20 months. Of 64 with histologic follow-up, 29 (45%) were in histologic remission; symptomatic and histologic responses agreed in 56% of cases. On univariate analysis, stricture formation correlated with small-bowel lymphocytosis ($p=0.01$), small-caliber esophagus ($p<0.01$), concomitant lichen planus ($p=0.03$), and endoscopic features of EoE (rings, furrows, exudates; $p<0.01$). Treatment-refractory disease associated with diverticulosis ($p=0.03$). Seventeen patients required multiple dilations. Overall, LE often follows a benign course with most responding to PPI or topical steroids; severe, stricturing disease appears linked to the factors above.

Vishnuram Balasubramani

Discipline: Health and Human Development

Authors:

- #1 Varan Peranathan
- #2 Lizeth Cifuentes
- #3 Mike Wells
- #4 Amina Akram
- #5 Ryan Alexander
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- #7 Don Codipilly
- #8 Diana Snyder
- #9 Cadman Leggett
- #10 Jeffrey Alexander
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- #12 Louis Wong Kee Song
- #13 Ryan Law
- #14 Karthik Ravi

Abstract Name: PRE-POEM TIMED BARIUM ESOPHAGRAM ANATOMIC FEATURES PREDICT POST POEM GASTROESOPHAGEAL REFLUX DISEASE

Gastroesophageal reflux (GERD) is a known complication of peroral endoscopic myotomy (POEM), yet reliable predictors remain unclear. Timed barium esophagram (TBE) evaluates anatomic features that may affect post-POEM reflux clearance. We aimed to determine whether pre-POEM TBE findings predict GERD. We conducted a prospective cohort study of consecutive achalasia patients undergoing POEM at a tertiary center from March 2020 to March 2025. All patients completed TBE with 200 mL barium ingestion, radiographs at 1, 2, and 5 minutes, and a 13-mm barium tablet. A blinded radiologist assessed maximum and distal esophageal diameter (3 cm above the GEJ), alpha angle, leftward tortuosity, presence of sump, morphology (straight vs. sigmoid $<135^\circ$), and dilation grade (<3.5 cm; 3.5–6.0 cm; ≥ 6.0 cm). Post-POEM GERD was defined by EGD evidence of LA Grade B–D esophagitis; severe GERD was LA Grade C–D. If EGD was inconclusive, wireless pH testing defined GERD by acid exposure $\geq 6\%$ on $\geq 50\%$ of days. Continuous variables were reported as medians; categorical variables as percentages. Mann-Whitney testing compared groups, and logistic regression evaluated predictors. Among 167 patients (42.5% female; median age 63.5), achalasia subtypes were 8.4% Type I, 76.6% Type II, and 14.4% Type III. Median myotomy length was 6.0 cm, and clinical success occurred in 93.4% at a median 4.2-month follow-up. GERD occurred in 44.9%, including 8.9% Grade B, 12.0% Grade C, and 4.2% Grade D esophagitis. Demographics and achalasia subtype were not associated with GERD. Larger distal esophageal diameter predicted erosive (28

vs. 24 mm, $p=0.032$) and severe esophagitis (29 vs. 24 mm, $p=0.038$). Leftward tortuosity strongly predicted erosive (RR 2.3) and severe esophagitis (RR 3.6). This study provides the first evidence that pre-POEM TBE findings predict post-procedural GERD, supporting its role in risk stratification, patient counseling, and procedural planning.

Adam Baldocchi

Discipline: Biology

Authors:

#1 Adam Baldocchi

Abstract Name: Prevalence of Shiga Toxin Producing Escherichia Coli in Illinois Bison Herds

Shiga toxin-producing Escherichia coli (STEC) represents an important group of zoonotic pathogens that pose ongoing risks to public health through foodborne outbreaks and environmental transmission. This project evaluated the prevalence and genetic distribution of stx1 and stx2 toxin genes in fecal samples collected from Illinois bison (*Bison bison*) managed under either commercial or preservation conditions. A total of 320 fecal samples were screened for STEC presence by performing enrichment culturing and confirmed by Polymerase Chain Reaction (PCR) for stx1, stx2, and uidA, which confirmed *E. coli* identity. Of all tested samples, 28.4% were STEC-positive, with stx2 (21.3%) far more prevalent than stx1 (6.2%). At the herd level, STEC detection averaged $54.5\% \pm 13\%$ in commercial herds compared with $19.5\% \pm 10.0\%$ in preservation herds ($p=0.0167$). These findings highlight how herd management, environmental exposure, and microbial ecology interact to shape pathogenic *E. coli* dynamics in large ruminants, supporting a One Health framework for surveillance. These results underscore the need for continued longitudinal monitoring of bison herds and further investigation into environmental and management factors that drive STEC persistence.

Madeline Baldwin

Discipline: Nursing and Public Health

Authors:

#1 Carrie Bailey

Abstract Name: A Comparison of Emotional Intelligence and Burnout Scores in Two Different Nursing Programs at a Large Southeastern State University

Psychologist Dr. Grace Tworek defines emotional intelligence (EI) as the ability to perceive, understand, comprehend, and manage emotions. The high levels of stress experienced by nursing students can create fatigue and burnout, therefore EI can be a vital skill for nursing students. Additionally, EI can also be a predictor of their future clinical decision-making and likelihood of attrition early in their career as well as reduce burnout in nursing students. High levels of EI have also been shown to improve coping and critical thinking in nurses which overall helps patient outcomes. Despite extensive research recognizing the need for EI in nursing students, little research has been done regarding how different styles of programs impact these scores. The purpose of this study is to determine differences in emotional intelligence and burnout scores between two different styles of nursing program models at a large state university in the southeastern United States. These programs are entitled "BSN Scholars" and "Traditional BSN (TBSN)". Data for this study was collected via surveys given to nursing students in their Pharmacology I class. The Maslach Burnout Inventory (MBI) and Scale of Emotional Functioning: Medicine (SEF:MED) were both utilized alongside the Marlowe-Crowne Social Desirability to assess for social desirability in responses. Overall, 172 students participated in

the study, 44 BSN Scholars and 128 TBSN students. The TBSN students had an average score of 1.63 on the MBI and 3.95 on the SEF:MED and the BSN Scholars had an average score of 1.73 on the MBI and 3.91 on the SEF:MED. These results are not statistically significant but display a slightly higher level of emotional functioning and lower level of burnout in TBSN students. Further research on how different nursing programs impact burnout and emotional intelligence is needed.

Amber Baldwin

Discipline: Psychology

Authors:

#1 Gina Fernandez

Abstract Name: Acetylcholine Receptor Antagonism via Dihydro-beta-erythroidine (DHβE) in Nicotine Conditioned Place Preference Following Adolescent Nicotine Exposure.

Adolescence is considered a critical period for neural development which is characterized by risk-taking behavior and reward seeking behaviors (Larsen & Luna, 2018; Spear, 2015). During this period, structures of the mesocortical cognitive pathway, which regulate reward, undergo extensive developmental changes (Spear, 2000). Behavioral disruptions related to adolescent nicotine usage have been extensively correlated with changes in this development, including dysregulation of cholinergic signaling. Cholinergic activity within the nervous system is responsible for attention and memory, and impairments can lead to the manifestation of maladaptive behaviors (Counotte et al., 2012). This project proposes pharmacological manipulation of the cholinergic system, examining its effect on the formation of rapid nicotine-context memory. Sprague Dawley rats are injected with twelve doses of 0.4 mg/kg nicotine (equivalent to that of one pack of cigarettes) or 0.9% saline during the adolescent developmental period (post-natal day 28-49). Animals undergo behavioral testing during adulthood to examine any changes in nicotine preference using a conditioned place preference (CPP) paradigm in which the same 0.4 mg/kg nicotine dose is paired with a specific, non-preferred, environment. Each conditioning session includes a co-administered injection of 5 mg/kg dihydro-β-erythroidine (DHβE; a competitive nicotinic acetylcholine receptor antagonist) or vehicle (dimethylsulfoxide [DMSO]). Based on preliminary findings, it is expected that this experiment will demonstrate that DHβE will attenuate reward seeking behavior in subjects pre-exposed to nicotine during the adolescent developmental period—indicating that DHβE may be an effective smoking cessation aid for future use.

Amber Baldwin

Discipline: Psychology

Authors:

#1 Amber Baldwin

Kaitlyn Kinslow

Abstract Name: Building Young Brains: Neuroscience Education for Elementary Students in Newport News, VA Through Children's Illustration.

As early as preschool, children are often asked the question, “what do you want to be when you grow up?”. How this question is answered is often shaped by a child's education and surroundings (e.g. what careers their caregivers have, or what they have learned in school), indicating that children's ideas about their potential futures are largely based upon in-class experiences, hands-on activities, and interactions with adults and

peers. Unfortunately, students are often not exposed to the field of neuroscience, even in the most basic sense, until grades 5-8 in the United States when they first begin learning about basic structures and functions of the nervous system in their life-science courses. Additionally, in Virginia, “neuroscience” does not appear in K-12 at all. To address this, the current project aims to increase neuroscience education across K-5 grade levels within Newport News Public Schools through the use of illustration and storytelling. An illustrated book was constructed with content aimed specifically at this age range, beginning with basic brain anatomy and simpler descriptions of action potentials. On the first visit to classrooms, a pre-survey is administered to students, physical copies are read by experimenters and distributed for classroom use. Two weeks after the initial classroom visit, experimenters return to each class and administer a post-survey assessing how students’ attitudes and understanding of neuroscience have shifted over time. It is expected that students’ attitudes toward neuroscience will improve after receiving the educational material. This project emphasizes the importance of early education in neuroscience, exposing the next generation to the field in order to initiate long-lasting interest.

Rayna Ballard

Discipline: Film/Photography Studies

Authors:

Abstract Name: LGBTQ+ Representation of Black Men in Teen Television: Cultivating Monotypes of Gayness

Studies have shown that representation in television and movie media can affect viewers' perception by creating perspectives on reality based on what is written. Mainstream television and movie media has a history of marginalizing Black gay men into stereotypical patterns unlike other races of gay men. This comprehensive literature review gathering the history of comedy and drama works portraying characters in these ways, mainly negatively, was conducted in order to understand how the representations are subtly molded in today’s media, even with the push of themes of acceptance. The representations are not explicitly stated to describe a character, but viewers have noticed the repeated writing of Black gay men behavior that might go unnoticed by critics as their perspectives of how Black gay men are supposed to act or behave is linear. The popular and highly rated television shows *Heartbreak High* (2022) and *Adults* (2025) were analyzed by tallying the amount of scenes certain behaviors are shown. The two characters were analyzed in this paper; a Black gay man and a White gay man. Connections of these behaviors were drawn to previous media representation to determine if there was a specific uptick to stereotypical patterns based on race. These findings suggest that flamboyant etiquette, interracial coupling, hypersexual behaviors, and lack of supportive community may be a negative pattern in today’s young adult dramedies as these characteristics are the main ones to gain attraction from viewers for its comedic purposes. This paper aims to draw attention to the subtle cultures and perceptions in the U.S toward Black gay men created by the lack of diverse representation.

Emily Ballesteros

Discipline: Art History

Authors:

#1 Emily Ballesteros

Abstract Name: Herb Lubalin: Redefining Typography as Visual Communication

Herb Lubalin was an American graphic designer who reimagined the role of typography in visual

communication. Born in New York City in 1918, Lubalin established a huge obsession with letterforms and saw their emotional future when he was studying at Cooper Union School of Art. As his career started in advertising, magazine design, and typeface development, he repeatedly questioned the standards of readability and composition. Lubalin argued that typography should not just be words shown on a page but rather have them be visually expressive with emotion and feeling within the text. He took text and images into a cohesive form of expression that visually told the meaning. In his most famous projects like Avant Garde, Eros, and Fact magazines, he used the type as illustrations, he distorted the letterforms to provoke ideas of movement, familiarity, and emotion. He collaborated with the International Typeface Corporation (ITC) and a designer named Tom Carnase who helped evolve typography more and more. Lubalin's typefaces, Avant Garde Gothic and Lubalin Graph, are still being used to this day and still have such a strong influence on design. Looking over the aesthetics, Lubalin reinforced communication over decoration, he wanted clarity and emotional depth in visual storytelling. All of his work shaped how artists, typographers, and teachers go for the balance between language and image. This paper will go into his early education, typographic innovations, publishing collaborations, and his lasting legacy.

Cora Ballinger

Discipline: Biology

Authors:

#1 Clayton Carlson

Abstract Name: Modeling Charcot-Marie-Tooth Type 1 in *C. elegans*

Charcot-Marie-Tooth (CMT) type 1 is a genetic disease that results from the damage of myelin sheath. The myelin sheath is a protective cover of the nerves. The damage that results does not allow the nerve signals to be properly transmitted to the brain which leads to problems such as muscle weakness, impaired movement, and reduced sensation. CMT type 1 is most commonly associated with mutations in the human genes PMP22, LITAF, and EGR2. *Caenorhabditis elegans* (*C. elegans*) provide an effective model for studying CMT because their genes *vab-9*, *f36g3.3*, and *egrh-1* are human homologues of the CMT-1 causing genes. Mutations in these genes cause CMT type 1 in humans, and similar effects can be seen in *C. elegans*, despite the worms lacking a myelin sheath. The goal of this project is to characterize these CMT-1 genes in *C. elegans* to establish a worm model for the disease. To study how each gene affects CMT type 1 an assessment of lifespan, neurological morphology using DiI staining, and muscle strength through NemaFlex measurements of each mutant *C. elegans* (*vab-9*, *f36g3.3*, and *egrh-1*) and wild type (n2) were observed. Early work has focused on establishing healthy populations of mutant and wild-type worms. DiI staining procedures allowed the visualization of neurological structure, and confirmed that the strains produce consistent fluorescence patterns under the fluorescent microscope suitable for morphological comparison. Discovering whether mutations in *vab-9*, *f36g3.3*, and *egrh-1* reduce longevity or weaken muscle function will allow us to further determine how these genes contribute to CMT type 1 disease.

Imani Ballou

Discipline: Mathematics

Authors:

Abstract Name: Roulette Probabilities

This research explores effective betting strategies in Roulette. To win, a player must predict the spin's

outcome. The roulette wheel has numbers 1-36 on red and black spaces. The casino, referred to as 'the house', green slot on the wheel (0/00) that give it an automatic win. The most common bets are even/odd and red/black. Zeros do not count as red or black, and only fit into certain bets like straight-up or the 'first five'. Wins pay even money (1:1) or more depending bet. We coded an R simulation of 'n' rolls to calculate the user's earnings. We investigated the common betting schemes like red, black, even, odd, straight, split, etc. We calculated the probability and expected value theoretically. We confirmed the theoretical outcomes with our simulation. The expected value of winnings does not benefit the player, which in turn is how the house makes money. Observing the theoretical results and real-world games will help to determine the best winning strategy and whether it will make a difference despite the house edge. In addition to examining the basic betting types, we focused on some complex betting strategies that involve bankroll management and progressive strategies to determine if these tactics could make a difference when compared to the expected value of basic bets. Strategies such as alternating bets, refraining from betting until k amount of color showed up, and betting the same color until a loss. We found the expected value through simulation and determined that it would eventually match the expected value of the basic betting types. This research provides insight into the game of Roulette and the extent to which a player's behavior can influence the outcome of this game of chance.

Addie Balogun

Discipline: Interdisciplinary

Authors:

Abstract Name: Words, Worlds, and Webs: A Journey Toward Social Cohesion in Senegal and Niger

Urban and rural communities in Francophone Sub-Saharan Africa experience media, language, and representation in distinct ways that shape how people perceive one another and interact socially. These experiences define how people tune into information, navigate overlapping languages, and move through social worlds that teach them who to rely on and where they fit. This research investigates how urban-rural differences in media credibility, linguistic practices, and patterns of representation influence social dynamics and community cohesion in Senegal and Niger. Through close reading and a comparative analysis of existing literature, survey data, and media content from both urban and rural regions in Senegal and Niger, the research examines how communities access, interpretation, and evaluation of media across linguistic and cultural settings. By integrating qualitative insights with quantitative indicators, we hope to highlight both shared trends and region-specific divergences in media engagement across the two countries. The analysis reveals that urban communities favor digital and French-language media while maintaining a greater skepticism toward mainstream outlets, whereas rural populations rely more heavily on local-language radio and place greater trust in familiar voices. These differing patterns of media engagement shape how information circulates and how social interaction and community cohesion are formed or sustained within each setting. Understanding these urban-rural differences is key to guiding media strategies that build trust, inclusion, and stronger community ties when developing communication and public policies in Francophone Africa.

Azul Baltazar

Discipline: Linguistics and World Languages

Authors:

#1 Danielle Daidone

Abstract Name: Perception of Spanish Lexical Stress by Heritage Speakers and Second-Language Learners

English and Spanish both have word stress; however, it is realized differently across languages. Both Spanish learners and heritage speakers have been shown to have difficulties with Spanish word stress. With this experiment, we aim to discover what participants' responses tell us about the relationship between perception ability and spelling knowledge, and between perception ability and grammatical knowledge. We are testing two groups, Spanish heritage speakers and Spanish learners, with three tasks: discrimination, identification with orthography, and identification with grammatical person. In all these tasks, we examine the perception of penultimate versus final stress. The first task, an oddity discrimination task, requires participants to listen to stimuli from three speakers to determine which of the nonce words are different, if any (e.g., sago-sagó-sago). In the second task, an identification task, participants listen to a word that is either in the first-person present tense (hablo "I speak") or the third person past tense (habló "He spoke"). They will then need to pick the subject of the verb they heard, choosing between the buttons él and yo ("he" and "I"). In the third task, an identification task, participants are presented with standard Spanish orthography. After hearing a stimulus, participants choose between two options, such as "hablo," and "habló." Preliminary results from the first heritage speaker show a 63% accuracy rate in the oddity task and a 92% identification accuracy rate on both penultimate and final stress trials in the subject identification task. However, for the spelling identification task, while penultimate trials had a 92% accuracy rate, final stress trials had a 77% accuracy. These results suggest that, for heritage speakers, perception difficulties lie in understanding sound-spelling correspondences with accent marks. Additionally, they may also struggle with perceiving stress differences in unknown words judging by performance on the oddity task.

Esteban Baltodano

Discipline: Chemistry

Authors:

#1 Nathan Oxman

#2 Akiko Fillinger

Abstract Name: Deuterium isotope effect on the electrochemical stability window of heavy water with Pt electrodes

Storage of solar and wind-generated electricity is critical for these alternatives to become reliable energy sources. For large-scale storage, an aqueous solvent is an attractive choice for its inflammability, high ionic conductivity, and lower cost compared to organic counterparts. However, the disadvantage of aqueous solvents is the relatively small electrochemical stability window (ESW) which is limited by H₂(g) and O₂(g) evolution, resulting in the maximum voltage output of aqueous batteries of less than 2 V. This ceiling was expanded to 3 V with highly concentrated neutral electrolytes, which was rationalized by low concentrations of water in the electrolyte solutions. Recently, heavy water (D₂O) has been explored as an alternative to H₂O to further enlarge the ESW of aqueous solvent using glassy carbon electrodes, reporting the ESW of concentrated neutral electrolytes to be 3.4 V, which enables a competitive voltage output to Li-ion batteries with organic solvents. This effect has been explained by the stronger D-O bond than H-O bond stemmed from the lower zero-point energy of deuterium than protium, resulting in the smaller ion product and larger

dehydration energy of heavy water. We have investigated electrode variations of deuterium isotope effect on the ESW of heavy water using Pt electrodes. The size of the ESW expansion was significantly smaller (70 to 160 mV) with Pt electrodes, while 250 to 400 mV has been reported with the glassy carbon electrodes, by adopting the same current threshold of 1.5 mA/cm² for ESW determination. We suspect that the catalytic activity of Pt toward water electrolysis reduced the deuterium isotope effects observed with the sp² carbon, which is less catalytic toward water electrolysis, of the glassy carbon electrodes.

Zara Baltzell

Discipline: Environmental Science and Sustainability

Authors:

#1 Zara Baltzell

#2 Katelyn Lawson

Abstract Name: Spring Into Summer, Crawl Into Fall: How Seasonality Affects the Results of Macroinvertebrate Bioassessments

This study analyzes the relationship between seasonality and macroinvertebrate bioassessment results in the Uchee Creek Watershed, a tributary to the Chattahoochee River and a Strategic Habitat Unit for Alabama which contains many rare aquatic species. Macroinvertebrate samples were collected during the spring and fall of 2025 from 10 sites in 1st and 2nd order streams at road-stream crossings using EPA sampling protocols (Barbour et al. 1999). At each site, twenty samples from all available microhabitats were collected using a D-Net within a 100-meter reach downstream from to road crossing. Samples were preserved in 95% ethanol and identified to Order in the laboratory. The Alabama Water Watch Rapid Bioassessment score was calculated for each sample, and nonmetric multidimensional scaling (NMDS) was used to examine the differences among macroinvertebrate assemblages across sites and seasons. Results indicate that there is variation in bioassessment scores between spring and fall samples with samples collected from the same season having greater similarity than between different seasons. Weather patterns such as high rainfall during the spring and summer and severe drought during the fall likely impacted stream conditions and macroinvertebrate assemblages. Stream quality ranged from poor to excellent, potentially affecting variability in results. Findings suggest that seasonality may influence macroinvertebrate bioassessment results, which emphasizes the need for further research with more consistent stream quality.

Parthiv Reddy Bandi

Discipline: Health and Human Development

Authors:

#1 Yurisha Duwal

#2 Lisa Cencia Rohan

#3 Sravan Kumar Patel

Abstract Name: Toward Understanding Nanoparticle Transport in Cervicovaginal Mucus: AI-enhanced Methods for Particle Tracking

The vaginal route is promising for delivering drugs locally to address women's health issues. Nanoparticle-based systems can enhance drug delivery across the multilayer epithelium, enabling access to the stroma and the lymphatic system. Realizing this potential warrants understanding nanoparticle transport through cervicovaginal mucus (CVM), a dense, viscoelastic barrier that restricts particle motion. Rationally designing

nanoparticles to overcome the mucus barrier demands reliable methods to quantify their diffusion. We utilized fluorescence microscopy to image nanoparticle diffusion in CVM. Poly(lactic-co-glycolic acid) (PLGA) nanoparticles loaded with a fluorescent dye and surface-decorated with polyethylene glycol (PEG) were prepared and imaged using a confocal microscope. Two-dimensional videos of nanoparticle motion in a CVM simulant were recorded and processed to correct drift and reduce imaging artifacts. Particle trajectories were extracted using Fiji, MosaicSuite, and MPThub, and mean-squared displacement (MSD) was computed as a measure of diffusivity. PEGylated PLGA nanoparticles showed enhanced diffusion compared to non-PEGylated particles, suggesting adhesive interactions with mucus. Furthermore, higher-molecular-weight PEG 10k particles exhibited greater MSD than PEG 5k particles, consistent with stronger hydration-layer shielding and reduced adhesive interactions with mucus. Despite these findings, traditional tracking methods remain limited by manual pre-processing, tracking gaps, user variability, and reduced reliability in complex CVM samples. To overcome these limitations, we implemented an artificial intelligence (AI)-driven framework using DeepTrack, a Python-based deep learning platform. Synthetic nanoparticle datasets were used to train convolutional neural networks capable of automatically detecting and tracking particles under noisy backgrounds and complex imaging conditions, reducing user variability and enabling reproducible diffusion analysis. Integration of the MotionNet model to further categorize the particle motion into different diffusion modes is ongoing. The combined microscopy and machine-learning-based tracking provides an accurate and reproducible framework for studying nanoparticle transport in mucus, ultimately supporting the design of effective vaginal drug-delivery systems.

Karlee Bane

Discipline: Engineering

Authors:

#1 Prakriti Sardana

Abstract Name: Understanding the Importance of Timing: Exploring the Implementation Outcomes of Potable Reuse Projects through a Project Phase Analysis

In recent years, potable reuse projects have emerged as a means for water utilities to foster water resiliency in their communities. By treating wastewater to drinking water standards, utilities can reduce their net consumption, fill consumer supply gaps, and combat regional scarcity. These projects have promised dependable, available, and sustainable water resources for the foreseeable future; however, their outcomes have been difficult to predict, varying from straightforward execution to indefinitely stalled or altogether failed projects. To enhance success rates within potable reuse projects, existing research has sought to understand the mechanisms that influence positive outcomes. Most researchers have investigated influential factors within individual projects or examined factors in isolation, but results from these studies are non-generalizable and cannot serve as a rigorous model for other projects. By identifying influential factors and combinations of factors that may facilitate or hinder progress across projects, researchers can diagnose which factors and factor combinations make or break a potable reuse project and model generalizable paths toward successful implementation. This model can then be presented to utilities to implement into their engineering plan, facilitating a smoother and more predictable project execution. The research presented herein aims to take this concept one step further by modeling not only generalized paths to success, but also ideal project timelines. Knowing when to incorporate influential factors into the project schedule will allow utilities to plan and execute important factors in a timely manner. This mixed-methods model will be developed through phase-based temporal analyses – including phase-based Fuzzy Set Qualitative Comparative Analysis (fsQCA) and Jaccard's Similarity Index – and can be used by practitioners to schedule their potable reuse project for success before it ever breaks ground.

James Bangura

Discipline: Computer Science

Authors:

#1 Sherif Abdelhamid

#2 Gunnar Romsland

#3 Katelyn Redlinger

Abstract Name: Hybrid Intelligence for Phishing Detection: Integrating Machine Learning and LLM Multi-Agent Reasoning

Phishing websites and deceptive online content continue to be major contributors to financial loss, identity theft, and large-scale cyber incidents. Despite significant progress in automated detection, most existing systems rely on a single analytical approach, such as machine-learning classification or linguistic analysis, which limits their ability to interpret evolving social-engineering tactics. This project asks the central research question: Can a hybrid framework that integrates machine-learning models with a large-language-model (LLM) multi-agent system improve the accuracy and interpretability of phishing detection? To investigate this question, we develop a two-tier detection architecture that combines a Random Forest classifier trained on a publicly available dataset of phishing websites with a specialized LLM-driven multi-agent subsystem. The machine-learning component evaluates URLs using 87 lexical, structural, and external features to produce a baseline classification score. The multi-agent subsystem consists of three independent analytical agents—a Market Researcher, Language Analyst, and Threat Analyst—that examine factual inconsistencies, linguistic cues, and manipulative behavioral signals within suspicious messages. A Final Evaluator synthesizes all outputs to generate a unified deception score on a scale from 1 to 10. Our methodology includes dataset preprocessing, feature-correlation analysis, model training, and rigorous performance evaluation using accuracy, precision, recall, and F1-score. In parallel, we construct prompt-engineered LLM agents that emulate expert reasoning in fraud investigation, linguistic forensics, and social engineering analysis. Preliminary results show that while the Random Forest model achieves strong performance across all evaluation metrics, the multi-agent LLM subsystem consistently enhances detection accuracy, reduces false negatives, and provides human-interpretable explanations for high-risk classifications. The combined system demonstrates noticeable improvements over conventional single-model approaches. The outcome of this work is TrustNet, a web-based platform that integrates both subsystems to deliver real-time risk assessments of URLs and textual content.

Ava Banionis

Discipline: Biology

Authors:

#1 Rhoda Adjartey

#2 Christa Merzdorf

Abstract Name: Investigating Aqp3b as an Upstream Regulator of Xbra Expression Through FGF signaling in *Xenopus laevis* Gastrulation

In early embryonic development, the dorsal mesoderm (DM) undergoes convergent extension (CE) to give rise to the notochord and further contribute to central nervous system development. CE is a critical morphological movement regulating gastrulation, the process establishing the three germ layers of the embryo. CE is partially mediated through the noncanonical Wnt/PCP pathway. Additionally, gastrulation is supported by FGF signaling through the specification of mesodermal fates and axial patterning. Morphological changes resulting in CE and associated cell movements are largely conserved between humans and *Xenopus laevis*, making it an ideal specimen to study vertebrate gastrulation. Preventing CE in the DM results in embryonic nonviability through malformation of the nervous system, trunk, and

tail. Aquaglyceroporins are transmembrane proteins responsible for the transport of water, glycerol, and small uncharged molecules across the plasmalemma. Previous research has elucidated Aquaglyceroporin 3b (Aqp3b) as a component of CE and the FGF pathway. Aqp3b has been found to upregulate the FGF pathway, activate the PI3K/Akt pathway, and induce expression of the protein Xbra. Xbra has been found to upregulate the ligand for the Wnt/PCP pathway, and therefore CE. The objective of this project is to reveal the mediating role of Aqp3b within the FGF pathway. This will ultimately be determined through Western blot of protein isolates. *X. laevis* embryos will be injected at the 4-cell stage with aqp3b morpholino oligonucleotides or aqp3b mRNAs to knock down or upregulate Aqp3b expression, respectively. DM explants will be cut and lysed. Protein samples will be run through SDS-PAGE in preparation for Western blot. Expected results would show that when aqp3b is knocked down, baseline Akt levels will be unaffected. However, aqp3b upregulation will promote increased levels of phosphorylated Akt via PI3K activation. These results would clarify Aqp3b as a positive regulator of CE in vertebrate gastrulation.

Sanai Banks

Discipline: Psychology

Authors:

#1 Scott Debb

#2 Sanai Banks

Abstract Name: The Impact of “Finsta” Social Media Use: Psychosocial Correlates for African American Gen Z Mental Health

This ongoing study examines how young adults—particularly African American members of Generation Z—use Finsta (private or alternate Instagram) accounts and how these behaviors may relate to mental health, self-expression, and overall social media experiences. Existing research suggests that Finsta use is often connected to closer social bonding, more authentic self-presentation, and the expression of more negative emotions; however, these patterns have not been examined specifically within African American communities. The present study aims to identify the sociodemographic and psychological factors associated with Finsta use in this population and to explore whether these accounts function as protective spaces that support well-being. Data collection and analysis are still in progress, and the extent to which Finsta use influences mental health, self-expression, or perceived social support remains XX. The findings of this study are expected to provide a more culturally informed understanding of Finsta use and its potential implications for well-being.

Johnathan Banks

Discipline: Biology

Authors:

#1 Johnathan Banks

Abstract Name: Assessing the Effectiveness of Stream Restoration on Reducing Thermal Stress of Native Brook Trout: A Case Study at Smith Creek, Va

Understanding the factors that drive summer stream temperature variability is essential for assessing habitat suitability for brook trout (*Salvelinus fontinalis*), a cold-water species highly sensitive to warming conditions. This study evaluated whether riparian restoration along Smith Creek, Virginia – implemented through the Conservation Reserve Enhancement Program (CREP) in 2005 – has measurably reduced thermal stress,

improved habitat conditions, and counteracted broader climatic influences. Using high-resolution temperature logger data collected from the summers of 2006, 2007, 2024, and 2025, we compared thermal regimes across restored and unrestored stream time periods, and assessed the relative importance of air temperature, streamflow, and riparian condition in shaping stream temperature patterns. Contrary to expectations, air temperature emerged as the dominant predictor of stream temperature, overwhelming the moderating influence of riparian restoration. Streamflow did not exhibit the anticipated cooling effect, suggesting that reach-scale thermal dynamics were decoupled from watershed-scale discharge patterns during the study period. Although the 3 kilometers of restored reaches exhibited localized shading and habitat improvements, these effects were insufficient to counteract strong atmospheric controls on daily and seasonal temperature fluctuations. These findings indicate that while riparian restoration provides ecological benefits, its capacity to buffer summer thermal regimes may be limited under contemporary climatic conditions. As regional air temperatures continue to rise, brook trout populations in small Appalachian streams may face increasing thermal vulnerability unless restoration efforts are paired with broader climate adaptation strategies. This study highlights the need for integrated watershed-scale management approaches and contributes to ongoing efforts to understand and mitigate the temperature-productivity squeeze affecting cold-water fisheries across the Appalachian region.

Andrew Banks

Discipline: Communications

Authors:

#1 Andrew Banks

#2 Mariah Young

Mariah Young

Abstract Name: Do Support for Artificial Intelligence Tools Affect Academic Performance Among College Students?

The rapid growth of AI tools in education has raised many questions about how much they can help students succeed in college. Some students see AI tools as a helpful learning resource, whereas others do not see AI tools make a difference in learning. Due to a generational perception in using new technology, younger learners seem to be more likely to use AI tools than the older learners. Thus, the purpose of this study is to investigate whether students who use AI tools in college classrooms tend to have higher GPAs than those who do not, as well as whether younger students are more likely to use AI tools in learning than the older students. Approximately 105 students who are above 18 years old completed this cross-sectional study. The survey asked about people's opinions on AI tools in education, their birth year, how often they use AI tools for learning, and their cumulative GPA. After coding the data and running the analysis by SPSS, an independent sample t-test first compared the GPAs of students who use AI tools versus those who do not. The results ($p = 0.633$ > 0.5) showed that there was no significant difference between the two groups, meaning that the use of AI tools might not necessarily affect students' performance on their GPAs. A correlation test was used to determine the potential relationship between the age of participants and the use of AI tools in college. The results ($p = .086$ > 0.5) showed that there was no significant linear relationship between participants' age and use of AI tools. Overall, the results revealed that simply being open to or using AI tools might not predict students' academic success in college. The nonsignificant results, interestingly, challenge the societal perception that only young learners use AI tools in learning.

Cadence Banks

Discipline: Dance

Authors:

Abstract Name: Embodying Community: A Reflection on the Value of African Diasporic Dance Forms

This creative research project investigates the communal frameworks embedded within African Diasporic dance forms and examines how these frameworks challenge dominant Western assumptions about what constitutes "valuable" dance knowledge. While African diasporic movement practices have increasingly entered academic spaces, they remain marginalized compared to Western concert dance traditions such as ballet and modern dance. This project responds to that disparity by developing a performance piece that fuses scholarly research, embodied practice, and personal experience to illuminate how African Diasporic dance constructs community through shared affect, emotional reciprocity, and collective presence. Grounded in dance studies scholarship, this project integrates theoretical inquiry with a choreographic process shaped collaboratively with performers. Rehearsals incorporated assigned reading, group dialogues, and movement investigations that translated scholarly findings into embodied expression. The resulting performance invites the audience not only to observe but to participate- foregrounding the reciprocal relationship between mover and witness that is central to the movement of the African diaspora. This participatory structure challenges viewers to reconsider their own assumptions about value and belonging within dance. The project further explores how documenting this process can inform pedagogical approaches in academic dance settings. By analyzing both the rehearsal process and the community-building elements that emerge, the research aims to propose a learning tool that reflects the integrative nature of African Diasporic dance practices. Ultimately, this work seeks to expand conversations around redesigning dance education and to highlight the transformative potential of movement practices that center community, shared energy, and embodied knowledge.

LaTanyah Baptiste

Discipline: Biology

Authors:

- #1 Elizabeth Hayes
- #2 Sean Walker
- #3 Maria Uben
- #4 Jazmyn White
- #5 Justin Clarke
- #6 Yusra Bashir-Danfati
- #7 Anne Wiley
- #8 LaTanyah Baptiste

Abstract Name: Controls of Bold versus Shy Behavior in Painted Turtles: What Lies Beneath the Shell

Controls of Bold versus Shy Behavior in Painted Turtles: What Lies Beneath the Shell?LaTanyah Baptiste, Elizabeth Hayes, Maria Uben, Jazmyn White, Yusra Bashir-Danfati, Sean Walker, Justin Clarke, Ya'Mar McCoy, Anne Wiley In wildlife biology, individual differences were once overlooked, with animals treated as uniform members of their species. However, growing research highlights that personality traits such as boldness and shyness can significantly impact how animals interact with their environment, compete for resources, and adapt to ecological challenges. Our project explored these personality traits in eastern painted turtles (*Chrysemys picta picta*) by observing bold versus shy behaviors at two study sites: Bowie State University and the Patuxent Research Refuge, MD. We evaluated how behavior during handling (including retraction into shells and gaping) was linked to body condition, sex, diet, season, and site. While several variables (diet, sex) were unrelated to bold vs. shy behavior, we found that shy painted turtles were more common at relatively remote sites in the Patuxent Research Refuge and tended to be smaller (with lower standard carapace length). We also found that bold behaviors were most common in the spring and least

common in the fall (but did not correlate with daily temperature), which suggests that social interactions during mating could play a role in shifting painted turtle behavior during handling. Overall, our results suggest that bold vs. shy behaviors in our study population of painted turtles may be controlled by temporary factors, such as season or age, rather than set differences in personality between individuals.

Ameria Barajas

Discipline: Art History

Authors:

#1 Ameria Barajas

Abstract Name: Designer Hero: Maria Sibylla Merian

This highlights the accomplishments of Maria Sibylla Merian, a 17th-century naturalist and artist, who combined art and science with her observations and illustrations of insect metamorphosis and environmental relationships. By using paints she made, personally, she was mostly skilled in watercolors but had started with a sketchbook and a pencil and by taking a vastly impressive two year trip to Suriname by herself, she was a highly creditable illustrator during that period. Despite minimal formal education and societal hurdles, an important legacy was created for women and natural history by vividly depicting metamorphosis and questioning gender conventions in science. Though she herself taught several artistic techniques and undertook long-term bug observations, leading to ground-breaking illustrations that altered the portrayal of ecological. With thorough documentation made her findings more accessible than those before her. Even with her achievements, Merian faced systemic barriers in the field that often obscured her talents. The paper emphasizes the need to acknowledge women's roles in natural history. By advocating for inclusive research on female naturalists such as Merian, we recognize their significant impact on both art and science in the history of graphic design.

Lainey Barden

Discipline: History

Authors:

Abstract Name: The Tension Between Law and Grace: Jesus vs Jewish Law

This project will examine the historical and theological tensions between Judaism and the early Christianity movement from 30 to 100 CE, focusing on how Jesus's teachings challenged the established expectations of Jewish law and religious identity. Jesus also challenged the Jewish messianic expectations that perceived the promised messiah to be more of a military savior rather than a personal one. This study will explain the historical context of scholarly analysis and debates that may portray these tensions as doctrinal, cultural, or political. Methodologically, this project relies on a close analysis of primary sources such as the New Testament books of Matthew, Mark, Luke, John, and Acts. It also includes a study of Jewish texts such as the Torah while also including the historical perspective of Judea's political climate and previous tensions due to Roman occupation of the region. The research reveals that the conflict between Judaism and the early Christian movement was rooted in more than just theological disagreements. Jesus's reinterpretation of Jewish law, His emphasis on spiritual rather than ritual purity, and His declaration as the Son of God directly challenged the authority of Jewish religious sects such as the Pharisees and disrupted established communal traditions founded in Jewish law. Additionally, Roman imperial politics strengthened these tensions through its control and persecution of both Jewish and Christian development during this period. The study concludes

that the early divergence between Judaism and Christianity was caused not only by differing religious doctrines but also by conflicting understandings of religious identity, authority, and salvation. These findings will be discussed within the historical context of how this developing period shaped the future of both religions.

Kyle Barfuss

Discipline: Biology

Authors:

#1 Kyle Barfuss

#2 Jada Hanson

#3 Tayler Patrick

#4 Renata Blocher

#5 Irina Polejaeva

#6 Ying Liu

Abstract Name: Effects of Melatonin and Cytokine Supplementation on Oocyte Mitochondrial Function, mtDNA Copy Number, and Embryo Development Under Heat Stress

Heat stress impairs egg (oocyte) quality and early embryo development in cattle, partly through disruptions in mitochondrial function. This study evaluated whether melatonin, an antioxidant, and cytokines (FGF2, LIF, IGF1; FLI), individually or in combination, could protect bovine oocytes from heat-induced mitochondrial dysfunction during in vitro maturation (IVM). Two complementary experiments were assessed: (1) mitochondrial membrane potential (JC-1 staining) and mitochondrial DNA (mtDNA) copy number (qPCR) in matured oocytes, and (2) development of fertilized embryos and cleavage patterns from 2-cell to blastocyst using time-lapse imaging. Four groups were included: control, melatonin, FLI, and melatonin+FLI (combo). Hot season data were collected in July-August (4 replicates) and cold season data in October (3 replicates). The data were analyzed using a generalized linear model (Jamovi software). Our results showed that JC-1 ratio was negatively correlated with local slaughterhouse temperature ($P < 0.001$), whereas positive correlation was observed in the cold season ($P = 0.02$). Combo-treated oocytes maintained the highest and most stable JC-1 ratios under hot conditions, indicating enhanced oocyte quality. In contrast, mtDNA copy numbers remained unchanged across treatments and seasons. Time-lapse image analysis revealed season-dependent developmental differences. The cold-season embryos exhibited less variation in developmental timing and faster progression through several developmental stages. The 4- 8-cell and 8- 16-cell stages appeared most affected by heat stress, although the differences were not significant. The treatment effects were not statistically significant. In conclusion, melatonin and FLI, especially in combination, steadily increased mitochondrial function during heat stress but did not influence mtDNA copy numbers nor embryo development. These results suggest that supplementation primarily enhances mitochondrial efficiency and cytoplasmic competence rather than promoting mitochondrial genome replication. This work provides insight into strategies that may improve oocyte resilience and reproductive outcomes in cattle exposed to elevated environmental temperatures.

Alexis Barker

Discipline: Mathematics

Authors:

Abstract Name: Optimizing IEP Scheduling for Special Education Educators using Integer Linear

Programming

We address a common scheduling problem that special education teachers face: creating individualized education plan schedules (IEPs) for multiple students. The work began as a special project in an Optimization Modeling class and continued as an independent research project. The purpose was to develop a scheduling model that supports one special education teacher that works with thirteen fifth and sixth grade students. The model can be adapted for additional teachers or grade levels as needed. Currently, most IEP scheduling is a manual, iterative process that requires significant time and trial and error. This project aims to reduce the workload of special education teachers in creating IEP schedules through the usage of computational optimization. The model is formulated as an integer linear program in AMPL and solved using Gurobi. The model defines sets of students, subjects, days, grade levels, and time blocks, and incorporates constraints including: preventing student double-booking, preserving teacher workload boundaries, supporting subject-specific instructional formats, and differentiating core subject priorities such as reading and mathematics. The objective function then balances these factors to produce a workable, conflict-free schedule. The resulting schedules meet IEP requirements, limit conflicts, and make better use of classroom time. The final presentation will discuss these outcomes, how well the approach works in practice, and how this model could be extended to support additional teachers or larger school environments.

Jayla Barkley

Discipline: Biology

Authors:

#1 Celia Dodd

Abstract Name: Short Chain vs. Long Chain Per-and Polyfluoroalkyl Substances: Comparative Effects of PFAS on *Caenorhabditis elegans* Lifespan and Implications for Human Health Risk

Per-and polyfluoroalkyl substances are synthetic, environmentally persistent organic compounds known as "forever chemicals." With over 14,000 variants, PFAS are major contaminants, particularly in drinking water. In April 2024, the Environmental Protection Agency added six PFAS to the National Primary Drinking Water regulations to reduce human exposure. However, as of May 2025, only two are under regulation: perfluorooctanesulfonic acid (PFOS) and perfluorooctanoic acid (PFOA). Other studies show that PFOS exposure shortens the lifespan of *Caenorhabditis elegans* (*C. elegans*). In our study, we investigate if two previously regulated PFAS -- short-chain perfluorobutanesulfonic acid (PFBS) and long-chain perfluorononanoic acid (PFNA) -- alters *C. elegans* lifespan when exposed to environmentally relevant concentrations. Age-synchronized worms were treated at 1 μ M, 10 μ M, 50 μ M, and 100 μ M concentrations of PFNA and PFBS separately and against a control group. Lifespan assays were conducted 40 hours post-treatment to measure longevity of *C. elegans*, monitoring a small population daily and scoring mortality as occurred. Survival was monitored over a 26-day period for PFNA-exposed worms, with the first signs of mortality occurring on Day 9 for all treatment groups. Between Days 23 and 25, majority of the followed populations across all concentrations reached the highest mortality level as the worms were scored dead. In contrast, *C. elegans* exposed to PFBS were monitored over a 29-day period. By Day 26, maximum mortality was reached by majority of the populations of all treatment groups; the 1 μ M group showed no survival by Day 29. Preliminary results suggest no dramatic change in *C. elegans* lifespan when exposed to these specific concentrations. Additional experimentation will be done to validate these findings and to determine which concentration reduces the lifespan of *C. elegans*. Future directions aim to explore the mechanisms of PFAS toxicity to better provide implications for human health risks.

Nevaeh Barnd

Discipline: Exercise Science and Nutrition

Authors:

#1 Diyva Bhaskaran

Kaitlyn Morgan

Olivia Tobin

Abstract Name: Influence of handedness on upper extremity balance in Division III Athletes.

The human postural control system regulates the body's balance and stability, which is essential for athletic performance and injury prevention. While many studies have examined upper extremity balance in sports that heavily rely on the upper body, fewer have explored shoulder imbalances in sports with varying upper-body demands. This study aimed to fill that gap by comparing upper extremity balance in female NCAA Division III gymnasts and track and field athletes, ages 18 to 23. The track and field group included athletes in upper-body-dominant events such as throwing and pole vaulting. Gymnastics was selected due to its bilateral upper-body movement patterns, while track and field events emphasize unilateral use. A total of 28 participants were tested, 12 track and field athletes and 16 gymnasts. Through using the Upper Quarter Y-Balance Test (UQYBT), a validated tool for assessing shoulder mobility and stability. Contrary to previous research suggesting unilateral athletes show greater side-to-side asymmetries, our results showed no significant differences between dominant and non-dominant arm reach scores within either group. Additionally, no statistically significant differences were observed between gymnasts and track and field athletes. These findings challenge assumptions in the current literature and suggest that upper extremity balance may not differ as much across sport types as previously thought. Given the limited research conducted at the Division III level due to funding constraints, this study highlights the importance of including underrepresented athlete populations in sport science research. Expanding our understanding of shoulder stability in a broader range of sports can help improve training protocols, enhance performance, and reduce injury risk in athletes at all levels.

Ellie Barnett

Discipline: History

Authors:

Abstract Name: The Matilda Effect: Decades of Silenced Women

This research project examines the "Matilda Effect," a term coined by historian Margaret Rossiter to describe the long-standing pattern of women's intellectual and creative achievements being overlooked, minimized, or attributed to men. After learning about this phenomenon and seeing how talented women today still experience forms of dismissal or under recognition, I became interested in tracing how these patterns developed and why they continue to shape whose work is remembered. My initial research focused on Matilda Joselyn Gage, whose writing first highlighted this issue, as well as early historical cases showing how women's work was ignored or overshadowed by male-dominated narratives. I also reviewed more recent examples in art and public history, which show that this issue continues today, especially in how museums and historical institutions choose whose stories to highlight and which to not. This research is especially timely because questions about representation, authorship, and credit are central to many current cultural and academic debates. As institutions reconsider who gets included in textbooks, museum exhibits, award lists, and public memory, understanding the roots of these imbalances becomes essential. The Matilda Effect still affects whose work gets taken seriously, and studying the politics and social norms behind these misattributions can help us think more clearly about fairness and how we document history. As I continue this project, I plan to study specific cases more closely by reading first-hand accounts, analyzing the political and cultural contexts of each period, and comparing how these uncredited or miscredited works were discussed publicly. Ultimately, I hope to understand how persistent patterns of overlooking women's contributions

shape which work becomes visible and why recognizing women's achievements remains an important goal for scholars and society today.

Fatoumata Barrow

Discipline: Computer Science

Authors:

Abstract Name: MataVision: Predicting and Preventing Traffic Accidents in Salem, Massachusetts Using Machine Learning

Traffic accidents continue to be a major concern in Salem, Massachusetts, with many incidents influenced by weather, lighting, road conditions, and the time of day. Although the state collects large amounts of crash data, much of it is not analyzed deeply or used to support preventative safety planning. MataVision is designed to address this gap by applying machine learning and clear visual tools to better understand local crash patterns. This project uses five years of crash data from the Massachusetts Department of Transportation. The dataset is cleaned and organized to explore trends over time, environmental factors, and roadway patterns. Several machine learning models—Decision Trees, Logistic Regression, K-Nearest Neighbors, and Support Vector Machines—are trained to estimate when and where crashes are more likely to happen. The city is mapped using H3 hexagonal indexing, which breaks Salem into small, uniform zones that make hotspot detection more accurate and easier to interpret. The results are presented through interactive maps and automatically generated summaries. These tools give city planners, researchers, and insurance analysts a clearer way to spot dangerous areas, compare conditions, and support safety decisions based on data rather than assumptions. Overall, MataVision aims to shift Salem's approach to road safety from reacting after crashes occur to identifying risks earlier and reducing them. By combining machine learning models with simple and readable visualizations, the project contributes to building a safer and more informed community.

Cheri Barta

Discipline:

Authors:

#1 Catherine Chan

#2 Kelly Jetzer

#3 Yashira Zavala

Hyewon Park

Abstract Name: Broadening Participation in Undergraduate Research through a Summer Bridge Program

High-impact practices (HIPs) can significantly improve student outcomes, including growth in disciplinary knowledge, improved cross-cultural communication and leadership skills, gains in interpersonal and team collaborations, and improved academic achievement. Regardless of these significant benefits, first-generation and limited-income (FGLI) scholars often engage in HIPs at a lower rate. The Office of Experiential Learning (OEL) at the University of Wisconsin-Madison has been working towards expanding learning opportunities by providing inclusive and assessable scaffolds for engagement in HIPs by removing common challenges, such as financial barriers and hidden curriculum, that have historically prevented many FGLI students from participating in transformative educational experiences beyond the classroom walls. One program that has shown a lot of promise towards increasing engagement in undergraduate research is STEM Catalyst, a

residential, four-week summer bridge program that introduces incoming scholars to immersive undergraduate research early in their college careers. In addition to conducting hands-on research with STEM faculty, participants build their self-efficacy and research identity through intentional networking opportunities with STEM faculty, a scaffolded 1-credit hour course that synchronously supports the research experience, and community building opportunities that create a robust support network of students with similar interests. The structure and implementation of the program will be discussed, including the successes and challenges of initiating a bridge program for novice researchers. Additionally, quantitative and qualitative data measuring the effectiveness in creating belonging, cultivating a STEM research identity, and fostering confidence as a STEM scholar will be shared.

Amber Bartlett

Discipline: Psychology

Authors:

#1 Amber Bartlett

Abstract Name: When No Response is a Response: Predicting Survey Non-Compliance in Isolated, Confined, and Extreme (ICE) Analog Space Missions

Long-duration space exploration will place small, interdependent teams in isolated, confined, and extreme (ICE) environments, where they will face risks including communication delays, high autonomy, increased workload, team tension, and intense stress. All of these risks require research studies aimed at mitigating them, many of which take place at analog space stations. However, these analog missions, which aim to study human behavior in ICE settings, suffer from chronic survey noncompliance, which threatens data integrity and reduces the accuracy of crew monitoring. This project examines which individual characteristics predict who completes research surveys during missions at the Mars Desert Research Station, a Mars-analog habitat in Utah. Before their missions, crew members completed questionnaires assessing personality (with a focus on conscientiousness), their identification with their team, their cultural values (especially collectivism, or putting the group before oneself), and their difficulties with emotion regulation. During the mission, they were asked to complete brief daily and weekly surveys. For each person, I will calculate survey compliance as the percentage of assigned surveys completed, and I will use regression models to test whether conscientiousness, emotion regulation, team identification, and collectivism predict higher compliance. I will also test whether collectivism strengthens the link between team identification and survey completion, such that highly collectivistic crew members who strongly identify with their team are especially likely to respond. I expect that crew members who are more conscientious, better at managing their emotions, more strongly identified with their team, and more collectivistic will show higher survey compliance. The work integrates literature on ICE stressors, organizational citizenship behavior (OCB), survey methodology, and individual differences to generate actionable recommendations for designing analog-station research protocols and for operational monitoring in deep-space missions.

Lance Barton

Discipline:

Authors:

#1 Lance Barton

#2 Sarah Powell

Sarah Powell

Abstract Name: Building Career Readiness through Undergraduate Research

Undergraduate Research allows students to apply classroom learning to real-world problems, but how well does it prepare them for real world careers?. Undergraduate research helps develop transferable professional skills in students that promote career readiness, but these connections are not always overt in the scholarly process. The National Association of Colleges and Employers (NACE) identifies eight competency areas for career readiness skills that undergraduates should practice before graduation. To emphasize the importance of undergraduate research to developing these competencies, the Office of Undergraduate Research (OUR) at UNC Charlotte developed a series of discrete student learning outcomes (SLOs) for these eight competency areas. A total of 16 SLOs (two per competency area) are used as a framework for student learning through undergraduate research. During the research program, professional development opportunities offered by OUR highlight these competency areas and equip students with the vernacular to describe the benefits of their undergraduate research experience. At the end of the research term, students and mentors assess growth and development for these career competencies. We will share students' and mentors' perspectives on how undergraduate research contributes to career readiness. We will also share how OUR uses these tools to refine existing programs and develop new programming to support student transitions from college to career.

Hope Basaman

Discipline: Interdisciplinary

Authors:

Abstract Name: The Perfect Formula: A Comparative Analysis of the Electric Vehicle Policies in China, South Korea, and Japan

The rise of electric vehicles has become a defining feature of East Asia's green technology agenda, showcased in China, Japan, and South Korea. Each nation has mobilized ambitious policies under their carbon neutrality goals, however their outcomes, measured in EV adoption rates, sales performance, and public perception, vary widely. This thesis argues that these differences cannot be explained by political factors or market dynamics; rather, successful EV market integration depends on the alignment of political strategy, cultural context, and individual psychological perceptions. Through a comparative, cross-national analysis, this research examines how government policies, national culture, and psychological factors intersect to shape EV market outcomes. Hofstede's cultural dimensions and the Unified Theory of Acceptance and Use of Technology (UTAUT) model frame the cultural and psychological foundations of policy effectiveness. Drawing from policy documents, scholarly literature, and market data, the study synthesizes analyses of state incentives, cultural values, and consumer perceptions, including range anxiety, environmental concern, and status symbols. Findings reveal that while China leads the market through strong state-led policies and infrastructure investment, its success is driven more by political will than by the incorporation of psychological perception. South Korea, positioned second, demonstrates the greatest harmony between policy and public sentiment through its collectivist innovation culture and government-industry collaboration. Japan, though technologically advanced, lags behind due to cautious consumer psychology and a preference for hybrid vehicles as a transitional technology. By bridging political analysis with cultural and psychological insights, this study adds to the scholarly debate on EV policy-making in East Asia and offers a full account of varied national approaches to green technology adoption.

Christina Basara

Discipline: English and Literature

Authors:

Abstract Name: "Needles"

My research is conducted based on my own personal experience related to Bipolar Disorder, specifically as an adolescent. Through spoken word poetry, I reflect on the treatment I have received as a part of this disease. A diagnosis like bipolar disorder is extremely rare to receive as an adolescent, and only about 2.9% of adolescents will be provided with psychiatric care. At fifteen years old, I became a part of this statistic, and I was diagnosed with Bipolar Type One. Although Bipolar disorder affects your brain chemistry, it also affects your physical health and requires an immense amount of tests, samples, and blood work done regularly. This can be incredibly painful to walk through and can cause trauma symptoms to arise in patients. Even though genetics and my environment played a key role in my illness being triggered at such a young age, I had no education before the life that followed after my first hospitalization. In my spoken word, "Needles," I reflect on how walking through the early parts of my treatment was terrifying, especially related to inpatient care I experienced. I wrote "Needles," a few years after receiving my diagnosis, when I began to process the trauma I received as a patient in the psychiatric system. Through outpatient treatment, like therapy, I saw its long-lasting effects on my life, especially with my ability to perform academically. "Needles" tells of the trauma I continue to receive from the healthcare system. I wrote this piece in a place of concern and empathy for patients who suffer from mental health disorders. I hope to use my story and my performance to spread awareness for adolescents currently suffering in the system, and bring hope to others as I continue to be one of the people to defy statistics and drastically low odds.

Layan Bashir Abdalla

Discipline: Computer Science

Authors:

#1 Layan Bashir Abdalla

#2 Sam Henry

Abstract Name: Extraction of Key Prescription Drug Information from Medication Labels

Drug labels contain crucial information such as active ingredient, strength, prescribing instructions, possible side effects, and contraindications. The FDA digitizes drug-label information and makes it available as DailyMed, but most of this information is buried in free-text fields of non-standard XML formats that are difficult for computer systems to process. Efforts have been made to extract this information, but they have focused on a small subset of drugs or on the structured fields. This project considers the following question: Can we make prescription drug label content more accessible and structured for use by computers? To do this, I selected 25 drug labels from DailyMed and looked at eight important fields: brand name, generic name, strength, active ingredient, inactive ingredients, side effects, indications, and contraindications. I annotated each drug label by hand to create a gold standard reference set. I then looked at two approaches for information extraction. The first was a rule-based approach, which made use of hand-written patterns. The second was a machine learning approach, where the computer learned from labeled examples to identify and extract pertinent information. The rule-based approach excelled at pulling out well-structured information such as strength and drug name but performed poorly on more unstructured narrative fields such as contraindications and side effects. The machine learning approach performed well on free-text fields, but requires more annotated data and further fine-tuning to improve performance. These results indicate that a hybrid approach, leveraging rule-based methods for structured content and machine learning for free-text content, presents the most promising direction. Increasing the availability of drug label information has important consequences: reducing patient and provider confusion, making safety checks more effective, and facilitating broader research throughout health informatics. Future work will include the expansion of the dataset to include more drugs and continued model performance optimization on free-text fields.

Kiley Basik

Discipline: Engineering

Authors:

#1 Lauren Isaac
#2 Arthur Johnson
#3 Kiley Basik
#4 Sanaa Lemmon
#5 Tommy Holliday
#6 Sutton Bates
#7 Siddhi Sunil
#8 Atharva Shastri
#9 Lihua Lou

Abstract Name: Graft-Free ACL Reconstruction: Optimizing Fiber Geometry and Composition in 3D-Printed Ligament Replacements

The anterior cruciate ligament (ACL) tear is one of the most prevalent knee injuries in sports medicine, particularly in high-demand sports that require rapid directional changes. This is devastating for patients due to the extended recovery period of 9-12 months and the heightened risk of re-injury. Addressing these challenges, our research focuses on engineering a synthetic ACL with biomechanical properties that closely mimic those of native ligaments, thereby enhancing durability under athletic stress. Our approach aims to eliminate the need for grafts traditionally used in ACL reconstruction. Eliminating the need for a graft reduces the invasiveness of the surgery and minimizes the time the patient spends under anesthesia. Furthermore, using an artificial ACL streamlines the surgical workflow by negating the need for intraoperative tendon harvesting and preparation. To achieve this, we employed a three-pronged approach to evaluate the efficacy of the synthesized artificial ACL. The initial phase involved an in-depth evaluation of the components, structural integrity, and mechanical properties of a native healthy ACL. Research on the forces acting on an ACL during a human gait cycle was conducted to ensure that the design could withstand the applied forces. Leveraging the insights gained, three different artificial ACL models were constructed in SolidWorks, with different fiber orientations and compositions. Finite element analysis was used to predict the biomechanical performance of the artificial tendon. Upon computational optimization, a physical prototype was fabricated using the 3D printing technique. The successful implementation of this project is expected to offer substantial benefits to both surgeons and patients. Overall, our project aims to offer a synthetic ACL replacement that reduces surgical complexity and accelerates recovery time.

Susan Baskar Raj

Discipline: Psychology

Authors:

#1 Pinar Demirayak
#2 Rajesh Kana

Abstract Name: Intervention-Related Neuroanatomical Changes in Autistic Children

Several brain networks have been implicated in the neurobiology of autism spectrum disorder (ASD). The emotion network (EN), located primarily in the frontal and temporal cortices, is one of those. ASD and neurotypical children have been reported to show differences in cortical thickness (CT) within EN regions (Lucibello et al. 2021), and reading comprehension difficulties can also contribute to emotion dysregulation in ASD (Hogeveen and Grafman 2021). While language and emotion have separately been studied in ASD,

fewer studies address their relationship. We examined the relationship between neuroanatomical changes and behavioral assessments in autistic children (7-13 years) pre-and-post an intensive reading intervention. 14 ASD children received intervention (ASD-EXP) between baseline and post-tests, and 11 ASD children were included in the waitlist-control group (ASD-WLC). Emotional control (EC) and emotion regulation (ER) subscores of the Behavior Rating Inventory of Executive Function (BRIEF) questionnaire (Gioia et al. 2000) were correlated with CT difference (Δ CT: post–baseline). CT values for EN network regions were extracted using Matlab and FreeSurfer (Fischl 2012). EC baseline scores were negatively correlated with Δ CT in left inferior temporal gyrus (TF; $r(13)=-0.635$, $p=0.015$), left posterior orbitofrontal cortex (pOFC; $r(13)=-0.552$, $p=0.041$), right dorsomedial prefrontal cortex (8BM; $r(13)=-0.615$, $p=0.019$), and right OFC ($r(13)=-0.711$, $p=0.004$) in ASD-EXP. ER baseline scores were negatively correlated with Δ CT in right OFC ($r(13)=-0.627$, $p=0.016$) and left TF ($r(13)=-0.552$, $p=0.041$) in ASD-EXP. None of the correlation scores reached the significance level in ASD-WLC. These findings suggest that ASD children who received intervention exhibited a meaningful coupling between baseline emotional functioning and subsequent intervention-related CT changes in frontal and temporal regions that support emotion regulation. The absence of similar relationships in ASD-WLC indicates that this relationship is not simply a developmental trend but may reflect intervention-related plasticity of these regulatory circuits in ASD.

Maya Basnyat

Discipline: Environmental Science and Sustainability

Authors:

#1 Todd Lookingbill

#2 Stephanie Spera

#3 Beth Zizzami

Abstract Name: An Accuracy Assessment of Tree Age Estimation Methods

Trees provide a multitude of benefits to their surrounding ecosystems and human communities. Their ability to store carbon, particularly as they age, plays a key role in the face of global climate change, and is of particular interest in this study. The University of Richmond (UR) campus recently completed a decade-long tree inventory project, but still lacked accurate information regarding tree age. As carbon storage and age have a logistic relationship, the role of old trees is paramount for human value such as carbon storage and landscaping aesthetics. Age can be estimated through various methods, but the most accurate are lethal (i.e. counting rings of cut trees). Through reviewing various types of age assessment techniques, this project attempts to find the best non-invasive alternative method for tree estimation. Diameter at Breast Height (DBH) data were gathered to estimate age, with a focus on variation between species. DBH (cm) age factors were averaged based on current literature. These age factors were validated through counting trees rings of recently removed trees on campus, along with focused tree coring on campus. By strengthening these alternative age estimation methods, we hope to gain a more comprehensive understanding of tree age on campus. In the future, this data will be used to analyze the relationship between age and other ecological variables including nativity, carbon storage capacity, and landscape types. Developing a non-destructive method for tree age estimation that maintains accuracy would help future researchers gain a more accurate understanding of how. More accurate age estimates could then improve estimates of carbon storage, as both vary widely between species. Furthermore, these results can be used to better understand direct and measurable environmental repercussions of land use change, which would help better inform those making land management decisions.

Benitaah Basse

Discipline: Biology

Authors:

#1 Benitaah Basse

#2 Prince Verma

#3 Elizabeth Duncan

Abstract Name: Testing the role of CBX3/HP1 γ in radiation resistance.

Tumors can be a combination of diverse cells with different mutations that favor uncontrollable growth and their ability to resist aggressive treatments. Genome stability is therefore a critical factor in the study of cancer initiation and progression. Eukaryote genomes are organized into chromosomes that have both actively expressed regions and transcriptionally silent sections called heterochromatin. One of the proteins involved in the compacted state of heterochromatin is CBX3/HP1 γ which binds to trimethylated histone 3 Lysine 9 (H3K9me3). Recent cancer studies have shown that the overexpression of CBX3 can indicate a bad prognosis, increased proliferation and resistance to treatment for patients. CBX3 is therefore an interesting gene needing further inquiry regarding its precise function. This project aimed to investigate the functional role of CBX3 in planarians, flatworms with unique traits that make them a good model for studying protein function in vivo. Planarian stem cells share interesting similarities with cancer stem cells due to their high regenerative capacity and their ability to withstand high doses of radiation. Prior data analysis in the lab found that CBX3 is downregulated after RNAi knockdown of the chromatin protein Set1. As loss of Set1 causes planarians to become more sensitive to radiation, we hypothesized that RNAi on CBX3 will result in a similar phenotype. To test our hypothesis, we synthesized double stranded RNA of two CBX3 constructs (to assess off-target effects) and a negative control gene, unc-22. After three consecutive RNAi feedings, half of the worms were radiated with 12.5 Gy and then cut to observe the regeneration process. Although conclusive results are awaiting, current observations show no distinct phenotype on both CBX3 (RNAi) planarians, as well as the irradiated ones. Even so, this project contributes to a better understanding of chromatin stability and the role it plays in DNA damage repair.

Mikeal Bates

Discipline: Visual Arts

Authors:

#1 Mikeal Bates

Abstract Name: "Grandpa Always Says" Reimagining a Memory Card Game as an Effective Storytelling Technique for Cultural Colloquialisms

This project, "Grandpa Always Says", explores how a memory card game can be reimagined as a storytelling technique for cultural colloquialisms and how connections between memory and language can be deepened through interactive visual storytelling. Through the exploration of Australian colloquial language, specifically that of my grandfather Rodney Bates, this project explores how memories of slang are connected, passed down, and presented through visual communication. During this project, I conducted research on Australian slang and its origins, to see how my Grandfather's sayings that he has passed down, contribute to the history and patterns in Australian geographical language. As language is a fundamental pillar in Australian culture and identity, Australian slang, therefore, is a series of odd expressions and sayings that are shaped by the culture itself, as it is shared between people in a conversation. I created a matching card game, featuring my grandfather's odd and unique Australian slang that I grew up hearing, to share with others the lens through which he sees the world, and to further explore the origins of these phrases. Using the memory card game as an informative teaching tool, this structure allows for the experience of repeated cultural slang to be repackaged in a storytelling format. This project serves as an opportunity to explore the connections that are made between culture, memory, and language, exploring new ways to engage with histories of cultural colloquialisms. By reimagining the memory card game as a visual storytelling device, this project asserts that

engagement with memory and language in an experiential, impactful, and vibrant format lowers the barrier for cultural history education.

Jacob Battle

Discipline: History

Authors:

Abstract Name: Delay and Disrupt: Defending the Fulda Gap in the Age of Mobile Defense

During the final decades of the Cold War, both NATO and the Warsaw Pact prepared extensively for a conflict that neither side sought to initiate. Nowhere was this tension more concentrated than the Fulda Gap, a lowland corridor in central West Germany that war planners theorized would be the most direct invasion route for Soviet forces into Western Europe. By the 1980s, NATO strategy for defending the Fulda sector was no longer centered around immediate nuclear escalation as it was in the 1950s. By this point, NATO doctrine had shifted towards a conventional, mobility-focused defense. Through this, NATO war planners hoped that Western forces could make up for their numerical inferiority by delaying and counterattacking against Soviet formations, bringing a Soviet advance into West Germany to a halt. The introduction of mobile defense doctrine and eventually AirLand Battle demonstrates how NATO sought to maintain battlefield initiative through decentralized maneuvers, working to create conditions for rapid counteroffensive despite overwhelming Soviet numbers. Fulda itself represented NATO's dilemma of halting a massive conventional attack without risking greater nuclear escalation, as even mid-level officers could be tempted to summon atomic artillery support or tactical nuclear strikes if they feared their position was being overrun. In the end, the defense of the Fulda Gap embodied deterrence theory, signaling to Soviet leaders that an invasion of Western Europe would be costly, and ultimately unwinnable.

Amanda Bauer

Discipline: Business

Authors:

#1 Katheryn Zielinski

#2 Jennifer Schultz

Mikayla Bergler

Abstract Name: Impact of Experiential Learning: Elevating Student Soft Skills

Experiential learning is an impactful and innovative type of learning that allows students to have a hands-on approach to earning their education. This allows students to develop and reinforce skills that connect education, career, and character (Kolb, 2015). At Minnesota State University, Mankato, business students are given the option to participate in experiential learning through the Integrated Business Experience (IBE). This distinctive, high-impact learning experience equips students with essential business skills in areas such as marketing, finance, and operations management. However, beyond these technical skills, many students enter the workforce lacking strong soft skills (Tulgan, 2015). This research aims to explore the impact of the IBE on students' soft skills, specifically efficacy, hope, optimism, and resiliency. To assess this, we will analyze existing data collected in a required Introduction to Business course taken by all College of Business students, comparing results between students who have completed the IBE certificate and those who have not. We will compare the results between students who have completed the Integrated Business Experience certificate and those who have not. This comparison will help determine which soft skills students may be

developing through experiential learning experiences that they might not have acquired otherwise. IBE provides structured opportunities to practice and refine soft skills in real-world business scenarios; we hypothesize that participation in the program positively influences the development of students' soft skills.

Zoe Bautista

Discipline: Biochemistry

Authors:

#1 Ferhat Ozturk

Abstract Name: Evaluating a Microplate Enzymatic Assay for Fructose and Glucose Quantification in Honey

Honey's composition varies widely depending on nectar sources, seasonal changes, and environmental factors. Sugars in honey constitute 80% of its makeup, primarily in the form of fructose and glucose. These sugars influence honey's rate of crystallization and its nutritional characteristics, providing valuable information about longevity to producers and health benefits to consumers. Conventional techniques such as high-performance liquid chromatography (HPLC) provide precise and detailed quantification; however, they require costly instrumentation and extensive training, making them impractical for high-throughput analysis. Alternatively, enzymatic assays based on the spectrophotometric detection of NADH are selective and sensitive, enabling their use in sugar quantification in fruits as a cost-effective method. Despite this, the performance of these enzymic assays with complex matrices such as honey has not been fully explored. The objective of this study is to evaluate the performance of a commercial enzymatic assay kit to quantify fructose and glucose content when adapted to a 96-well microplate format. Honey alloys were created with controlled fructose to glucose ratios to represent the variation of honey composition while providing direct sugar profiles to assess the method. The initial findings suggest that the enzymatic assay produces consistent measurements across the tested ratios. Ultimately, these results support the use of microplate enzymatic assays as an alternative to traditional quantitative methods and for routine sugar analysis in honey research.

Aria Bayat

Discipline: Biology

Authors:

#1 Aria Bayat

#2 Chloe Tsinya

#3 Asia Bayat

#4 Alex Matsayko

#5 Mohammad Hossan

#6 Melville Vaughan

Abstract Name: Evaluating Barium Sulfate Blended polycaprolactone (PCL) for Endovascular Implants

The poster presents the study and evaluation Barium Sulfate Blended polycaprolactone (PCL) samples for radiographic visibility and biocompatibility for potential use in endovascular implants such flow diverters in the treatment of intracranial aneurysms. In spite of adaptability and complementary degradation characteristics, PCL cannot be visualized during X-rays and angiographic procedures, which is critical for endovascular intervention, due to the absence of radiopacity. Barium Sulfate (BaSO_4), a radiopaque additive, was mixed in various ratios into the medical grade PCL granular and blended in the hot extrusion process to fabricate 3D printing filament. The BaSO_4 - PCL filaments were then evaluated and compared under hand-

held X-ray machine to find optimum combination of BaSO₄ and PCL. The highest radiographically visible filaments were used to 3D print 10 mm x 10 mm x 1 mm samples. The control samples were 3D printed using medical grade PCL filaments. The samples were then evaluated for biocompatibility using Human umbilical vein endothelial cells (HUVECs). HUVECs were prepared at approximately 1×10^5 cells/ml. The cells were cultured on the blended and control samples for 48 hrs with period media changes. After culturing and reaching confluence, samples were fixed and stained to evaluate cell adhesion, morphology, and cytoskeleton organization, and integrity of tight junctions. To quantify metabolic activity across different conditions of material the Click-stain assay was conducted. The results show that the BaSO₄-PCL samples support normal endothelial attachment, healthy cytoskeletal organization, and intact tight-junction formation compared to pure PCL. The results also show that BaSO₄-PCL samples are visible in x-ray image. The study shows that BaSO₄ blended PCL can be used radiographically trackable as well as biocompatible material for potential applications of endovascular implants and devices.

Asia Bayat

Discipline: Biology

Authors:

#1 Asia Bayat

#2 Chloe Tsinya

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Abstract Name: Cellular Evaluation of Ta₂O₅ Blended Polycaprolactone for Biomedical application

This research investigates the development and biological evaluation of a novel tantalum oxide (Ta₂O₅) blended polycaprolactone (PCL) samples for potential use in endovascular bioresorbable flow diverters for brain aneurysm treatment. Tantalum oxide (Ta₂O₅) blended with medical grade polycaprolactone (PCL) filament was fabricated using hot extrusion process. The blended filament was then used to prepare 10 mm by 10 mm samples for biocompatibility experiments with Human Umbilical Vein Endothelial Cells (HUVECs). The control samples were made from pure medical grade PCL filaments. Human umbilical vein endothelial cells (HUVECs) were seeded on each material and cultured until full confluency. HUVECs were prepared at a working concentration of 9.6×10^5 cells/mL, which corresponded 167 μ L of the cell suspension was seeded onto each sample. Cells were cultured in 24-well plates containing the Ta₂O₅-PCL samples or PCL controls and maintained for 48 hours, allowing them to reach full confluency on the material surfaces. Following culture, samples were fixed and stained using ZO-1 (tight junction marker) and Pycam 1 to assess cytoskeletal alignment, cellular adhesion, and tight junction integrity. A Click-stain assay was used to evaluate cell proliferation and metabolic activity, providing quantitative measures of biocompatibility. The samples were examined using confocal fluorescence microscopy (Nikon Eclipse Ti2 system). The cell viability, proliferation and adhesion were quantified. The results were compared between the blended samples and controls. The results showed that Ta₂O₅-PCL samples demonstrated strong endothelial adhesion, preserved tight junctions, and healthy cytoskeletal organization comparable to control PCL samples. Also, Ta₂O₅-PCL samples are visible under the x-ray images. In conclusion, the Ta₂O₅-PCL blended material shows strong potential as a safe, bioresorbable, and radiographically visible alternative materials to existing metallic or polymer based endovascular implants. However, in-vivo studies will be needed to confirm these outcomes.

Selin Baykal

Discipline: Biology

Authors:

#1 Selin Baykal

#2 David Luther

Abstract Name: Title: Behavior Analysis of Amazonian Mammals and Bird Species Along a Disturbance Gradient

Understanding how animals respond to environmental change is essential for interpreting population dynamics and developing effective conservation strategies. While most research focuses on species presence or absence, these data alone do not show how animals use their environment such as where they forage or carry young rather than simply passing by. To address this gap, this study uses camera-trap data from the Amazon rainforest along a disturbance gradient ;segmented fragments, secondary, and primary forest to investigate how mammals and birds interact with these habitats through foraging and parenting behaviors. This study analyzed animal behaviors captured by 40 camera traps generating over 10,000 images in the Brazilian state of Amazonas near Manaus. The camera traps recorded a diverse set of mammals and birds. Species identification was assisted by artificial intelligence, but behavioral classification required manual input. Statistical analyses, including single-factor ANOVA tests, were used to compare counts of foraging and parenting behaviors across habitat types. Species were also grouped by diet type. By examining behavioral patterns among forest types and diet groups, the study aimed to clarify how habitat conditions influence ecological activity. Foraging behavior was recorded in 23 species with 339 observations, while parenting behavior occurred in 5 species with 28 observations. Analyses showed no significant difference in either foraging or parenting behavior across forest types within species. However, diet type had a significant effect on foraging frequency. A Tukey test revealed that frugivorous species forage significantly more often than herbivores, suggesting a dietary influence on habitat use. Although we expected undisturbed primary forests to support more frequent foraging or parenting, no significant differences were found among habitat types. This indicates that primary, secondary, and segmented forests may all function as effective habitats for the species observed. Even disturbed forests may still provide suitable ecological conditions for certain animals.

T'Niyah Baylor

Discipline: Social Work and Human Services

Authors:

#1 T'Niyah Baylor

#2 Dr. Yali Pang

Abstract Name: Lived Experiences of Black Girls in an Urban Environment

Adopting an asset-based approach, this poster highlights the existing strengths and skills of young Black girls and the resources available in their communities. We present findings from a city-wide report using a mixed-methods approach, including online surveys, focus groups with Black girls aged 12-17, and interviews with parents, guardians, and emerging adult Black women, to examine their experiences through a positivist framework. This study complements the emerging field of Black Girlhood Studies (BGS), which showcases the full humanity of Black girls and girlhood (Apugo, Castro, & Dougherty, 2022), and presents my work as an undergraduate researcher on an exploratory study of the lived experiences of young Black girls in an urban environment. Guided by a Scholarly Personal Narrative (SPN) orientation, the poster integrates insights from my lived experiences with the study's findings to illustrate how both can serve as tools to empower the growth, development, and future opportunities for Black girls. The results of this study underscore the role of friendships, family support, mentors, and accessible community spaces and programs

in shaping how young Black girls feel supported and capable of thriving at the micro (self), mezzo (community), and macro (policies and systems) levels. This poster also highlights the contributions of the community partner in developing and sustaining this work. Together, the results are useful to policymakers, stakeholders, and community leaders, enabling them to better support the needs and interests of young Black girls.

Lucas Beach

Discipline: Geography/Geology

Authors:

#1 Lucas Beach

Abstract Name: Fishing as a Feud: GIS Analysis of Turkish Commercial Activity and Maritime Conflict in the Kastellorizo Archipelago

Resource scarcity in the Eastern Mediterranean has intensified competition among commercial fleets and reignited boundary disputes between regional states. Turkish vessels operating near Greece and Cyprus navigate overlapping jurisdictions, turning maritime space into a zone where economic extraction and political signaling intersect. Building on existing research connecting fisheries governance and geopolitical influence, this study examines whether Turkish commercial fishing from 2020 to 2025 contributes to maritime conflict and diplomatic escalation within the Kastellorizo archipelago. This study hypothesizes that increased vessel concentration near contested borders corresponds with higher enforcement activity and moments of political tension, revealing how fleet behavior expresses national power. Geospatial data from the National Oceanic and Atmospheric Administration (NOAA), Global Fishing Watch (GFW), the International Commission for the Conservation of Atlantic Tunas (ICCAT), and the European Union Naval Force (EU NAVFOR) combine into a single database linking vessel movement, ecological conditions, and enforcement records. Quantitative modeling in ArcGIS Pro and R measures correlations between vessel density, ecological stress, and enforcement events to test the connection between commercial activity and maritime control. The project's significance lies in demonstrating how spatial evidence can expose the geopolitical dimensions of resource competition in the Eastern Mediterranean.

Jada Beach

Discipline: Engineering

Authors:

#1 Yihong Li

Kyle Radaker

Riely Fauntleroy

Abstract Name: Advanced Green Hydrogen Generation: Standardization for Proton-Conducting SOEC Electrolyte Fabrication

Green hydrogen, a clean fuel, can be produced using solid oxide electrolysis cells (SOECs), which utilize electrical energy to drive a non-spontaneous chemical reaction. One of the main benefits of green hydrogen produced with SOECs is that it offers a highly efficient and environmentally friendly way to produce energy. The electrolyte component of SOECs is important for improving durability of the whole cell and preventing electricity leakage. Standardizing and optimizing the process of electrolyte pellet fabrication will aid in creating a foundation for improving SOEC's performance. The current procedure for pellet fabrication is

extremely time consuming with varied conductivity among batches. Alterations such as removing the planetary ball mill cycle, lowering the calcination temperature, and testing additional sintering aids have been implemented to have consistent pellet conductivity and minimize the length of fabrication. Electrochemical Impedance Spectroscopy (EIS) provided data to determine the conductivity of the pellets. The original pellet fabrication procedure resulted in the variation of conductivity between electrolytes being 9.322%. By following the previous procedure with one fewer planetary ball mill cycle, the variation of conductivity between electrolytes was reduced to 0.682%. Additional simplified procedures are currently being evaluated to identify the approach that yields the least variation in conductivity. Overall, this work not only simplifies lab procedures but plays a significant role in the strides to produce a standardized procedure and improve conductivity of electrolyte pellets. For future work, the addition of Pyrolytic Boron Nitride-Oxide (PBN-O) coating and optimizing an Atomic Layer Deposition (ALD) process will further improve the performance of the SOECs. PBN-O coating enhances electrode stability and conductivity, while Atomic Layer Deposition (ALD) enables precise, uniform thin-film application to improve interfacial performance.

Gabrielle Beacham

Discipline: Biology

Authors:

#1 Gabrielle Beacham

#2 Jake Ferguson

Abstract Name: An Evaluation of Artificial Intelligence's Classification and Detection Accuracy for Camera Trap Photos

Prior ecological research has used the camera trap method to estimate animal habitat use, activity patterns, and population density. We began a camera-trap study on a 60-acre field site near the University of Kentucky to assess its wildlife population; however, in under 12 months, these camera traps produced tens of thousands of photos. To evaluate them quickly, we used artificial intelligence (AI) to detect animal presence and classify species. The purpose of our study was to evaluate the effectiveness of the Megadector AI, a popular conservation AI program, in classifying and detecting animals within our camera trap photos. To do this, we took a subset of 8,000 out of our data of over 50,000 photos and identified each species by hand. We then ran those same 8,000 photos through Megadector AI and compared the results. Our results determined that Megadector AI reliably detected the presence of animals, but the classification of species depended primarily on the confidence threshold of the AI. Specifically, the higher the confidence threshold of the AI, the higher the classification accuracy. In addition to this, we evaluated whether different variables, such as season, habitat (forest or field), and time of day, impacted effectiveness. We did not find substantial evidence to validate these claims ($p > .05$). In conclusion, our findings indicate that future studies utilizing Megadector AI should ensure that the confidence threshold of the AI is high. This will allow for more accuracy in the AI in classifying species within camera trap photos.

Zackary Beagle

Discipline: Physics and Astronomy

Authors:

#1 Michael Rodruck

Abstract Name: Refining GEMS: Validating TESS M-Dwarf Giant Planet Candidates with ZTF and ASAS-SN

The Transiting Exoplanet Survey Satellite (TESS) has collected a large sample of transiting exoplanet candidates. The Searching for Giant Exoplanets around M-dwarf Stars (GEMS) survey utilizes the TESS catalog with an emphasis on finding giant exoplanets around M-dwarf stars and has identified a large number of candidates (greater than 100). These objects are of interest as they give insight into the formation and evolution of low-mass star systems originally thought to not contain the required mass to form. Working in conjunction with the GEMS survey, we present a method of eliminating non-planetary signals from the GEMS survey using a Python script developed for this project to analyze public observational data from the Zwicky Transient Facility (ZTF) and the All-Sky Automated Survey for Supernovae (ASAS-SN). We use this code to gather data from ZTF and ASAS-SN containing observation date, magnitude and/or flux, and coordinates. With this data and code, we then produce phase-folded light curves of GEMS targets and corresponding nearby objects to determine the validity of a possible transit signal on the GEMS target. We aim to produce a large population of giant planets around M-dwarf stars on which further research and investigation can be done. Here we present our findings of positive and false positive transit signals, creating a more refined GEMS candidate population.

Brianna Bean

Discipline: Geography/Geology

Authors:

#1 Jenna Hassebrock

#2 Krista Seng

#3 Steven Goldsmith

Abstract Name: Strong Long-Term Relationship Between Chloride and Dissolved Organic Carbon Export in Road Salt-Affected Exurban and Suburban Watersheds

Road salts and salt-impacted runoff are often transported to the side of the road, where sodium (Na^+) and chloride (Cl^-) can infiltrate the soil, leach into groundwater, and slowly release into streams over time leading to a long-term increase in waterways. However, deposition of Na^+ in roadside soils alters can cause displacement of calcium and magnesium, leading to a decrease in soil aggregate stability in the process of releasing organic matter. While lab and limited field studies suggest an influx of road salt to roadside soils can lead to pulses of dissolved (DOC) delivery from soils and groundwater to streams, few to no studies have examined the long-term relationship of these parameters in road salt affected watersheds. To address these knowledge gaps, a 20-year dataset (1999-2019) of monthly streamwater quality data combined with daily streamflow for six exurban and suburban watersheds in southeastern Pennsylvania is used to assess the co-relationship between flow-normalized Cl^- and DOC concentrations. The relationship between long-term land management practices and DOC concentrations and loads is also explored. Similar patterns were observed in the study watersheds, with a flow normalized Cl^- and DOC initially increasing, with DOC reaching an inflection point, and then subsequently decreasing. Over the last 10 years of the study period, a strong negative statistically significant relationship was observed between flow-normalized Cl^- and DOC concentrations, suggesting a decrease over time of organic matter in upstream roadside soils. The subsequent decrease in flow-normalized DOC concentrations was not statistically linked to any LULC changes over the study period. The study results have implications for watershed management. For example, road salt driven increases in streamwater DOC concentrations can increase the potential for disinfection byproducts during the water treatment process. Conversely, a subsequent decrease in DOC concentrations can negatively impact microbial process and marine food webs.

Henry Beasley

Discipline: Political Science

Authors:

#1 Jamie Harris

Abstract Name: Displacement, Financialization, and the NIMBY/YIMBY Divide: Capturing the Political Conversation Surrounding Housing in Milwaukee

Housing has been a hot topic of debate in Milwaukee, a renter-dominated city struggling with unaffordable rents, a declining tax base, and high levels of outside investment. Despite attempts made by private stakeholders, public groups and figures, and city government to address this housing crisis, through means such as affordable housing complexes, zoning code overhauls, or state-level legislation, little progress has been made to truly address the problem. When these measures fail, the first ones to get blamed are the NIMBYs, or “Not In My Backyard” crowd. The NIMBYs purportedly aim to prevent change in their neighborhoods by any means necessary, stemming from calls for aesthetic preservation or fears stemming from racism and classism...but is this blockade against progress truly the fault of an archetypal crowd of white, conservative, and wealthy suburbanites? Through an examination of journalistic materials, the City of Milwaukee’s Legistar city meeting archives, social media, and public testimony, this research has revealed that the answer in Milwaukee is far more complex, and often presents in a more bipartisan fashion than expected. The concerns of opponents ranged from calls for environmental justice, the potential for gentrification and displacement, a real fear of outside investment, and the struggle between the private and public interest. The aim of this project, as it moves forward, is to help cement understanding of the issues surrounding urban governments attempting to address the housing crisis, with the goal to expand our analysis further into the Milwaukee metropolitan area to better understand this issue from the suburban perspective.

Keana Beaufort

Discipline: Environmental Science and Sustainability

Authors:

#1 John Anderson

#2 Ruben Delgado

Abstract Name: Intercomparing PBL Height and Stability Metrics over a Coastal Urban Bay

The planetary boundary layer (PBL) governs near-surface stability and therefore pollutant dispersion over coastal urban regions such as Hampton Roads and the Lower Chesapeake Bay. Building on prior work that inferred PBL structure from potential temperature and relative humidity, we analyze radiosonde soundings over the Hampton Roads area and intercompare six complementary stability diagnostics: relative humidity, potential temperature (θ), specific humidity, atmospheric refractivity, the bulk Richardson number, and a parcel (buoyancy) method. For each metric, we estimate PBL height and characterize stability, then quantify cross-method consistency and divergence. This multi-method framework highlights the conditions under which moisture-based versus thermodynamic and dynamical approaches provide the most reliable signals of PBL stability, and it clarifies how methodological choices affect inferred mixing depths. The results provide a basis for selecting stability indicators in coastal applications and improve interpretation of boundary-layer controls on pollutant dispersion and air-quality variability across Lower Chesapeake Bay.

Kristen Beaver

Discipline: Health and Human Development

Authors:

Abstract Name: The Impact of Informative Intervention: Promoting Physical Activity to Increase Mental Wellness in Adolescents

Background and Significance: The adolescent population is experiencing increased rates of mental health issues such as depression, anxiety, and stress, which has now led to a national crisis. Although multiple research studies show a positive correlation between increased physical activity and mental health outcomes, there is still a lack of awareness and knowledge of these benefits in the adolescent population. Aim: This evidence-based project aims to implement an informative intervention designed to promote physical activity to improve mental health in adolescents. Method: The method chosen is an informational session with four weeks of weekly structured educational presentations, interactive workshops, and guided physical activity engagement to promote exercise and reflection on mental well-being. During this intervention, students will be able to expand their knowledge of the benefits of exercise on mental health and get opportunities to engage in group-led activities and peer discussions, as well as the opportunity to explore their mental health and mood improvements. Pre- and post-intervention surveys will be utilized to assess changes in activity levels, emotional states, and overall mood. George Engel's biopsychosocial model is used to address the biological, psychological, and social aspects that affect overall adolescent health. Conclusion: The goal of this project is to increase awareness, knowledge, and motivation to use physical activity as an accessible, affordable, and effective mental health option. The findings of this project could potentially influence future efforts in school settings to improve mental health support and resources for adolescents. Keywords: Adolescents, mental health, physical activity, informational session, health promotion.

Jamal Beavers

Discipline: Psychology

Authors:

#1 Kristi Costabile

#2 Emma Bognar

Abstract Name: Competence & Relatedness Need Satisfaction Through Conflict Resolution & Relationship Themes in Narrative Media

The effect of motivation through media has been grounded through Self-Determination Theory (SDT), which identifies three intrinsic needs of competence, relatedness, and autonomy as driving human behavior. The current research examines the following research questions: 1) How are conflict resolution themes within self-reported summaries of TV show plots related to participant competence need satisfaction? 2) How are relationship themes in these summaries related to perceived character relatedness need satisfaction and participant relatedness need satisfaction? Survey data was collected through Prolific and included 321 participants. All participants were asked to report summaries of the most recent television episode they had watched and the main character from the reported show. Additionally, participants reported how they felt their own competence and relatedness needs were satisfied, as well as the satisfaction of the TV show character's relatedness needs. Reported plot summaries will be coded based on the prominence and valence of conflict resolution and relationship perception themes. Bivariate correlation models will be used to assess relationships between competence need satisfaction and conflict resolution themes, as well as relatedness need satisfaction and relationship perception themes. We expect positive conflict resolution themes are positively associated with participant competence need satisfaction, and negative conflict resolution themes are negatively associated with participant competence satisfaction. Additionally, we expect positive relationship themes have a significant, positive association with reported perceived TV show character relatedness need satisfaction and participant relatedness need satisfaction. We also expect negative coded relationship themes are negatively associated with both reported perceived TV character relatedness

satisfaction and participant relatedness need satisfaction. Examining these needs through narrative media would provide significant implications in how narrative media can fulfill needs and increase well-being.

Seth Becker

Discipline: Interdisciplinary

Authors:

#1 Seth Becker

#2 Johnathan Close

#3 Cristian Waddell-Lallana

#4 Jackson Bostian

Johnathan Close

Cristian Waddell-Lallana

Abstract Name: Just-In-Time Outreach: A User Experience Design Strategy for Connecting Students with University Services

Despite research demonstrating that students who utilize tutoring services achieve higher academic outcomes (Alexander et al., 2022; Batz et al., 2015; Bengesai et al., 2023), significant underutilization of these services persists on college campuses (Ciscell et al., 2016; Winograd & Rust, 2014). This user experience design project identifies barriers preventing students from accessing Tutorial Services, informing the development of a generalizable framework for increasing student utilization of these and other university services. The research consisted of one exploratory and one evaluative study. The exploratory study was conducted through fifteen interviews with undergraduate students at a small liberal arts university. Through affinity mapping, recurring patterns and pain points were identified, and findings were synthesized into representative user personas and problem statements. Analysis revealed that students at the university lack awareness of Tutorial Services, particularly transfer students. Based on these findings, the “Just-In-Time Outreach for Tutorial Services” (JITOTS) intervention was designed as a coordinated approach between Tutorial Services and faculty to deliver strategically timed, discipline-specific reminders before critical academic periods. The evaluative study will assess the effectiveness of the JITOTS implementation through pre-appointment surveys with students attending tutoring sessions. Survey questions will ask students how they learned about Tutorial Services, what prompted their decision to schedule an appointment, and whether they are first-time-in-college or transfer students. This data collection approach captures both source attribution (indicating the solution’s utility as a tool for spreading awareness) and key differences in outcomes across student populations (indicating the solution’s particular impact on transfer students’ utilization of Tutorial Services). If successful, the framework will offer scalability to other universities and student-facing departments (ex. a Career Advising office may send timely reminders about internship and position postings by discipline), providing a replicable model for improving service awareness and adoption by supporting student success across different institutional contexts.

Maegan Bedwell

Discipline: Business

Authors:

#1 Maegan Bedwell

#2 Yinghong Zhang

Abstract Name: Comparison of Sentiment and Tone in Corporate Risk Disclosures Using AI Tools

While the business world continues to integrate AI into its daily operations, many businesses are hesitant to implement AI due to concerns about lack of human oversight and the accuracy of AI tools. My study examines the competence and effectiveness of popular AI tools in evaluating the sentiment and tone of the "Risk Factors" sections in annual reports of selected major U.S. public companies. Sentiment analysis enables businesses to understand the emotional tone of text by automatically classifying it as positive, negative, or neutral. By evaluating AI tools' ability to interpret complex financial disclosures, my study highlights their strengths and limitations, which helps businesses make informed decisions. I used Microsoft Copilot and Google Gemini to perform the sentiment analysis. Three industries and two competing companies from each industry were selected. The risk factor section from each company 10-K (annual) report was uploaded to both AI tools with identical prompts. The prompts instructed AI to score the negativity of the risk factor section and identify the most frequently used risk-related terms for each company. The outputs were recorded to allow comparisons across companies and industries. I found that the two AI tools provided similar outputs. Microsoft Copilot and Google Gemini reported an average negativity score of 85.33% and 83.45%, respectively. Interestingly, Copilot assigned a higher negativity score than Gemini to three out of the six companies analyzed while Gemini scored higher for the other three. In the risk term frequency analysis, the most frequently reported terms identified by both AI tools aligned with expectations for each industry type. These results support the notion that AI can deliver accurate and consistent results in qualitative analysis.

Samantha Beebe

Discipline: Biology

Authors:

#1 Samantha Beebe

#2 Ahvi Potticary

Abstract Name: Escaping competition through care: *Nicrophorus* parents feed offspring more when competition is high

Parental care is expected to buffer offspring development, yet parenting strategies vary extensively and this variation strongly impacts offspring phenotypes. Why does parental care vary? One possibility is that variation in care is driven by the likelihood of securing future breeding opportunities, where parents in high competition environments invest more in care than parents experiencing low competition. Alternatively, parents may decrease care in competitive environments due to the costs of finding and defending breeding resources. We investigated these ideas in the burying beetle *Nicrophorus sayi*, which shows extended parental care and requires a limited resource - small carrion - to breed. *Nicrophorus sayi* is the first *Nicrophorus* species to emerge from winter diapause. As such, early season beetles experience both lower intra- and inter-specific competition relative to *N. sayi* breeding in late season. We took advantage of this temporal pattern to investigate how competition influences the expression of parental care behavior. Early season parents spent less time feeding offspring, resulting in longer larval developmental periods and larvae that were heavier at dispersal. On the other hand, late season parents fed offspring more, larvae developed faster, and were smaller at dispersal. These results may indicate that late season parents invest more in care behaviors directed towards rapid development of the larvae, potentially to reduce the risks inherent to developing on a coveted resource in a high competition environment.

HALLIE BEEKER

Discipline: Biology

Authors:

Abstract Name: Demystifying the Neural Activity of Disordered Eating and Exercise: A Study Using Event-Related Potentials (ERPs)

One in four adolescent girls are affected by disordered eating or weight control, emphasizing the need for further evaluation. Disordered eating and exercise behaviors are often associated with each other and may have distinct neural mechanisms. Electroencephalography (EEG) is a noninvasive means to study brain activity. Event-related potentials (ERPs) are changes to the EEG signal immediately following an external stimulus. In this study, visual stimuli of food, exercise activities, and neutral objects (office supplies, furniture, etc.) were used to evoke ERPs from which the P300 wave was calculated. The P300 wave is a neurophysiological indicator of cognitive function that reflects attention, information processing, and decision making. This ERP has been used in research to investigate anxiety disorders, depression, and Obsessive-Compulsive Disorder (OCD), making it a point of interest while looking at disordered eating and exercise behaviors. Participants (18-25 years old) were recruited through social media, snowball sampling, and targeted emails to complete surveys about their exercise and eating behaviors and opt-in to participating in the EEG portion of the study. Of 141 responses, 91 complete surveys indicated approximately 40% of respondents exhibit behaviors that may elevate their risk of eating disorders or exercise disorders. 11 have completed the EEG, and 8 of their results have been analyzed. EEG analysis showed the strongest P300 responses to exercise images, moderate responses to food images, and the weakest responses to neutral images. These findings show that exercise stimuli evoke greater cognitive and motivational processing, reflecting their heightened relevance in individuals with exercise or body-related attentional biases. Future analysis should correlate EEG findings with individual survey results, which would elucidate the relationship between P300 and disordered eating or exercise behaviors. Overall, this study highlights how neural responses to varying exercise and food cues can reveal meaningful patterns in cognitive and behavioral health.

Kyra Beer

Discipline: Nursing and Public Health

Authors:

#1 Kyra Beer

Abstract Name: Balancing Books and Babies: Barriers to Support for Parenting Students in Higher Education

Background: Parenting students in higher education face unique challenges, including navigating higher education and academics while raising a family, working, and planning for a career. Yet, on campus resources do not always align to support parenting students effectively. In the United States, nearly 20% of undergraduate students have children. Methods: A campus-wide mixed methods survey was distributed at an institution of higher education. A total of 112 parenting students or legal guardians completed the survey. The survey assessed barriers and utilization of institutional and community resources, perceived effectiveness, childcare access, financial support use, and awareness of resources. Results: Early analysis indicates that 53% of parenting students have experienced barriers to accessing resources off-campus and 51% have experienced barriers on-campus. Time scheduling conflicts emerged as the most frequently cited barriers to accessing resources on-campus and off-campus. Discussion: Findings highlight gaps between the needs of parenting students and the support currently provided at UCO. Increased visibility of resources, expansion of childcare

options, increased financial support, and targeted institutional policies may help reduce stress, improve academic outcomes, and foster a more inclusive and family-friendly campus culture. Strengthening support for parenting students benefits not only individual learners but also their families and the broader university community.

otto beer

Discipline: Biochemistry

Authors:

#1 Radmila Janjusevic

Abstract Name: Functional Studies of Surface Protein from Segmented Filamentous Bacteria from Humans

Segmented filamentous bacteria (SFB) are gram-positive, spore-forming bacteria that attach directly to the epithelial cells in the small intestine of animals. They are present during early stages of life in a variety of hosts, including mice, turkeys, and humans. Their primary surface antigen is known to play a role in differentiating the Th-17 cells of the host, but it remains unclear what biological purpose it serves for the SFB. One of the functions of Th-17 cells is to promote the production of antimicrobial peptides (AMPs) used to defend the epithelial cells from invading pathogens. Because of this, we hypothesized that one of the functions of the primary surface antigen discovered on the mice-specific SFB could be to protect bacteria and allow them to live in close proximity to the epithelium unharmed. To test this, we have been expressing separately or co-expressing the main mouse SFB surface antigen (or its homologs from human- and turkey-specific SFB), and selected AMPs from those hosts. Our initial results showed that both proteins, each with a different tag added, could be co-purified on 2 different gravity columns or cross-linked. In silico analysis of complexes indicates the mechanism of protection from AMPs.

Chloe Beers

Discipline: Philosophy, Ethics, and Religious Studies

Authors:

#1 Frank Faries

Abstract Name: Identifying Rationale and Accuracy in AI Detection

The increasing sophistication of Large Language Models (LLMs) such as ChatGPT, Gemini, and Claude provokes unprecedented challenges against educators upholding academic integrity. Unlike conventional forms of plagiarism, the novelty and diversity of LLM outputs present a unique challenge in detecting academic dishonesty. Students can now use AI tools to produce unique essays that are grammatically and structurally sound while mimicking their own writing style. AI-produced work can also imitate introspection to a degree that makes it indistinguishable from genuine human thought. While AI detection tools like GPTZero and Turnitin are being developed, their accuracy remains ambiguous. The burden of combating academic dishonesty is placed solely on the educator, who must determine whether an essay is AI-generated, with no comprehensive guidance on how to make these determinations. Relevant research on AI detection accuracy has primarily examined obstacles to creative integrity outside the classroom. While this provides a strong foundation for the goal of our study, we hope to build upon this by placing professors in the role of our “human expert judges”, who interact with and are well-versed in the variability of student-submitted work. This study seeks to compare the accuracy of AI detection software such as GPTZero and Turnitin with the judgments of human experts in identifying AI-generated undergraduate essays. Using a dataset of 200 human-

written undergraduate philosophy essays completed in class, we will assess the accuracy of AI detection tools and human educators, examining the justification patterns provided by both in their findings. Our research will demonstrate the accuracy levels of both AI detection mechanisms and illuminate vulnerabilities in the AI-detection process, thereby strengthening educators' strategies for assessing student work.

Remi Beik

Discipline: Sociology

Authors:

#1 Susie Steinbach

Abstract Name: Revising Honors for All Hamline Students

Research on collegiate honors programs has increasingly reported underrepresentation of certain demographics, such as race, gender, and first-generation status. The current study builds on this work to explore the causes of this disparity. It employs a mixed-methods approach to examine the representation of students across those various demographic categories. We confirm that students with non-White racial identities and/or first-generation status are 16% less likely to participate in honors. It was found through bivariate analysis that time devotion plays the largest role in the relationship between race or first-generation status and participation. Interestingly, extra effort was not as significant an issue for the mentioned student demographics. The students' differing relationship with those two factors implies that they do not refrain from participation because of the perceived extra effort; rather, they do not have the time in their lives to set aside for the program. Using structural modeling equation analysis revealed that time commitment and extra effort combined account for 41% of the reasoning behind nonparticipation from the mentioned students. Our findings illuminate the mechanisms of underrepresentation in the context of a small liberal arts institution with limited application barriers, which may serve as a guide to institutions with similar honors programs. Furthermore, our study points to tensions in the experience of underserved students in college and the ways that institutions must adapt programming to serve them.

Audrey Beilharz

Discipline: Psychology

Authors:

#1 Audrey Beilharz

#2 Amelia Baker

#3 Amy Buddie

Ameila Baker

Abstract Name: The relationship between Undergraduate Research Participation and Educational Outcomes

This study examines how participation in funded undergraduate research programs influences student success before and after graduation at Kennesaw State University (KSU). Previous research indicates that undergraduate research engagement enhances critical thinking, hands-on experience, and professional connections, skills that play a vital role in both academic and career advancement. Furthermore, participation in research has been linked to higher rates of employment, graduate school admission, and the development of a strong professional identity. Using retrospective data provided by KSU's Offices of Undergraduate Research and Institutional Research, this study analyzes indicators of pre-graduation success, such as retention and academic progression. To assess post-graduation outcomes, LinkedIn profiles were used to

gather information on employment and further education. The dataset includes 980 students who participated in funded research programs between 2019 and 2024, encompassing initiatives such as the First-Year Scholars Program, the Summer Undergraduate Research Program, and the Peer Ambassadors Program. By exploring the impact of these funded research opportunities, this project aims to identify how undergraduate research experiences contribute to students' professional and educational trajectories. The findings will offer valuable insight into how institutional research programs can better support academic growth, enhance employability, and promote long-term career development among undergraduates.

Michaela Beiting

Discipline: Psychology

Authors:

#1 Michaela Beiting

#2 Makayla George

#3 Sarah Hudson

#4 Jacob Neukom

Abstract Name: Student and Peer Leader Perceptions of Chemistry Workshops

Peer-led team learning (PLTL) is a pedagogy often used in college-level natural science workshops that are held outside of class to deepen student understanding of course content. Workshops are led by more advanced students (i.e., the peers in "peer-led") who had successfully completed the course. This mixed-method research assessed the effectiveness of chemistry workshops. We surveyed students ($N = 31$) taking chemistry classes that use PLTL workshops to determine students' perception of the workshops. We interviewed peer leaders ($N = 5$) to understand what they do in the workshops to engage students and how the workshops could be improved. We interviewed students ($N = 11$) to obtain a more nuanced understanding of students' experiences in the workshops. Results indicated that several elements contribute to the effectiveness of the chemistry workshops. Students reported that feedback provided by the peer leader was invaluable, allowing students to identify areas for improvement and strengthen their understanding of the material. Availability of study materials has enhanced students' study experiences and improved their performance. However, a notable drawback is the lack of communication among the students in the workshop, which hinders collaborative learning opportunities and the exchange of ideas. Encouraging more interaction among students could further enhance the overall effectiveness of the workshops. This study confirmed findings from previous research that showed what students appreciate in PLTL. Results from this research can be used across science classes and at other universities that employ PLTL.

Michaela Beiting

Discipline: Psychology

Authors:

#1 Michaela Beiting

Abstract Name: Academic Motivation

As a college education becomes increasingly more valued in the workforce, it is important to understand the factors that influence a college student's academic motivation. Academic motivation is important for student success, particularly as related to student persistence to graduation. This study examined how imposter syndrome and test anxiety are related to academic motivation. It also scrutinized whether self-efficacy was a

mediating factor in both of these relationships. Undergraduate students (N = 200) completed an online survey with measures of academic motivation, self-efficacy, test anxiety, imposter syndrome, and need for cognition; need for cognition can be considered another form of academic motivation. Results showed that imposter syndrome and test anxiety are significantly related, but neither variable was significantly correlated with academic motivation or need for cognition. However, high levels of self-efficacy were seen to mediate the relationship between imposter syndrome and academic motivation as well as test anxiety and academic motivation. Self-efficacy can decrease feelings of imposter syndrome and test anxiety, thus fortifying academic motivation. This work suggests that improving college student self-efficacy may be more fruitful than attempting to decrease imposter syndrome and test anxiety. This strategy may be an effective path to increasing academic motivation in college students.

Dayanah Belcher

Discipline: Biology

Authors:

#1 Dayanah Belcher

Abstract Name: Assessing the Behavioral Effects of Caffeine on the Sleep Cycle in *Drosophila Melanogaster*

Caffeine is a widely consumed substance officially classified as a stimulant because of its significant effects on the human sleep-wake cycle and the central nervous system. Chronic overconsumption of caffeine can lead to the development of tolerance, which may reduce the responsiveness of cAMP and PKA signaling mechanisms. Reduced responsiveness not only impacts the sleep cycle throughout the night, but can also play a role in wakefulness behaviors during the day by increasing alertness at the times of the natural dip. These disruptions can be closely related to dopaminergic activity, which plays a crucial role in arousal, motivation, and reward pathways. This experiment uses *Drosophila melanogaster* as a model system to investigate how caffeine consumption and withdrawal alter dopaminergic activity and the sleep-wake cycle. Two genetic crosses were generated using the Gal4–UAS system to enable flexible and efficient gene manipulation, as well as to allow precise visualization of brain structures in the control group. The manipulation cross consists of offspring containing the 8848 dopaminergic Gal4 gene and the 41753 UAS halorhodopsin gene. The control cross was created from the 8848 dopaminergic Gal4 gene and the 8515 UAS e-GFP gene. Due to the optogenetic experimentation of the manipulation group, the vial was wrapped with aluminum foil to prevent light exposure and handled in a dark environment. The vial contained al-trans-retinol (ATR) food and 0.75mg/ml of caffeine injected into the food source after 3-5 days. Both the manipulation and control were then sent to the *Drosophila* Activity Monitor (DAM) to assess circadian behavior over 48 hours. It is hypothesized that the sleep cycle of the caffeinated *Drosophila* will decrease in the first 24 hours of withdrawal, after the hyperpolarization period in the following 24 hours. The DAM data is currently pending and will be analyzed via linear regression.

Eric Belfanti

Discipline: Environmental Science and Sustainability

Authors:

#1 Eric Belfanti

#2 Dan Ressler

#3 Sara Ashcraft

#4 Matt Wilson

Abstract Name: Even Nature Likes To Flash: Predicting Stream Flashiness To Mitigate Flood Events

Flash flooding poses a danger to life and property, so knowing how to accurately calculate and notice trends can help predict areas at risk. While flashiness can now be calculated through discharge patterns—thanks to the Richards-Baker Index (RBI)—this data is not available for the majority of streams. To examine stream flashiness, small (<50 sqmi) drainage basins with a USGS gage across Pennsylvania were selected and environmental factors (i.e. land use, slope, etc.) were examined. R-code was used to gather USGS data and calculate annual RBI averages. Land use was tabulated within each basin using ArcGIS. The results were then put through a linear regression model to test significance. It was found that developed and agriculture land in the state had the greatest influence on flashiness. Temporal data was also analyzed by comparing these factors across the past 25 years. Simulations are currently underway to use these findings in helping support the needs for best management practices (BMPs) across various landscapes. It is expected that BMPs will reduce the risks of flash flood events by manipulating the energy of the flood system. Since it is not feasible to place stream gages in every waterway, understanding the factors and how they influence stream flashiness, along with knowing what BMPs are most suitable, can be important ways to mitigate flash flooding events across all watersheds.

Ethan Bell

Discipline: History

Authors:

#1 Ethan Bell

Abstract Name: "Technology that Shaped the Second World War Mechanization in the U.S. Cavalry 1919-1945"

Before the Second World War, many nations experimented with military technology to have the upper hand. The United States was no different, analyzing friend and foe to improve their armored vehicles. But there was great debate within the American military about the role of tanks. In the pages of the Cavalry Journal, the professional forum for cavalry officers, military strategists argued various sides of the issue. My project studies the development of tank doctrine in the Cavalry Journal from 1920 to 1945. I focus on seven writers whose ideas pushed tank doctrine forward in the years before World War II. I use Andrew Feenberg's "substantive" theory of technology to show the politics of tank development. Feenberg argues that even though technology can be a useful tool, it can also control doctrine and change strategy. By analyzing the Cavalry Journal with Feenberg's theory, I show that the debate over armor design improved the U.S. Army's doctrine and strategy. This project shows the impact of technology in the army. It evolved from a tool to serve doctrine to a powerful force that shaped doctrine.

Ethan Bell

Discipline: Physical/Occupational Therapy and Speech Language Pathology

Authors:

#1 Abrianna Lalle

#2 Jeffrey Stevenson

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#9 Viviana Rivera
#10 Peter Smith
#11 Peter Smith
#12 Matt Dombrowski
#13 John Sparkman
#14 Albert Manero

Abstract Name: Evaluating usability of multi-gesture controls in electromyographic upper limb prostheses using single sensor via muscle contraction magnitude

The increased device capabilities of electromyographic (EMG) prostheses may include a tradeoff in usability and training time; this is a topic that remains largely unexplored in established literature. Single-gesture prostheses have high accuracy, but limited capabilities. Incorporating additional gestures, such as a pinch-and-point or peace sign, come with an expected decrease in accuracy, as users need to flex at specific intensities to trigger targeted gestures. This study evaluated performance and perceptions of a multi-gesture EMG control system using a novel training application to establish what an attainable regimen may look like for a novice user. The training application was connected with Bluetooth to a tablet and controlled via a surface EMG sensor to register and display flexion strength in-game. Participants were divided into cohorts, each using the training instrument with a different number of zones. Each zone represented a distinct threshold of flexion strength that corresponded to a different gesture on the prosthesis. The training app prompted the user to flex so that their peak flexion would reach within a specified zone, outlined with a green highlight. These cues were randomized to test user accuracy in reaching varied flexion strengths. To measure accuracy, participants received one point for every correct response. In addition to accuracy scoring, the System Usability Scale (SUS) and NASA Task Load Index (NASA-TLX) were collected outcomes. Data analysis showed that accuracy scoring decreased as more zones were added, which was consistent with previous literature and expectations. Usability scores differed across cohorts, but remained highest among users training through the progressive cohort. Cognitive workload increased with more zones. These findings support the possibility of implementing up to three gestures with a progressive mode of training. This strikes a balance that increases device capabilities while retaining accuracy and high perceived usability.

Julia Bell

Discipline: Chemistry

Authors:

#1 Dr. Karl Sienerth

Abstract Name: Quenching Modes of Explosive Analogs with Perylene

Chemical explosives are commonly found associated with crime scenes and as waste products in water sources. Residues of explosives threaten environmental safety and homeland security. Detection of explosives is instrumental in protecting the health of individuals and the environment, and it can aid investigators with early leads in criminal cases. The ability to detect explosives on-site can help solve investigations and environmental issues at a faster rate, compared to central laboratories, which could take months to process samples due to backlog. When explosives are combined with compounds that normally fluoresce (emit light), the intensity of the fluorescence decreases – this is called quenching. The level of quenching can be used to determine the amount of explosive present. A Stern-Volmer plot is created, which measures quenching vs concentration of quencher added. Nonlinearity in these plots is typically due to a transition between different modes of quenching (dynamic or static). It is necessary to investigate the concentration ranges of the explosive to find which concentrations are important for each quenching mode. A method called time-correlated single photon counting (TCSPC) is used to estimate the decay time of fluorophores. This study investigated quenching of mono-, di-, and tri- nitrophenols and nitrotoluenes. Identifiable trends were

observed in how the explosive analogs quenched fluorescence with perylene as the fluorophore. It was found that nitrophenols are more effective quenchers than nitrotoluenes and can be detected at lower concentrations, and the more nitrate groups on an explosive, the better it is at quenching. Explosives that demonstrated both quenching modes showed dynamic occurred at all concentrations, while static occurred only at higher concentrations. The next steps will involve testing these explosive analogs with a different fluorophore, DPA (Diphenylanthracene), followed by a broader comparison with the perylene results.

Elizabeth Bella

Discipline: Chemistry

Authors:

#1 Elizabeth Bella

#2 Rodrigo Sarabia

Rodrigo Sarabia

Abstract Name: Can Subsampling Replace Full Particle Analysis? A Validation Study for Microplastic Identification

Consistent microplastic (MP) quantification often relies on the assumption that a small subsample of particles can accurately represent the full sample. This study evaluates the validity of extrapolating MP identification results from particle counts by comparing analyses conducted on 10-100% of the total particles from the sand beach sample from Columbia. A total of 1,093 potential MP particles were examined using spectroscopy identification (FTIR-ATR). Statistical evaluation revealed that MP particles within samples are not homogeneously distributed, leading to variability in polymer type and abundance at lower subsampling levels. Our analysis shows that extrapolations based on subsampling become meaningfully reliable only when at least 60% of the total particles are analyzed, corresponding to approximately 75% confidence in accurately predicting full sample composition. These findings indicate that small subsamples (e.g., 10%) are insufficiently representative, and substantial subsampling is required to minimize uncertainty. This work highlights the need for an evidence-based subsampling threshold to improve data quality in MP research and support more accurate reporting of environmental MP burdens.

Amelia Bellah

CA - California State Polytechnic University - Pomona

Discipline: Anthropology and Archaeology

Authors:

#1 Iftekhar Alam

Jesse Richert

Abstract Name: Characterizing the human burial signatures using ground penetrating radar: A case study on Agua Mansa Pioneer Cemetery

This research is a continuation of Understanding the human burial signatures using ground penetrating radar (GPR): A case study on Agua Mansa Pioneer Cemetery. Data obtained from surface geophysical surveys via ground penetrating radar (GPR) are being used to identify, characterize, and understand the burial signatures at the Agua Mansa Pioneer cemetery. The Agua Mansa settlement was established in the 1830s by settlers from Abiquiu, New Mexico. It was a prevalent farming settlement until 1862 when a flood destroyed most of the settlement. The cemetery survived the flood due to its location on a hilltop; most of its destruction came

in the early 1900s from vandalism as well as a fire in the late 1900s which burned any wooden grave markers. This 6.3-acre pioneer cemetery in Colton, California actively buried from 1854-1963. The site consists of the ruins of an old church, a replica church, and approximately 2,000 human burials. Out of the 2,000 burials, only a few hundred still have grave markers. Data obtained at this site uses GPR, a non-invasive geophysical technique that utilizes electromagnetic waves to map the subsurface to indicate locations of unmarked burials by analyzing the signal characteristics that correlate with marked burial signatures. This project focuses on expanding data acquisition to the entire site and processing data to accurately identify and characterize anomalies related to burials and distinguish them from other anomalies not related to the burials. Results of this project include possible locations of unmarked graves characterized by high amplitude reflectivity in 3D surface maps.

Imani Bellamy

Discipline: Psychology

Authors:

Abstract Name: Fool me once, shame on you: Understanding and Preventing Psychological Exploits in Cybercrime

Scammers increasingly exploit psychological vulnerabilities and software design weaknesses to deceive users across trusted platforms. This study examines whether stress levels, impulsivity, and online behaviors increase young adults' susceptibility to phishing attacks, even when they are aware of scams. Young adults frequently navigate emotionally intense periods, such as job searches, financial deadlines, and academic stress, which may heighten their vulnerability. This research also evaluates whether theory-based warning messages specifically, inoculation-style interventions, can reduce phishing susceptibility during these heightened emotional states. Grounded in the Heuristic-Systematic Model (HSM) and Cyber-Routine Activity Theory (Cyber-RAT), the study investigates how emotional states influence decision-making and whether attackers intentionally target users during known vulnerable periods. Participants first complete a pre-survey assessing emotional state, online behavior, and prior phishing exposure. They are then randomly assigned to receive either no warning, a generic tip, or a targeted inoculation message designed to build resistance against phishing attempts. Following this, participants complete a simulated phishing task using emotionally charged emails, such as fake job offers or tuition warnings, to measure trust and response likelihood. It is hypothesized that participants experiencing higher stress will demonstrate greater vulnerability, especially when the phishing content aligns with their personal circumstances. It is further expected that those receiving an inoculation message will show greater resistance to phishing attempts. By combining emotional psychology, digital behavior, and preventive interventions, this study offers a novel perspective on phishing susceptibility. Findings may inform the development of real-time awareness tools and emotionally responsive phishing education programs tailored to young adults.

Mari Belle

Discipline: Gender, Ethnicity, Diversity, or Cultural Studies

Authors:

#1 Peter Rerick

Abstract Name: Living Unapologetically: LGBTQ+ Coming Out in Midlife and Beyond

While much of the research on LGBTQ+ identity development focuses on adolescents and young adults, a

growing number of individuals are discovering or embracing their queer identities well into adulthood. This study explores the experiences of LGBTQ+ individuals who came out at age 35 or older, with the goal of understanding the psychological, social, and cultural factors influencing later-in-life self-discovery. Through qualitative interviews with participants across the United States, this project investigates common themes such as internalized stigma, family expectations, religion, relationship dynamics, and access to affirming spaces. Preliminary findings suggest that individuals who come out in midlife often face unique barriers—many shaped by heteronormative pressures during formative years—but also report profound personal transformation. Despite grief over lost time or past relationships, participants frequently described a sense of freedom, relief, and renewed authenticity. Many highlighted the lack of representation and resources tailored to older LGBTQ+ individuals, noting how support networks and mental health services often assume earlier identity development. This research emphasizes the need for inclusive approaches in both policy and practice—ones that acknowledge and validate LGBTQ+ journeys across the lifespan. The study also calls attention to a gap in public discourse, where late-blooming narratives are often overlooked. By centering the voices of those coming out in midlife and beyond, this work aims to challenge ageist assumptions and expand understandings of queer identity formation. Attendees of this presentation will gain insight into the lived experiences of older LGBTQ+ adults, as well as recommendations for creating more affirming, inclusive environments across clinical, academic, and community settings. This project is ongoing and supported by the RCSA program at the University of Central Oklahoma.

Victoria Bello

Discipline: Psychology

Authors:

#1 Maria Reyes

Abstract Name: The Impact Of Social Media On Self-Perception And Mental Health In Young Adults

This study explores how social media affects the psychological well-being and body image of young adults aged 18 to 28—a group especially vulnerable to online pressures and unrealistic visual standards. As image-focused platforms continue to shape what people believe they “should” look like, it becomes increasingly important to understand how these experiences contribute to self-objectification, low confidence, and other mental health concerns among both males and females. Gaining insight into these patterns can help support the development of practical, gender-inclusive strategies that encourage healthier online habits and greater self-acceptance. To investigate this issue, the study used a mixed-methods design by combining a systematic review of existing research with a qualitative survey completed anonymously by participants ages 18–28. The survey collected primary data about self-perception, body satisfaction, and online behavior. Descriptive statistics and several inferential tests were used to analyze gender differences, the influence of various platforms, and connections between time spent online and changes in body satisfaction. All research procedures followed strict ethical standards approved by the IRB to protect participant privacy and well-being. A total of 79 valid responses were included in the final analysis. Results showed that both males and females experience similar levels of body dissatisfaction—directly challenging the common assumption that women are significantly more affected. In fact, 78.6% of all participants reported feeling unhappy with their bodies due to comparison on visual platforms such as TikTok and Instagram. Notably, young men reported a particularly strong loss of confidence linked to these comparisons. Overall, the study confirms that digital comparison, especially on image-heavy apps, plays a major role in lowering body satisfaction. These findings highlight the urgent need for mental health interventions that address body dissatisfaction as a shared experience and support young adults of all genders in developing healthier relationships with social media.

Aliah Beltre Jorge

Discipline: Health and Human Development

Authors:

#1 Jocelyn Jarvis

#2 Heewon Gray

#3 Marilyn Stern

Abstract Name: Associations Between Parental Weight Concern and Motivation for Change in a Family Healthy Lifestyle Program

Background: Prior research shows that caregiver concern and perceived importance of change influence intervention engagement. This project aims to examine how these factors influence caregiver engagement and participation in the NOURISHT+ study. Methods: The current study analyzed baseline data collected from 241 caregivers of pediatric cancer survivors with overweight/obesity enrolled in a randomized control trial of a behavioral intervention focused on nutrition and physical activity. Caregivers completed questions assessing their concern about their child's current weight, their perceived importance of making healthy behavior changes, confidence in meeting nutrition and activity goals, and readiness to participate in the program. A multivariate analysis of variance (MANOVA) was conducted to examine the effect of caregiver concern about their child's weight on these three indicators of engagement. Results: Participants primarily identified as female (93%) with an average age of 39.62 years (SD = 8.25). There was a significant overall effect of caregiver concern about their child's weight on engagement indicators, $F(12, 708) = 5.32, p < .001$. Follow-up analyses indicated that higher concern about the child's weight was associated with greater reported importance of making healthy behavior changes, $F(4, 236) = 10.83, p < .001$, and higher readiness to participate in the program, $F(4, 236) = 3.42, p = .010$. No significant effect was observed for confidence in meeting nutrition and activity goals. Conclusion: Higher caregiver concern on child's weight was associated with motivation to engage in change but not with confidence. Future intervention studies may incorporate strategies to improve caregiver confidence.

Skye Bendheim

Discipline: Biology

Authors:

#1 Siti Hidayati

Abstract Name: Does flower abundance or color influence insect visitation to species in the daisy family (Asteraceae) on cedar glades of Middle Tennessee?

Flower traits such as color and odor influence interactions between insect visitors (pollinators) and plants. Vibrant colors act as reward signals for visually oriented insects when nectar foraging. However, flower abundance is also an important factor in visitation, with dense patches attracting visitors due to the likelihood of providing an abundance of nectar. This project was designed to test whether flower color or abundance plays a greater role in insect visitation rates during the summer versus autumn flowering seasons. Plots of flowers varying in color and abundance were selected at Flat Rock Cedar Glades and Barrens State Natural Area near Murfreesboro in Rutherford County, Tennessee. Visitation surveys were conducted hourly between 10:00 am and 4:00 pm, 5-6 days per week in July-August and October 2025, documenting plant species, flower color and abundance, insect species, and the number of visiting insects. Unidentified insects in the field were collected and examined in the laboratory. The data were converted to a visitation rate as the number of insects per flower head per hour. A wide variety of insect taxa visited the plants, but insect diversity was higher during summer than autumn. During both flowering seasons, the most abundant flowers had relatively low visitors. In contrast, plants with low flower production had relatively high visitation rates: colored purple or yellow in summer and purple or white in autumn. These discoveries emphasize the importance of floral traits in attracting pollinators, which can ultimately shape plant reproductive success.

Understanding pollinator preferences can offer valuable insight and inform future research on pollination ecology.

Sarah Benes

Discipline: Chemistry

Authors:

Abstract Name: Development of Artificial Metalloenzymes To Study Bioinorganic Cofactor Systems

Artificial metalloenzymes (ArMs) integrate metal-based reactivity within a protein framework, bridging bioinorganic and enzymatic catalysis. Among ArM platforms, the biotin-streptavidin system has proven particularly powerful due to its remarkable affinity ($K_d \approx 10^{-15}$ M) and structural stability, providing a versatile host for incorporating synthetic cofactors. This project explores the potential of the biotin-streptavidin scaffold to serve as a model system for studying bioinorganic cofactors and the influence of the protein environment on metal center behavior. The primary objective was to establish foundational methods for protein expression, purification, and preparation of a streptavidin variant suitable for cofactor incorporation. Streptavidin was expressed in *E. coli*, purified through affinity chromatography, and will eventually be evaluated for crystallization under varying buffer and pH conditions. In parallel, biotinylated cofactors were explored as potential anchoring groups for introducing metal centers into the protein host. While this study remains in the exploratory phase, it provides critical groundwork for future structure-function analyses and cofactor reconstitution experiments. The biotin-streptavidin framework offers a unique opportunity to investigate how the secondary coordination sphere in hydrogen bonding, electrostatics, and local geometry, can be systematically tuned through protein engineering to modulate metal reactivity. By establishing reliable methods for preparing and characterizing this modular system, this work contributes to a growing toolkit for designing artificial metalloenzymes. The long-term goal is to apply these systems toward understanding natural metallocofactor chemistry and creating novel catalysts that extend beyond nature's repertoire. This project thus lays the experimental and conceptual foundation for future studies at the interface of coordination chemistry and enzymology.

Su Benli

Discipline: Political Science

Authors:

Abstract Name: Big Brother is Watching: The Impact of Digital Authoritarianism on Maintaining Long-Term Political Power, Case Studies of Turkey and Iran

This article examines how the governments of Turkey and Iran use digital authoritarianism to impose their ideologies on their citizens and to remain in power. Due to the shift of focus from news to social media in recent years, governments have been using policies regarding these platforms in order to gain supporters and maintain their political power. By using policy analysis and content analysis I will highlight the ways the governments of Turkey and Iran have used digital authoritarianism and religion to remain in power, and survey data to see the social impacts of these policies. In addition, I will interview a journalist to highlight how digital authoritarianism has affected journalists who do not align with their governments' ideologies. The results are expected to show that governments of Turkey and Iran have been heavily censoring social media content and using surveillance to detain people exercising their freedom of speech. Religious legitimization in politics covers up these policies, and it also helps impose government ideology to the people. These results

suggest that Turkey and Iran shifted their policies regarding remaining in power to digital platforms, and use religion for legitimizing these new policies, which creates self-censorship in the society. This project adds to the new study area of digital authoritarianism by providing a comparative analysis between Turkey and Iran, and highlighting its social impacts. The project also builds a connection between religious legitimization and digital authoritarianism, which has not been studied together.

Sophie Bennett

Discipline: Health and Human Development

Authors:

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Abstract Name: Evaluating Enjoyment and Social Connectivity in Gamified Training Designed for Upper Limb Prostheses

Adherence to a recommended training routine may improve the muscular control required for electromyographic (EMG) prosthesis actuation. EMG electrodes placed on the surface of the skin record electrical signals generated by muscle flexes. These signals are translated to prompt movement in the prosthesis. EMG-powered prostheses introduce benefits including increased capabilities, comfort, and control, especially for children with congenital limb differences. Gamified training implemented in pediatric populations is proven to facilitate faster and simpler prosthesis control. Existing literature suggests that multiplayer gameplay results in increased enjoyment and social connectivity, which may increase adherence. This has not been studied in a gamified EMG training environment. Limbitless Redline is a custom-built multiplayer motorcycle racing game where players control acceleration by flexing their non-dominant forearm muscle and manage their steering with a one-handed controller. Muscle flexion is recorded using an EMG Flex Controller secured on the forearm. A usability assessment study was designed to evaluate the training game. Participants were split into 4 cohorts containing 1, 2, 3, and 4 players, respectively, and played three rounds to assess the effects of single and multiplayer environments. Post-assessment surveys, including the Game User Experience Satisfaction Scale (GUESS), Social Presence in Gaming Questionnaire (SPGQ), and System Usability Scale (SUS), were completed after gameplay. Preliminary results show that enjoyment and social connectivity GUESS subscales were the highest in cohort 4 compared to the cohorts with fewer players. Additionally, SPGQ subscales demonstrate that cohort 3 have the lowest reported negative feelings and the highest behavioral involvement. These results support the hypothesis that social engagement factors increase in multiplayer environments with more players. Multiplayer capabilities in gamified training may improve adherence to training methods and the overall user experience.

Julia Bennett

Discipline: Law and Legal Studies

Authors:

Abstract Name: American Scrutiny vs German Proportionality: An Analysis

Since its ratification in 1868, the Fourteenth Amendment of the United States Constitution has been utilized to mitigate the effects of discrimination and guarantee individuals' equal protection under the law. Established in 1949, Germany's Article Three focuses on those same goals. This paper explores how Article Three vastly ensures better protection for the individual than the Fourteenth Amendment by using Germany's proportionality test and obligating the government to take positive action against discrimination. This article begins by examining how, in America, due to the Court's scrutiny tests, some suspect classifications are awarded less protection than others. Whereas in Germany, courts employ a more nuanced approach to discrimination cases to include a balancing element, which ensures the government is being analyzed in the strictest sense. This paper then focuses on how the German government is constitutionally obligated to actively seek out and mitigate current discrimination, while the United States government is only required to act reactively, meaning it does not actively seek to mitigate current discrimination. Ultimately, this paper recommends that the United States should adopt Germany's proportionality test and compel the government to act, because in doing so, the United States can better mitigate discrimination and ensure protection of the individual.

Cestihny Bennett

Discipline: Sociology

Authors:

#1 CESTIHNY BENNETT

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Abstract Name: Christian Legalism: Accountability or Asceticism?

Theological legalism is characterized by rigid adherence to religious rules over grace. Although linked to negative mental health outcomes, legalism's impact on Protestant Christians remains understudied. To analyze the effect of legalism, this study proposes a quantitative, cross-sectional design in which 100 Protestant participants aged 27 and above will complete the Perceived Perfectionism from God Scale and self-reported mental health assessments. It is hypothesized that higher levels of legalism correlate with declining mental health (guilt, shame, anxiety) among Protestants, while grace-based perspectives foster well-being. Results are anticipated to reveal significant associations between legalism and adverse psychological outcomes, contrasting with the protective effects of grace. This research addresses a critical gap in sociological and theological literature, potentially unveiling how doctrinal interpretations shape mental health within Christian communities. Findings could inform pastoral care and interventions to promote grace-centered spiritual practices to enhance and enrich the mental health of believers.

Natalie Bennings

Discipline: Psychology

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Abstract Name: I Get By With a Little Help From My Friends: Mixed Methods Analysis of Bystander Intervention Strategies In Scenarios Involving Negative Alcohol Consequences

College campuses promote excessive drinking. A number of dangerous consequences including sexual assault, alcohol overdose, and other related injuries associate with alcohol use. One common alcohol intervention strategy includes university training modules that aim to shape students into what is referred to as an “engaged bystander” to promote safer drinking environments. Research investigates the psychological factors that push individuals to decide whether to intervene when encountering alcohol poisoning symptoms. However, considerably less is known about what strategies are utilized by these engaged bystanders. The purpose of this study is to identify the strategies participants would use in a situation where they might choose to intervene. The current project 1) developed a measure to investigate intervention strategies, and 2) analyzed the likelihood of intervention between symptoms presented (drowsiness, unconsciousness, nausea, or vomiting), gender of the victim, and location (bar or party). Participants are university students who responded anonymously to an online survey. The measure is composed of both open-response and multiple-choice questions that propose a situation and ask participants to describe their thoughts and intentions when a friend experiences alcohol poisoning symptoms. Data analysis is ongoing. It is anticipated more participants may choose to intervene if the symptoms presented were more severe. It is also expected that participants will also intervene more if the victim was female. The data provided will inform universities of what students know and what can be done to improve their ability to respond to emergencies, so any alcohol safety training modules developed can be applicable to this population. Research Questions: Are there significant differences in bystander intervention strategies and the symptoms being presented? Does drinking location correlate with different strategies for bystander intervention for negative health consequences related to alcohol? Are women who experience alcohol-related symptoms significantly more likely to receive care from bystanders than men?

Alanna Bent

Discipline: Psychology

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Abstract Name: Traumatic Exposure and Posttraumatic Stress in Neuroimaging

Traumatic events are highly prevalent in adulthood, prompting research into physiological markers that may predict stress responses following trauma. One promising neural indicator is the error-related negativity (ERN), an event-related potential occurring 50–150 ms after an individual makes an incorrect response during a cognitive task. This study investigates whether different trauma types—specifically interpersonal versus non-interpersonal trauma—are associated with distinct patterns of neural error processing as measured by the ERN. Participants will be recruited from the University of South Carolina Upstate student population and fitted with a 64-channel EEG system. They will complete a flanker task designed to elicit error responses and measure ERN amplitude across 10 blocks of 30 trials. After task completion, participants will complete self-report measures assessing trauma exposure and posttraumatic symptoms. This data will be used to classify participants by trauma type and examine differences in ERN amplitude and behavioral performance. Data from approximately two-thirds of the expected sample have been collected. Based on prior findings, individuals with a history of interpersonal trauma will show enhanced neural reactivity to errors — specifically, a larger error-related negativity (ERN/Ne) amplitude — compared to both non-interpersonal trauma survivors and controls. These patterns would suggest that interpersonal trauma may uniquely disrupt

conflict monitoring processes and diminish sensitivity to threat signals. It is important to note that the literature shows mixed results. In a recent study, the researcher concluded that individuals with a history of non-interpersonal trauma showed enhanced neural reactivity to errors, thus showing opposite results from what was predicted. This research contributes to understanding how trauma heterogeneity influences neurocognitive functioning and may help clarify why individuals with different trauma histories show distinct patterns of stress-related risk.

Katherine Berensen

Discipline: Philosophy, Ethics, and Religious Studies

Authors:

Abstract Name: Process Makes Perfect: The Adoption of Process Ontology in Biological Classification

The Linnaean system of classification continues to play an active and functional role in biological nomenclature despite conflicting with current taxonomic and phylogenetic theory. A fundamental problem of the Linnaean system is that it is based in substance ontology. Substance ontology promotes categorical thinking, with strictly bounded taxa that have discrete and persisting features, rather than treating taxa as dynamic, gradient lineages that overlap in complex ways. Substance ontology thus constrains rather than facilitates the re-construction of evolutionary lineages and phylogenetic networks. I use two examples to demonstrate this point. The first is from microbial systematics. Microbial patterns of evolution are dominated by horizontal gene transfer (HGT), producing gradient evolutionary networks that treat taxa as dynamic systems rather than enduring substances. The other example is from Canidae systematics. Taxonomists have recently adopted taxonomic revisions to long-standing fox classifications to better reflect the phylogenetic relationships. This prioritizes capturing the transformative flow of taxonomic lineages, in contrast to categorical treatments that treat taxa as static entities. I advocate for the adoption of process ontology, or the view that the biological world is best understood as a hierarchy of processes stabilized through different time scales. This paper discusses how adopting a process ontology alters the function and relevance of the higher Linnaean system and provides a more thorough and complete understanding of the biological world, allowing for the generation of better research questions. My argument rejects categorical thinking in taxonomy in favor of a process ontology to best convey the reality of the often-convoluted biological world. This better positions us to evaluate novel taxonomic claims, including about de-extinction and the status of cloned charismatic mega-fauna like Dire Wolves, Mammoths, and Dodos.

Hanna Dawit Berhane Gebreyesus

Discipline: Computer Science

Authors:

#1 Matthew Lepinski

Abstract Name: Computerized Text Recognition for Ghanaian Cultural and Historical Documents Using Machine Learning

Ghana's National House of Chiefs preserves handwritten records about each chief across the country, including their hometown and the date they were enstooled/enskinned. These archives are crucial for policymakers and researchers studying traditional governance. These culturally significant documents are not accessible in the digital world. Because they are handwritten instead of typed, they cannot be searched, leaving them invisible to researchers and risking their loss over time. Commercial OCR systems like Google

Vision and Tesseract, optimized for printed Western text, consistently fail on these records due to handwriting variability, faded ink, and local village names. Without accessible digitization tools, Ghanaian historical records remain locked away, unable to support research requiring searchable, analyzable data. This research shows how lightweight machine learning methods can unlock these resource-scarce collections. We developed a five-stage pipeline to turn handwritten scans into searchable digital text. First, we tested four preprocessing methods: adaptive thresholding, CLAHE contrast enhancement, HSV color masking, and morphological background subtraction, identifying techniques that recover faded text without erasing handwriting. Second, automated detection extracts handwritten place names. Third, segmentation isolates characters and standardizes dimensions. Fourth, a convolutional neural network trained on EMNIST Letters, a benchmark dataset of over one hundred thousand handwritten characters, classifies each letter by learning spatial patterns. Finally, postprocessing combines predicted letters into words, applies structural analysis to distinguish visually similar characters, and matches predictions against known Ghanaian place names to incorporate linguistic context. The system achieved approximately ninety-three percent accuracy on benchmark data and seventy to eighty percent on archival samples, with adoption by political science researchers underway. This demonstrates that modest architectures combined with intelligent preprocessing can address complex cultural preservation challenges, creating a reproducible blueprint for bringing underrepresented historical archives into the digital age where they can be searched and analyzed globally.

Karol Bernal

Discipline: Biology

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Julia Raveneau

Brianna Collie

Abstract Name: Presence of Mycobacterium smegmatis Phages in Soil From the Banks of the Elizabeth River

This study focuses on isolation of mycobacteriophages from the soil or sediment of the Elizabeth River, a tributary of the Chesapeake Bay located in Virginia. The samples were collected during different seasons, using the host bacterium *Mycobacterium smegmatis*. This bacterial host was used because it is a common laboratory strain, frequently found in outdoor environments such as soil, and does not cause disease in humans. Bacteriophages are viruses that infect specific bacterial hosts and require a host in order to survive and replicate. The ultimate goal is to gain insight on the impact of seasonal change on the prevalence of phage. In addition, this research focuses on identifying bacteriophages that could have the potential of killing *Mycobacterium tuberculosis* which has morphological similarities to that of the host *M. smegmatis*. During the Fall of 2025, soil and sediment were collected from the Elizabeth River. The samples underwent enrichment, filtration, and overlay assays to detect and isolate mycobacteriophages. Results revealed the presence of phages in only the soil samples, with one phage successfully isolated and named Brokber. No phages were recovered from sediment samples during this season, contrasting with previous summer collections that yielded multiple sediment-derived phages. If sediment samples collected during the summer yield plaques, then mycobacteriophages capable of infecting *M. smegmatis* are more prevalent in warmer temperatures compared to cooler seasons.

Lillian Berry

Discipline: Art History

Authors:

#1 Lillian Berry

Abstract Name: Jackie Ormes Taking to the funny papers

In a time where women especially, black women were not seen or able to promote their concerns with society, one woman took a turn in the funny papers to become an advocate for black journalism. This woman no other than Jackie Ormes, the first African American woman to be a cartoonist. Born in Pittsburgh only to move to Pennsylvania, Jackie had a hand at talent at a young age only for the talent to blossom in the events of her career working at Courier and in the events of a tragedy in the death of her daughter in the later years of her life. Jackie would create a character to resemble some essence of her daughter but having a spunky personality as well as bite to call out the of America in the time of Jim Crow and Civil Rights movement, this would be featured in one of Orme's comics called Patty Joe and Ginger. While fighting for Civil rights in strips of comics, Jackie also used comics to uplift black woman with black femineity, show casing woman as beautiful and human.

Grace Bertrand

Discipline: Education

Authors:

Abstract Name: How Translanguaging Pedagogy Shapes Language Ideologies in Bilingual Picturebooks

Emergent bilingual children deserve literacy experiences that recognize their full linguistic identities as assets rather than deficits. Translanguaging pedagogy emphasizes flexible language use that reflects how multilingual learners naturally draw on all of their languages to make meaning, express emotions, and connect with their families and communities. This poster presents the findings of a systematic literature review that examines the relationship between translanguaging pedagogy and children's literature, with a particular focus on how bilingual picturebooks can support dynamic bilingualism and multilingual development while honoring learners as whole persons with integrated linguistic identities. Grounded in theoretical perspectives from García, Wei, and other scholars in ESL and bilingual education, the project investigates how bilingual books are shaped by underlying language ideologies and how these contrasting beliefs about bilingualism may influence multilingual learners' language use, literacy engagement, and identity development. To extend this theoretical analysis, the project also includes a qualitative review of bilingual picturebooks currently available in the U.S. market. A set of selected books was examined to identify how translanguaging is supported or constrained through text and design choices and to reveal embedded language ideologies shaping how English and home languages are positioned. Early findings suggest that although many publications encourage bilingual exposure, a significant portion still reinforce rigid separation of languages, hierarchical valuing of English over home languages, or translation based approaches that restrict opportunities for authentic multilingual expression. By comparing translanguaging oriented books with those grounded in monolingual norms, this study offers insights that can inform teachers, literacy researchers, and publishers who seek to promote equity in language education. The goal of this work is to promote the intentional selection and use of children's literature that reflects heteroglossic orientations in ESL and bilingual instruction, supporting multilingual learners in seeing their languages as interconnected, valued, and integral to who they are.

Nicholas Beskow

Discipline: Health and Human Development

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Abstract Name: Exploring the Relationship Between Interaction Quality and “SMART” Goal Quality in the NOURISH-T+ Intervention

Introduction: NOURISH-T+ is a family-based behavioral intervention for pediatric cancer survivors (PCS) with overweight/obesity. Each week caregivers create specific, measurable, attainable, relevant, and time-bound (i.e., “SMART”) goals. While both the quality of caregiver-facilitator interactions and SMART goals independently improve outcomes, their relationship remains unexplored. This study examines the relationship between interaction quality and SMART goal quality within a session of the NOURISH-T+ program.

Methods: Forty recordings are being independently coded by two trained raters. Inter-rater reliability will be assessed using Cohen's Kappa. Interaction quality is assessed using the Interaction Style and Engagement (ISE) tool, developed for the NOURISH-T+ program and yielding scores from 0 to 42. SMART goal quality is rated on a 0–5 scale based on SMART (specific, measurable, attainable, relevant, time-bound) criteria. Both ISE and SMART goal quality scores are split at the median into high and low categories. Pearson Chi-Square test will examine the association between interaction quality and goal quality ($p < 0.05$).

Preliminary Results and Hypothesis: Caregivers were predominantly mothers (87.5%) with a mean age of 40.52 ± 8.45 years. Caregivers identified as predominantly White (67.5%) or Black/African American (25%). It is hypothesized that sessions with high ISE scores are expected to produce higher-quality SMART goals vs. sessions with low ISE scores.

Implications: Findings will illuminate how caregiver–facilitator interactions support engagement, as reflected through the goal-setting process. These insights may inform strategies that strengthen continued behavior implementation and intervention adherence for families of PCS with overweight/obesity.

Helena Besler

Discipline: Business

Authors:

Abstract Name: Empathy Inflation: When Purpose-Driven Marketing Loses Its Impact

Purpose-driven marketing has become a dominant strategy for brands seeking to connect with socially conscious consumers. However, as emotional and empathetic messaging saturates the marketplace, audiences are beginning to experience “empathy inflation,” where repetitive expressions of care and solidarity lose authenticity and impact. This research investigates how overused empathetic language in marketing campaigns affects consumer trust and perceived sincerity, with a focus on campaigns related to mental health awareness, crisis response, and sustainability initiatives. A qualitative content analysis was conducted on selected campaigns from diverse industries, coding for recurring empathy-related phrases, emotional strategies, and tone. Each campaign was analyzed for language patterns, messaging frequency, and the presence of generic versus specific empathy appeals. Additionally, a small-scale consumer perception survey was used to explore how audiences interpret repeated empathetic language and whether it influences their trust in the brand or engagement with its cause. Preliminary findings suggest that while empathy-driven campaigns remain effective in promoting brand awareness and social engagement, phrases that are overly generic or repeated across campaigns contribute to audience fatigue and skepticism. Distinct, authentic

expressions of care, particularly those tied to concrete actions or measurable impact, were perceived as more credible and influential. These results show a critical tension in purpose-driven marketing: brands must balance emotional connection with authenticity to maintain consumer trust. This study contributes to the emerging discourse on ethical and effective marketing communication by defining patterns of empathy inflation and offering practical insights for brands seeking to connect with audiences meaningfully. By identifying which emotional appeals sustain trust and which risk desensitization, the research provides guidance for marketers aiming to design campaigns that are both socially responsible and genuinely impactful.

Za'chari Bey

Discipline: Exercise Science and Nutrition

Authors:

#1 Adam Forbes

Abstract Name: Perceptions of Parents of Children With Disabilities Toward Physical Education: A Systematic Review

Physical education (PE) has a unique opportunity in not only supporting children with disabilities but also their parents' physical-activity knowledge and support behaviors. Therefore, the purpose of this systematic literature review was to synthesize published studies regarding parent perspectives toward physical education (PE) for their children with disabilities. A total of 19 articles met inclusion criteria. Three themes emerged: (a) parents' understanding of adapted PE (A/PE), (b) parents' expectations of A/PE teachers, and (c) parents' undeveloped relationships with A/PE teachers. There exists a disconnection between parent expectations and PE teachers' abilities to accommodate their children and develop lines of communication. Additionally, parental value toward PE was often lower compared with other areas of need for their children. Future research suggests exploring teacher perspectives in understanding the relationships with parents. Furthermore, exploring the origins of parental values for PE and its impact on their perspectives warrants further investigation.

Mohamed Beydoun

Discipline: Psychology

Authors:

#1 Hilary Marusak

Abstract Name: Peer Victimization and Irritability In Youth

Peer victimization, or bullying, is a common adolescent stressor and may be linked to irritability, an emotion-related trait associated with broader mental health risk. This project uses survey data from a larger study to test whether peer victimization is positively associated with irritability in a community sample of 100 youth (mean $\pm$ SD age: 14.1 $\pm$ 2.1 years; 55% female). Peer victimization and irritability were assessed from multiple reporters (youth and parent/guardian) using validated questionnaires: the Revised Peer Experiences Questionnaire for victimization and the Affective Reactivity Index for irritability. Pearson correlations were computed to examine associations within and across reporters and variables. Results showed a positive association between youth-reported peer victimization and irritability ($r = .360$, $p < .001$), and between parent/guardian-reported peer victimization and irritability ($r = .377$, $p < .001$). Cross-reporter correlations were also significant: youth-reported victimization was associated with parent/guardian-reported irritability (r

= .294, $p = .003$), and vice versa ($r = .204$, $p = .042$). Overall, greater peer victimization was consistently associated with higher irritability across reporters. These findings support the idea that negative peer experiences may be tied to youth emotional reactivity. Screening for peer victimization may help identify youth at risk for clinically relevant irritability.

Kristi Bez

Discipline: Engineering

Authors:

Abstract Name: Forced immersion cooling for improved thermal management of cylindrical lithium-ion batteries

Temperature plays a critical role in the electrochemical performance, degradation rate, and overall reliability of batteries. During operation, batteries generate heat due to internal resistance and reaction kinetics. If the heat is not effectively dissipated, localized temperature rises can accelerate side reactions, cause uneven cell aging, and, in extreme cases, lead to thermal runaway — a major safety hazard. Forced immersion cooling using a dielectric fluid significantly influences the heat removal rate, thereby affecting the temperature distribution within the cell. In this work, commercial cylindrical batteries are directly immersed in a flowing dielectric fluid using a custom-built flow loop. We vary the fluid temperature and velocity of the dielectric fluid to evaluate their impact on battery performance. The findings contribute to a deeper understanding of forced immersion cooling for thermal management of lithium-ion batteries, offering a framework for optimizing battery safety, reliability, and electrochemical stability in energy storage research.

Hatice Bezci

Discipline: Biology

Authors:

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Abstract Name: In Vitro Characterization of Polysaccharide Binding by the SFB Surface Protein P12260

Segmented filamentous bacteria (SFB) are gram-positive, spore-forming bacteria that directly anchor to the host's intestinal epithelium. Although SFB-like organisms have been detected in multiple species, including humans, the molecular basis of their adhesion remains poorly understood. One predicted adhesion-related surface lipoprotein, P12260, contains a suspected carbohydrate-binding domain and is conserved in several animal hosts. Search for homologs of P12260 from mice-specific SFB has identified homologous proteins in turkey SFB and some other hosts, but not in a human SFB-like bacteria, possibly because of incomplete genome sequence. Because intestinal mucins and epithelial glycoconjugates are rich in diverse carbohydrates (CHs), we hypothesized that P12260 supports SFB colonization by binding to specific CHs. To investigate this, we expressed and purified His-tagged P12260 from *E. coli* and developed several in vitro CH-binding assays. In this work, we assessed the protein's binding specificity for various monosaccharides through porcine mucin-coated plates assay, pull-down assays with insoluble oligosaccharides and binding to various monosaccharide-charged agarose resins. Our results showed reproducible binding of P12260 to mannose and fucose supporting our previous results and hypothesis that it recognizes specific CH structures relevant to intestinal adhesion. This project investigates different experimental approaches for studying SFB CH-binding proteins and provides evidence that P12260 may play an important adhesion role for SFB interaction with

their host. Based on these findings, we will also discuss and explore potential host receptor targets for P12260 binding.

Mira Bhakta

Discipline: Business

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Abstract Name: Examining AI-Generated Content in Equity Crowdfunding: Implications for Investor Evaluation and Trust

This study examines how the emergence and proliferation of artificial intelligence affects investor due diligence and communication in equity crowdfunding settings. While existing research establishes that communication quality is fundamental to investor-entrepreneur evaluation processes, serving as a critical mechanism for reducing information asymmetry and signaling venture credibility—the rapid adoption of generative AI tools has fundamentally transformed online asynchronous communication practices. Unlike traditional face-to-face interactions, equity crowdfunding platforms rely heavily on written pitches and discussion forums, creating an environment where AI-generated content can seamlessly integrate into investor decision-making processes. However, the implications of AI-authored language for investor perceptions, trust formation, and due diligence remain underexplored. This research employs a comparative temporal design using panel data from equity crowdfunding platforms. The study establishes a pre-AI baseline by analyzing Crowdcube campaigns from 2017-2018, a period predating widespread generative AI adoption. Contemporary data collection from Republic.com is currently underway, capturing active campaigns, updates, and investor discussion forums in the post-AI era. Systematic textual analysis will identify AI-characteristic terminology, linguistic patterns, and syntactic structures across campaign materials. Variables include funding outcomes, investor participation metrics, company sustainability orientation, leadership demographics, and international orientation. The methodology incorporates an experimental component wherein participants will evaluate parallel investment pitches—one AI-generated and one human-authored—to assess whether AI authorship influences investment preferences and whether disclosure of content origin affects decision-making. Upon completion, this study is expected to reveal significant shifts in communication patterns and investor evaluation processes following AI emergence. Findings will be discussed within the context of information asymmetry theory and signaling mechanisms in entrepreneurial finance, contributing to understanding how technological disruption reshapes investor-entrepreneur dynamics in digital fundraising environments.

Leona Bhandari

Discipline: Biology

Authors:

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Riya Maurya

Abstract Name: The XenCart Protocol: A Method for Alcian Blue Labeling and Quantitative Analysis of Craniofacial Cartilage in Xenopus

Craniofacial birth defects, such as cleft lip and palate, are among the most common congenital anomalies and often arise from disruptions in early facial patterning. Many of these defects are linked to environmental teratogens, yet such exposures cannot be directly tested in humans, making animal models essential for evaluating developmental risks. *Xenopus laevis* offers a powerful solution: its embryos develop externally, share deeply conserved craniofacial patterning mechanisms with humans, and provide an accessible platform for uncovering how environmental exposures reshape facial structures during development. Here, we present the XenCart Protocol, a reproducible workflow for Alcian Blue staining and quantitative morphometric analysis of *Xenopus* craniofacial cartilage. This method provides clear visualization of individual cartilage elements and can be readily applied to investigate genetic or environmental perturbations. The *Xenopus* craniofacial skeleton contains distinct cartilaginous structures that perform key biomechanical functions and share strong homology with regions of the human craniofacial skeleton. These similarities allow direct comparison of developmental outcomes across vertebrates. As part of a CURE-based undergraduate course, the XenCart Protocol was used to measure jaw cartilage dimensions in embryos exposed to an emerging teratogen, e-liquids used in vaping. Quantitative analysis revealed significant reductions in specific jaw elements, consistent with phenotypes linked to midfacial narrowing and oral clefts. The ability to detect robust, structure-specific differences highlights the sensitivity of the protocol. Moreover, these findings also pinpoint the precise regions of the jaw most affected by e-liquid exposure, providing a foundation for uncovering the developmental mechanisms driving these craniofacial changes. In summary, the XenCart Protocol provides a standardized, scalable method for quantifying craniofacial cartilage development and offers a powerful platform for both mechanistic research and undergraduate training in developmental biology and toxicology.

Maiya Bhandari

Discipline: Exercise Science and Nutrition

Authors:

#1 Isabella Skibba

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Abstract Name: Impact of a Family Physical Activity Intervention on Parent Self-Efficacy for Personal and Child Physical Activity

Parents often struggle to maintain physical activity (PA) due to work, family demands, and time constraints. Over half of parents do not meet recommended PA guidelines. Parent self-efficacy (PSE) influences how parents manage their own health behaviors and shape their child's routines. Evidence suggests that parental support and monitoring are key drivers of children's PA engagement. The purpose of this pilot study was to examine how a family-based physical activity intervention influences parents' self-efficacy for their own PA and their self-efficacy for supporting their child's activity. A sample of eight parent-preschool child dyads were recruited from Cooperative Extension offices and Head Start preschools to participate in Families Moving Together, a 6-week family physical activity intervention. Parents completed pre- and post-intervention surveys assessing barrier self-efficacy for both their own and their child's PA, as well as parent and child PA levels. Pre-post changes in self-efficacy and PA were examined using Cohen's *d* effect sizes. There was a moderate increase in parent self-efficacy for their own PA from pre-intervention (10.4 ± 3.6) to post-intervention (12.9 ± 3.6) ($d = 0.523$). Similarly, parent PA increased from pre-intervention (41.6 ± 21.7) to post-intervention (49.1 ± 23.4) ($d = 0.415$). There was an increase in parental self-efficacy for supporting their child's PA from pre-intervention (11.4 ± 2.3) to post-intervention (13.9 ± 2.9) ($d = 0.84$). Child PA levels increased from pre-intervention (440.6 ± 163.3) to post intervention (478.8 ± 278.4) ($d = 0.159$). These preliminary findings suggest that a family-based PA intervention may increase parents' barrier self-efficacy, strengthen their confidence in supporting children's activity, and improve PA levels for both parents and children. Although based on a small sample, these improvements highlight the potential of a family-centered approach to promote shared engagement and mutually reinforcing PA benefits, supporting the need for evaluation in a larger cohort.

Pratham Bhanushali

Discipline: Engineering

Authors:

#1 Soumya Srivastava

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Abstract Name: Dielectrophoretic Characterization of Algal Cells Involved in Harmful Algal Blooms (HABs)

Harmful Algal Blooms (HABs) occur when toxic algae proliferate uncontrollably in bodies of water. These algae can negatively impact public health and harm local wildlife and the surrounding environment. Typically, the algae involved release toxins into the water, reduce available oxygen, and block sunlight from reaching lower depths. *Microcystis aeruginosa* (*M. aeruginosa*) is a type of cyanobacterium most commonly associated with such blooms and can release microcystin toxins that cause respiratory and gastrointestinal inflammation, liver and kidney damage, and have been linked to the development of hepatic cancer. Another species involved in HABs is *Chlorella vulgaris* (*C. vulgaris*), is non-toxic but can still cause severe environmental stress when it blooms, leading to oxygen depletion, biomass accumulation, and reduced light availability. The purpose of this research is to characterize the dielectric signatures of these two algal species as a first step toward developing an alternative method for monitoring HABs. Current monitoring methods include molecular DNA/RNA sequencing, fluorescence in situ hybridization (FISH), sandwich hybridization assay (SHA), microscopy, chromatography, and mass spectrometry. However, these techniques are often expensive, time-consuming, and require highly skilled personnel to operate. Thus, we propose using dielectrophoresis, a method that exploits minute differences in cellular dielectric signatures via non-uniform electric fields. When combined with a microfluidic device, this approach can separate different types of algae found in HABs, providing an economical, potentially portable method for HAB detection and monitoring. We found significant, measurable differences in the dielectric properties, especially membrane and cytoplasm conductivity and permittivity, between *M. Aeruginosa* and *C. vulgaris*. These findings form the basis for simulating the proposed device, with the long-term goal of developing a real-time monitoring system for water sources.

Anuranan Bharadwaj

Discipline: Engineering

Authors:

#1 Anuranan Bharadwaj

#2 Kalkamanali Satvaldy

#3 Vincent Shi

Kalkamanali Satvaldy

Vincent Shi

Abstract Name: Turbine Aerodynamics and Performance Characterization

This research presents an integrated study combining computational modeling and experimental validation to enhance the design and performance characterization of small-scale turbine systems. The theoretical component focuses on developing an object-oriented Python code for the preliminary design and performance prediction of radial turbines, capable of generating velocity triangles, thermodynamic properties, and geometric parameters from user-defined inputs. The tool employs Whitfield-based correlations and

fundamental gas-dynamic relations to estimate exit flow parameters, work ratio, and efficiency, offering flexibility for expansion into geometry export and CAD integration. Complementing the computational model, the experimental component aims to improve the aerodynamic testing capabilities of the axial turbine cascade rig through instrumentation and analysis upgrades. A Python-Excel integrated tool was created to determine turbine blade throat openings and deviation angles using Aungier's correlations and Mach-dependent flow effects. Concurrently, a custom horizontal Kiel probe rake is being designed and fabricated to enable multi-point total pressure measurements, replacing single-point probes and improving data resolution. Together, these efforts establish a cohesive framework for turbomachinery design, analysis, and experimental validation. The combined methodology demonstrates how computational and experimental approaches can jointly advance the understanding of turbine aerodynamics and streamline future research and educational workflows in jet propulsion and power systems.

Aashika Bhat

Discipline: Biology

Authors:

#1 Jonathan Alder

#2 Xue Jiang

#3 Kelly Loughridge

Abstract Name: Repurposing Cancer-Associated Telomere-Lengthening Mutations as Therapies for Short Telomere Syndromes

Most human cells age and eventually stop dividing, but cancer cells escape this fate by sustaining telomere length and achieving unchecked growth. This immortality is driven in part by telomeres, repetitive DNA regions at the ends of chromosomes that preserve genomic integrity and set the proliferative capacity of cells. While excessively long telomeres are associated with cancer, abnormally short telomeres contribute to premature aging diseases such as idiopathic pulmonary fibrosis (IPF), highlighting telomere shortening as a driver of degenerative disorders. The POT1 and TPP1 proteins, encoded by the POT1 and ACD genes, respectively, play crucial roles in regulating telomere length by controlling telomerase access and activity. Mutations in these genes, often observed in cancers, are thought to promote telomere elongation. Interestingly, a subset of patients that are born with mutations that cause short telomeres acquire mutations in telomere lengthening genes that are thought to be a genetic rescue mechanism. By genome-editing these specific regions, we aim to investigate how these mutations can be leveraged to safely restore telomere maintenance in short telomere syndromes. Using CRISPR-Cas9 base editing, we introduced targeted mutations in K562 leukemia cells, focusing on the POT1 locus on tetraploid chromosome 7 and the ACD promoter on triploid chromosome 16 at varying allelic levels. Preliminary studies suggest that cells with edited POT1 exhibited increased telomere length, whereas ACD-edited cells showed no measurable changes in telomere maintenance, potentially due to non-specific editing. Together, these results clarify the distinct regulatory contributions of POT1 and ACD and establish a framework for using genome editing to dissect mechanisms of telomere restoration in short telomere syndromes.

Umair Bhat

Discipline: Biology

Authors:

#1 Umair Bhat

#2 Trusha Parekh

#3 Stephen Spiro

Abstract Name: Characterizing the FlhSR regulatory pathway in the soil bacterium *Paracoccus denitrificans*

Paracoccus denitrificans is a methylotrophic soil bacterium that can use one carbon compounds like methanol and formaldehyde as sources of energy and carbon. Two regulatory proteins, FlhS and FlhR, activate the expression of the genes encoding the enzymes required for metabolism of these compounds. In the absence of FlhS or FlhR, *P. denitrificans* cannot grow on C1 compounds. To further explore this two-component regulatory system, we assessed the possible role of the phosphotransferase (Hpt) protein. We hypothesized that the Hpt protein is required for carrying the activation signal from FlhS to FlhR. Secondly, we also hypothesize that FlhSR is required for the expression of two proteins involved in carbon fixation – fructose-1,6-bisphosphatase (Fbp) and a regulatory protein, CbbR. Understanding bacterial regulatory systems can help us develop technologies to identify and eliminate toxins and understand bacterial evolution. To study the Hpt protein requirement, we deleted the *hpt* gene. We assayed growth of Δhpt and $\Delta flhR$ mutants and a wild-type strain on methylotrophic substrates. These assays demonstrated that the Δhpt grows at the same rate on methanol as the wild-type. Furthermore, we tested the activity of formaldehyde dehydrogenase in lysates of cells grown on various carbon sources. Enzyme activities in extracts of the Δhpt were comparable to wild type, whereas activity was greatly diminished in the $\Delta flhR$ mutant. The growth and enzyme activity suggest that Hpt is not required for methylotrophic growth and therefore uninvolved in the FlhSR-mediated signal transduction pathway. We generated *fbp* and *cbbR* promoter-lacZ reporter fusions and introduced the constructs into *P. denitrificans*. β -galactosidase enzyme activity assays will determine whether these promoters are activated during methylotrophic and autotrophic growth. We expect strong activation in wild type during growth on C1 substrates and it will be interesting to determine whether FlhSR regulates *fbp* transcription.

Yessica Bhatnagar

Discipline: Engineering

Authors:

#1 Matthew A. Salinas

#2 Mari J. E. Domingo

#3 Lily Buchanan

Abstract Name: Evaluating Murine Uterine Cell Viability on Polyacrylamide Hydrogel Models of Varied Stiffness

Aging has been shown to increase the risk of numerous uterine conditions, such as endometriosis, infertility, and endometrial cancer. Mechanical properties such as the stiffness of the uterus's extracellular matrix (ECM) can be significantly affected by age, contributing to the development of these disorders. Uterine cells interact with the components of the ECM, such as elastic fibers and collagen, to facilitate uterine remodeling. This process is crucial for menstruation, pregnancy, and endometrial homeostasis. There are documented changes to the stiffness of the uterine ECM and the decrease in cell mechanosensitivity in fibroblast-like cells with age. However, interactions between these factors are not fully understood. As the ECM stiffness changes with age, an in vitro study of uterine cell mechanosensitivity requires an environment that reflects these modifications. We hypothesize that aged uterine cells exhibit cell adhesion and growth on polyacrylamide hydrogels of varied stiffness. To investigate the impact of age on cell mechanosensitivity during future studies, we aimed to develop and optimize a protocol for the isolation, culture, and quantification of aged murine uterine cells on soft and stiff polyacrylamide hydrogel models. Uterine tissue was collected from four aged non-pregnant female mice. Endometrial cells were isolated using an enzymatic digestion mix consisting of collagenase and trypsin-EDTA. The cells were seeded on polyacrylamide hydrogels with stiffnesses of 1 kPa and 10 kPa. Brightfield imaging capturing preliminary experiments depicted cell growth and adhesion on both cell culture flasks and soft (1 kPa) and stiff (10 kPa) polyacrylamide hydrogels. The successful isolation and culture of endometrial murine cells indicate that this optimized protocol can serve as a reproducible

framework for future biomechanical studies exploring uterine cell mechanosensitivity in aging. Understanding cellular responses to variations in ECM stiffness with age may advance knowledge of uterine remodeling and the mechanisms of reproductive aging and related disorders.

Ashish Bhatta

Discipline: Film/Photography Studies

Authors:

#1 Priya Kambli

Abstract Name: Faces Around Us: A Photographic Study of Community

Faces Around Us is a photographic series documenting the people of Truman State University through analog large format film portraits paired with short personal stories. My goal is to highlight the familiar faces we pass every day, students, faculty, and staff, and create a sense of connection by showing not just how they look, but who they are. This project is inspired by Philippe Halsman's "Jump" series, where he photographed well known figures in moments of openness. I want to create a similar sense of honesty, but through conversation rather than movement. Large format film is a slow and deliberate process that gives me time to talk with each person as I set up the camera. I will ask open ended questions such as "What is your best silly memory?" or "What is something most people do not know about you?" to help them relax and share something personal before I take their portrait. As one of the few students still using the university darkroom, I am committed to preserving traditional analog practices. I often work with older materials, including damaged cameras and expired photo paper that others have thrown away. This appreciation for film shaped my earlier project for the Student Research Conference, where I printed archived negatives onto old photo paper that had turned gray. The imperfections created a nostalgic atmosphere, and I invited viewers to take home any photograph they connected with, giving new life to materials once considered waste. Faces Around Us continues that idea of connection. This time, I want to learn about the people in this community, their memories, their humor, and their stories, and pair their portraits with short written reflections. The project shows that people are more than faces we see in passing. They are stories waiting to be known.

Mahnoor Bhatti

Discipline: Biology

Authors:

#1 Elisabedi Kontridze

#2 Michael Preston

#3 Lauren Johnson

#4 Sasha Stoddard

Abstract Name: Developing Silkworm Pupae as a Biological Resource for Alzheimer's Pathway Research

Silkworm pupae (*Bombyx mori*), which are widely consumed as a traditional food in many silk-producing countries, contain high levels of proteins, lipids, and other bioactive nutrients known to support cellular and neural health. These properties suggest that pupae-derived compounds may influence oxidative stress, cholinergic function, and other pathways relevant to neurodegenerative diseases such as Alzheimer disease. Building on this foundation, the project aims to prepare pupae from various *Bombyx mori* strains as the initial step toward testing silkworm-derived media on Alzheimer's *Drosophila melanogaster* model flies to evaluate potential improvements in memory and other neural pathways, which will be assessed using behavioral,

molecular, and oxidative assays. Previous stages of the experiment focused on controlled nurturing of three silkworm strains to produce high-quality pupae for future extraction and experimental testing. Although developmental observations across instar stages were recorded, these data primarily served to verify reliable pupal production rather than to analyze strain-specific differences. The preserved pupae will be processed into media to be administered to genetically modified Alzheimer's model flies. Future work will assess whether pupae-derived compounds modulate memory performance, oxidative stress responses, and other neurobiological pathways associated with neurodegeneration. The next phase will center on behavioral assays, including negative geotaxis and olfactory learning tests, to evaluate whether pupae-derived compounds influence memory performance or mitigate Alzheimer-related functional decline. Upcoming studies will incorporate immunohistochemical staining of Alzheimer's fly brains to assess amyloid-beta plaque accumulation, as well as antioxidant assays examining potential effects on oxidative stress pathways. By combining a reliable pupae-production pipeline with a well-validated *Drosophila* AD model, this work lays out the groundwork for identifying biologically derived compounds that may influence Alzheimer's-related mechanisms. Attendees will gain insight into early preparation steps and the translational relevance of pupae-based functional testing for discovering accessible interventions targeting neurodegenerative pathways and functional food-based therapeutics.

Arya Bhosale

Discipline: Chemistry

Authors:

- #1 Arya Bhosale
- #2 Samith Jayawardana
- #3 Collin Gabel
- #4 Aruzhan Abdikaiym
- #5 Gbolagade Olajide
- #6 Shanuk Rajapakse
- #7 Tibor Szilvasi
- #8 Brad Pierce
- #9 Gayan Wijeratne

Abstract Name: Stoichiometry Dependent Modifications in Synthetic Heme Peroxo Reactivity with Nitrosonium: A New Paradigm for Understanding Heme Mediated Nitration Chemistry

The nitric oxide dioxygenase (NOD) pathway, where heme-superoxo intermediates are proposed to mediate the oxidation of nitric oxide to regulate its levels in biological systems, represents a fundamental detoxification mechanism for reactive nitrogen oxide species. Recent work has demonstrated that synthetic heme-peroxo intermediates can stoichiometrically react with NO^+ in an isoelectronic approach to mimic NOD chemistry, leading to metastable heme peroxynitrite intermediates. This breakthrough highlights the critical importance of nitrogen oxide stoichiometry, and opens new avenues for gaining detailed understanding into heme peroxynitrite chemistry, an area poised for revolutionary advances given the challenges in direct observation of such highly reactive intermediates in biological contexts. Nonetheless, the fate of similar reactivities with excess NO^+ remains unexplored, leaving fundamental questions unanswered. Understanding these reactivities is essential because interactions of heme-oxygen intermediates with nitrogen oxides are known to be highly stoichiometry dependent, with paramount implications in human physiology and pathology. This study investigates the reactivity of synthetic heme-peroxo complexes with excess NO^+ equivalents, revealing a distinct reaction pathway that differs from the established NOD chemistry observed with stoichiometric amounts of NO^+ . When exposed to 4 equivalents of NO^+ , synthetic heme-peroxo adducts generate two stoichiometric equivalents of $\bullet\text{NO}_2$, yielding ferric heme products. Comprehensive computational and spectroscopic analyses support this transformation confirming the formation of $\bullet\text{NO}_2$, which competently drives the subsequent nitration and oxidation of biologically relevant organic substrates. These findings provide new mechanistic understanding into how excess NO^+ alters the outcome of NOD

reactivity of heme-peroxo intermediates, offering new insights into how the manifestation of nitrosative stress may vary with divergent concentrations of nitrogen oxides.

Abigail Bible

Discipline: Nursing and Public Health

Authors:

#1 Abigail Bible

#2 Ji Yoo

#3 Kristen Ravi

#4 Anujit Sarkar

Abstract Name: Exploring the Impact of Adverse Childhood Experiences (ACEs) on Hair Cortisol Levels in Children Aged 3-12: A Biomarker Approach to Early Stress Assessment

Adverse Childhood Experiences (ACEs) are negative events that occur throughout a child's life. These events are associated with prolonged activation of biological stress-response systems: the hypothalamic-pituitary-adrenal (HPA) axis and the sympathetic nervous system. ACEs have been shown to increase negative health outcomes in adults from HPA axis dysregulation leading to a suppressed immune system which could increase illness. While the effects of ACEs on HPA-axis function in adults are well studied, much less is known about how ACEs affect HPA-axis function during childhood. Our primary hypothesis was that children aged 3–12 years old with higher ACEs scores would have lower hair cortisol concentrations than children with lower ACEs scores, reflecting HPA-axis dysregulation. We recruited children aged 3-12 years for this study. ACEs were measured via the ACEs-10 questionnaire which was given at a local Knoxville pediatric clinic. Cortisol levels were measured via hair sample using quantification by ELISA. The study was approved by the UTK IRB (UTK IRB-20-06025-XP). Our findings show that higher ACE scores are linked to lower hair cortisol levels, suggesting that HPA-axis regulation may already be altered in childhood. Because hair cortisol reflects only one aspect of HPA activity, further studies using additional measures of stress hormones are needed to clarify how ACEs affect HPA-axis function.

Noah Biggers

Discipline: Business

Authors:

#1 Noah Biggers

#2 Dr. C. Catherine Chiang

#3 Dr. Robert Sheu

Abstract Name: Carbon Footprint: Decoding Greenhouse Gas Emissions' Impact on Investment

In March 2024, the U.S. Securities and Exchange Commission (SEC) finalized The Enhancement and Standardization of Climate-Related Disclosures for Investors (“the rule”). After finalizing the rule in 2024, the SEC delayed implementation and a year later stayed it following legal challenges and internal skepticism. This change in regulatory stance by the SEC leads to a critical question: does the absence of greenhouse gas (GHG) emissions disclosure in the US leave investors with an incomplete understanding of a company’s climate risk, and if so, to what extent does it influence their investment decisions? This is an important question, as in the European Union the Corporate Sustainability Reporting Directive (CSRD) mandates that all large companies disclose their emissions data. We use a two-by-three between-subjects design where investors (i.e., survey participants) choose between a high- or low-polluting hotel index fund or a 30-year bond to answer this question. Additionally, we examine whether herd behavior, which explains how individuals within groups tend to follow collective trends, is triggered among investors when index fund managers make statements in support of or against GHG disclosure impact investors’ decision making. Our study examines whether emissions data alters investment behavior, providing evidence that can either support the case for mandatory disclosure or affirm the SEC’s current stance on the rule.

Katelynn Biggs

Discipline: Music

Authors:

#1 Sarah Sarver

Abstract Name: Beyond the Prescribed Music List: Female-Composed Music for the Modern Horn Student

In recent years, there have been much-needed conversations about expanding the repertoire that students perform and study to include more underrepresented composers. In the book *Analytical Essays on Music by Women Composers* edited by Laurel Parsons and Brenda Ravenscroft, they explain that in the same way women’s rights and representation are growing in most field of work, the growth of representation of women composers is constantly growing as well. With resources like Caiti Beth McKinney’s website that catalogs horn repertoire by underrepresented composers this makes everything more accessible to every instructor. Despite these efforts to inspire change, the prescribed music lists for high school level solo and ensemble horn competitions in Texas, Arkansas, Oklahoma, and Missouri feature predominantly male composers. If we want add representation in the secondary horn curriculum there needs to be change starting within these state level competitions. In this presentation I propose excerpts by women composers that fulfill the technicalities that fit the judging criteria. would I have examined the prescribed music lists for OSSA (Oklahoma Secondary School Activities Association), ASBOA (Arkansas School Band and Orchestra Association), UIL (University Interscholastic League), and MSHSAA (Missouri State High School Activities Association). I have explored why these technical passages are so crucial for young horn players and how we can incorporate more diverse examples. My recommendations will be drawn from the works from multiple composers, including Gina Gillie, Ruth Gipps, and Adrinne Albert.

Rachel Billings

Discipline: Physics and Astronomy

Authors:

#1 Marilyn Cole

#2 Donald Rice

Abstract Name: Pitch Changes and Harmonic Variations of Oboe Reeds through Material Reduction

The purpose of this research is to quantify the relationship between reed thickness and reed pitch. By taking new reeds and methodically reducing and measuring them, this research will analyze the effect of cane being taken out of specific sections of the reed. Most professional oboists spend just as long making reeds as they do playing their instrument. Because there are so many pieces, steps, and variables, every reedmaker develops their own superstitions about what makes a good and bad reed. The goal of this research is to demystify one aspect of the reedmaking process: changing the pitch. Unfortunately for current reedmakers, there are very few studies where the effects of scraping is tested across many reeds. Very few people possess the knowledge, skills, and resources to make reeds, and those people are focused on making them for their own use and for sale. It is generally accepted that any scraping done on the reed will lower the pitch and any clipping off the top of the reed will lower the pitch, however, there is no easily accessible data demonstrating this trend. I will start by making reeds of the same materials—cane from the same company, gouge, shape, and staple. I will record the number of scrapes on each section of the reed and document them along with when each session of scraping took place. I will then record notes into an audio software, scrape cane off the reed, and record again. I will continue this process to the deterioration of the reed. I will repeat this process with a variation of the reed and for each dataset, analyze the change in frequency and harmonic series over the progression of the material reduction.

Briana Bindus

Discipline: English and Literature

Authors:

#1 Briana Bindus

Abstract Name: Humanity's Mother: Eve and Original Sin as the American Female Archetype

This research examines the biblical story of creation in Genesis 2-3 and the enduring influence of Eve—both the original sinner and humanity's mother—on American perceptions of motherhood. In the biblical narrative, Eve's consequence of pains during childbirth after yielding to the forbidden fruit's temptation has created a paradigm that frames motherhood as both a punishment and moral burden. This thesis argues that the cultural legacy of Eve's transgression positions American women as responsible for atonement through childbearing. It further analyzes how deeply embedded Evangelical narratives persist in both literary representations, including *The Awakening*, *The Handmaid's Tale*, and works by Sylvia Plath, and contemporary American political debates on reproductive rights. Through close readings of four biblical translations—the King James Version, New International Version, English Standard Version, and New Living Translation—I trace how Eve's fall and its consequences are characterized, particularly in contrast to the antithetical figure of the Virgin Mary. By connecting biblical archetypes with modern cultural discourse, this thesis shows how religious narratives are ingrained in the American consciousness and continue to constrain women's autonomy.

Jackson Bing

Discipline: Physics and Astronomy

Authors:

#1 Jackson Bing

Abstract Name: Locating Exoplanets Using Lightkurve

Lightkurve software facilitates the analysis of data collected by the Kepler and TESS space telescopes. Through the use of this software, as well as Python analysis code, we can identify potential planetary transits from periodic dips in the brightness of stars. These periodic dips can be further refined and analyzed to determine other characteristics of the system such as the approximate size of the planet and parameters of its orbit. Data is accessed from the TESS space telescope using the MAST archive, and a variety of refinement techniques in Python are used to interpret and analyze this raw data. This research expands our understanding of distant solar systems and provides an efficient method of locating unidentified exoplanets. The specific star that I am analyzing is called TIC 283722336, which has about 0.8 times the mass of the Sun and is located about 6.5 parsecs from Earth. This star has multiple known exoplanets, but this project is the first to include the most recent data from the MAST archive. With this data, I have been able to rederive and refine transit times, orbital periods, and sizes of multiple planets orbiting this star.

Brett Bippert

Discipline: Biochemistry

Authors:

#1 Dr. Thomas Leeper PhD

Skylar Hamric

Abstract Name: Structural Determination of Putative Lytic Transglycosylase Inhibitor IVY-P2 via X-Ray Crystallography

Pseudomonas aeruginosa is a pathogenic Gram-negative bacterium with the potential to cause serious illnesses, notably lung infections in cystic fibrosis patients and other infections in immunocompromised individuals. The formation of biofilms and pervasive multiple drug-resistant strains make treatment of *P. aeruginosa* with traditional antibiotics difficult. Therefore, research into potential drug targets and the development of novel treatment options are of paramount importance for controlling deadly infections. One potential drug target, IvyP2, is a homolog of lysozyme glycoside hydrolase inhibitor IvyP1 and is purported to be an inhibitor of *P. aeruginosa* lytic transglycosylases. While the structure of IvyP1 has been experimentally determined, the structure of IvyP2 has not, and there are conflicting observations about the mechanisms for molecular recognition in this family. To define the details of molecular recognition that govern specificity and potency, the structure of IvyP2 was studied to enable comparison to the structure of IvyP1. A structure of IvyP2 determined by X-ray crystallography revealed significant structural homology with notable divergence at the N-terminal alpha helix between IvyP1 and IvyP2. While prior structural work on IvyP1 suggests that the key inactivation loop is the predominant driver for molecular recognition of IvyP1 for its target, our data suggests that additional surface contacts are required. A thorough understanding of the specifics of molecular recognition within the IVY family may answer some of the persistent questions regarding peptidoglycan synthesis and remodeling.

Shreemayi Biradar

Discipline: Biology

Authors:

#1 Andrew George

Abstract Name: Modulation of $\alpha 7^*$ -nAChRs on Basal Forebrain Cholinergic Neurons by Amyloid- β Fragments in Alzheimer's Disease

Alzheimer's Disease (AD) is a progressive brain disorder that gradually destroys memory and cognition. One major contributor to early AD appears to be small soluble clusters of amyloid-beta 42 (oA β 42), which build up in the brain years before symptoms begin and are strongly linked to cognitive decline. Basal forebrain cholinergic neurons (BFCNs), which help regulate memory circuits, are especially sensitive to these toxic peptides. These neurons rely on $\alpha 7$ -containing nicotinic acetylcholine receptors ($\alpha 7^*$ -nAChRs), which oA β 42 can abnormally activate. Interestingly, shorter naturally occurring N-terminal A β fragments (A β 1–15/16) and their core sequence (A β 10–15) may instead have protective/regulatory effects on these same receptors. The purpose of the study was to determine the effects of oA β 42, the N-A β fragment, and the shorter N-A β core peptide on the activity of $\alpha 7^*$ -nAChR expressed by BFCNs, which are the cells known to degenerate early in the course of AD. To perform these studies, we prepared ex vivo acute brain slices from ChAT-eGFP transgenic mice and identified BFCNs in the medial septal diagonal band (MSDB). We then used cell-attached single-channel electrophysiology to measure the actions of the peptides on $\alpha 7^*$ -nAChR channel activity. The preliminary results in the current study indicate that both N-A β fragment and N-A β core peptide evoke single-channel openings of $\alpha 7^*$ -nAChRs on MSDB BFCNs. Importantly, distinct biophysical properties such as open-channel burst duration and single-channel open probability (P open) are enhanced when combined with PNU-120596, a selective positive allosteric modulator of $\alpha 7^*$ -nAChRs. These results suggest that the two naturally occurring A β -derived peptides directly interact with $\alpha 7^*$ -nAChRs on BFCNs. Determining how these naturally occurring fragments differentially affect the activity of vulnerable BFCNs may reveal new therapeutic targets to counteract the harmful influence of oA β 42 and ultimately help slow or even reverse cognitive decline in individuals with AD.

Nicholas Bird

Discipline: Biology

Authors:

#1 Karen Lant

Abstract Name: Comparing the Effects of $\Delta 9$ -THC and $\Delta 8$ -THC in *C. elegans* Lifespan and Chemotaxis

The effect of cannabinoids on model-organism longevity is a rapidly emerging research area. In this study, we use *Caenorhabditis elegans*, a soil-dwelling nematode and cherished model organism, prized for its inexpensive husbandry and short life cycle, to test the effect of cannabinoid exposure on lifespan and sensory behavior. We expose adult worms to specific concentrations of water-soluble tetrahydrocannabinol-9 (THC-9), and a common analog tetrahydrocannabinol-8 (THC-8) environmentally in order to test each compound's effect on lifespan. Concurrently, we tested *C. elegans*' propensity to chemotactically favor environmental cannabinoids when presented a control option of pure water via a standard chemotaxis assay protocol with a Sodium azide reagent to paralyze the worms in defined experimental zones. A growing body of experimental data supports the idea that compounds like cannabidiol, a cannabinoid that is widely sold as an over-the-

counter supplement, has a measurable effect on lifespan in *C. elegans* worms. We expand the scope of this research by selecting a different set of phytocannabinoids produced by the cannabis plant in THC-9 and THC-8 and comparing the effects of each. While the data collection phase is complete, analysis and compiling is still a work in progress. We expect to see a few notable and quantifiable effects on *C. elegans* lifespan and chemotactic behavior once this process has finished. Our aim is to systematize the use of *C. elegans* as a low-cost, early-stage screening apparatus for testing compounds for their longevity promoting, or inhibiting effects.

Arnav Biruduraju

Discipline: Engineering

Authors:

#1 Arnav Biruduraju

#2 Rohan Prabhakar

#3 Ayati Vyas

Rohan Prabhakar

Ayati Vyas

Abstract Name: Comparative Performance of Li-Ion 4680 and LiFePO₄ Polymer Cell Batteries in Subzero Freezing Temperatures

Lithium-ion batteries are notorious for their performance degradation at subzero temperatures, where reduced ionic conductivity and increased internal resistance lead to a severe decline in capacity and power. In previous NASA-supported research, we proposed and validated a novel technique to overcome this limitation by encapsulating the battery in a vacuum chamber. This passive thermal management method significantly slows a battery's cooling rate by eliminating conductive and convective heat losses. Initial experiments were conducted on a LiFePO₄ polymer cell. Compared with atmospheric conditions, it took 25% longer to reach -15°C and 75% longer to reach -20°C when cooled from 20°C to -20°C in a vacuum. This thermal buffering was directly associated with lower performance loss in discharge capacity tests. This research is now being extended to a 4680 cylindrical lithium-ion battery, which presents an interesting comparison. The 4680 cell differs significantly from the more stable, flat LiFePO₄ cell in its cylindrical shape (46 x 80 mm), its smaller surface-area-to-volume ratio, and its high-nickel cathode chemistry. The working protocol involves placing the 4680 battery in a custom vacuum chamber and subjecting it to sub-zero environments by inserting it in a freezer along with its accessories like thermocouples, electrical cables, and vacuum pipes to set pressure inside the vacuum chamber. Key variables monitored include battery surface temperature, ambient temperature, vacuum cell pressure, and discharge IV characteristics. Work is still in progress, but preliminary results are promising and align with predictions. It is anticipated that the 4680 battery will demonstrate superior thermal retention due to its compact size and internal chemistry, resulting in even better performance in cold conditions. A full comparative analysis of the thermal and electrical performance for both battery types will be presented, concluding with insights into the practicality of this technique and outlining future work for real-world implementation.

Thomas Bischoff

Discipline: Interdisciplinary

Authors:

#1 Amy Donley

Abstract Name: Analysis of Psychedelics and Sociopolitical Stigmas

Psychedelic-assisted psychotherapy (PAP) is under investigative research to determine whether the use of psychedelic drugs and psychotherapy, within a professional setting, results in improvements for those with mental health disorders like post-traumatic stress disorder (PTSD) or treatment-resistant depression. Current studies have shown promise in PAP; however, the negative sociocultural stigmatization of psychedelic drugs is also apparent. These views, which are reflected in historical analysis, have been shown to limit research potential and contribute negatively to the scientific inquiry of psychedelics. This study expands the current knowledge of the public's perceptions of PAP/psychedelics. Via an online survey, data from 139 respondents have been analyzed to determine how various perspectives and knowledge towards psychedelics impact one's own attitudes toward PAP. Some results concur with previous studies: college students generally accept PAP (82.8%); there is a statistically significant relationship between one's knowledge of identifying a psychedelic and having a more positive attitude towards PAP. These results suggest that more education on psychedelics with university students may work to decrease the stigmatization of PAP. Further data collection of various sample sizes to garner a greater understanding of the public's attitudes may aid in assisting the growing interest and possible assimilation of PAP for the treatment of mental health disorders. This study has contributed to that understanding by employing historical analysis to examine the underpinnings of the stigma itself.

Aman Bista

Discipline: Computer Science

Authors:
#1 Rushit Dave

Abstract Name: The Human Signature: Facial and Behavioral Biometrics in Cybersecurity

Trust in architecture remains questionable as all security systems have advanced significantly. Traditional popular authentication models, such as passwords and tokens, which are still in use in 2025, are increasingly vulnerable. This research introduces "The Human Signature," a multimodal mechanism in cybersecurity that bridges the gap between biological identity and digital verification. Additionally, the goal is to measure and analyze these mechanisms in this diverse world and explore their potential for future applications. Moreover, the prominent approaches include facial and behavioral biometrics; these two modalities combined can be called a human signature — a composite of innate and learned traits that are extremely difficult to counterfeit. However, it is a study about a mechanism that executes liveness detection, ensuring the user is not falsifying their information, and identifies anomalies that don't fit the normal pattern. In addition, the blend of two biometrics: facial recognition (micro-expressions, gaze tracking) with behavioral analytics (keystroke dynamics and interaction patterns) uses advanced image analysis and machine learning to develop adaptive user profiling that continuously verifies legitimacy rather than doing so instantaneously. Furthermore, the methodologies include capturing real-time footage to recognize liveliness and review subconscious human behavior traits that are difficult to imitate. According to the preliminary findings, hybrid biometric mechanisms outperform single-modality verification by reducing the False Acceptance Rate (FAR) and False Rejection Rate (FRR), while enabling an uninterrupted authentication process. The research concludes that the future of cybersecurity favors an adaptive system that perceives the evolving behavior of a user and can also identify them by facial features, moving away from rigid barriers.

Luke Black

Discipline: Interdisciplinary

Authors:

#1 Luke Black

Abstract Name: Perspectives of AI Analytics in Professional Sports: Contracts, In-Game Strategy, and Health

Since the first Olympic Games in 776 B.C.E., human judgment has guided athletic strategy and decision making. In today's sports world, however, artificial intelligence (AI) and data analytics are increasingly reshaping these processes. This shift places many viewers and decision-makers in a challenging position, uncertain whether AI will truly enhance team performance or if relying on human judgment remains the better path. This development led to questions about how AI impacts viewers' trust and opinions regarding sports decisions. This research addresses Americans' views on to what extent artificial intelligence should be integrated into decision-making processes within the sports industry. To this end, I designed a survey with questions pertaining to AI in making sports decisions related to contracts, in-game strategy, and athlete health. The results demonstrate that the decision to support the use of AI in decision making in sports differs with the age of the respondents. Specifically, the younger population highly supports the role of AI in decision making more than the older population. These findings suggest that, consistent with trends in other industries, AI integration in professional sports is likely to expand in the coming years, particularly as younger, more AI-supportive generations become a larger share of the fan base and workforce.

Dominique Blair

Discipline: Engineering

Authors:

#1 Michael Lyons

#2 Connor Richeson

#3 Thomas Roper

Abstract Name: Development of a Continuous Flow Synthesis of X-Ray Imaging Contrast Agent: Iohexol

Iohexol is a non-ionic, iodinated, contrast dye administered intravenously for medical diagnostics through X-Ray imaging and CT scanning. In 2024, the global market of iohexol was valued at \$1.344 billion. With this market being susceptible to production shortages, as evident during the COVID-19 pandemic, the diversification of production processes is advantageous. Traditional iohexol synthetic routes rely on batch processes. Batch chemistry production processes are often limited by lengthy production times, inconsistent yields, and the generation of undesired waste. Continuous flow synthetic approaches mitigate these limitations by allowing greater control over reaction parameters, such as temperature and mixing, leading to faster production times with more consistent products and efficient processes. Additionally, continuous flow chemistry allows for greater heat and mass transfer, enabling high temperature high-pressure chemistry with improved safety. Process analytical technology can also be easily implemented into continuous processes for automation control and quality by design pharmaceutical manufacturing. Iohexol can be afforded in a three-step process involving a one-pot Ullmann-type cross-coupling and transamination, followed by iodination and acylation. A continuous flow iohexol production process will be developed by screening batch conditions for each step to identify conditions for further screening in continuous flow chemistry. Thus far, screening of the one-pot Ullmann-type cross-coupling and transamination with excess copper catalysts to simulate a packed bed reactor has shown promise for the transition to a flow system. The process development of an iohexol continuous flow synthesis has the potential to provide a more scalable, efficient, and environmentally friendly pathway, leading to greater accessibility of the imaging agent in the clinic.

Dominique Blair

Discipline: Engineering

Authors:

#1 Dominique Blair

#2 Michael Friedman

#3 Henry Donahue

Abstract Name: The Effects of Genetics on the Bone's Response to Immobilization

Mechanical unloading from disuse decreases bone mass, increasing the risk of fracture. Our lab has shown that genetic variation influences the magnitude of bone loss from disuse in inbred male mice. To further elucidate the effects of genetic variation, we used male and female mice of the diversity outbred (DO) mouse population. DO mice were developed by cross-breeding eight highly genetically diverse inbred founder strains. We hypothesized that genetic variation would affect the magnitude of bone loss from disuse via single-limb immobilization. Ten female and ten male 16-week-old DO mice had the right hind limb immobilized in a cast for 3 weeks, and then the mice were sacrificed. Femurs were scanned by in vivo micro-CT at baseline on day 1 and three weeks later, on day 22. All data was analyzed as the percent change from baseline to final scans. There was a significant decrease of mid-diaphyseal cortical Periosteal Perimeter/Total Bone Perimeter (B.Pm/T.Pm) for both sexes. Male mice had significant decreases of metaphyseal Bone Volume (BV), Bone Volume/Total Volume (BV/TV), and Trabecular Number (Tb.N), while female mice experienced significant increases in Tissue Mineral Density (TMD). Both sexes experienced increases in metaphyseal Trabecular Separation (Tb.Sp). Distal femur epiphyseal bone was more negatively affected by immobilization: BV, BV/TV, Trabecular Thickness (Tb.Th), Tb.N, Tb.Sp, and TMD all had significant differences due to immobilization. Male mice experienced a greater increase in TMD and Tb.Sp, than the females; females experienced a greater decrease in BV, BV/TV, Tb.Th, and Tb.N than the males. All mice had bone loss due to immobilization, regardless of genetics. Disuse leads to an increased risk of knee injury due to bone loss in the distal femur epiphysis.

Bailey Blair

Discipline: Architecture, Construction Management, and Interior Design

Authors:

Abstract Name: Living Independently with Glaucoma

Designing a residential environment for individuals with visual impairments requires a clear understanding of their spatial, safety, and navigational needs. An estimated 39 million people are blind, and around 246 million have moderate to severe visual impairments. Glaucoma is a progressive condition that gradually reduces peripheral vision due to irreversible damage to the optic nerve. Glaucoma most commonly affects individuals over 60. Although treatment can slow the progression of glaucoma, lost vision cannot be restored. This project aims to design a single-family home that accommodates a resident living with glaucoma. The project incorporates insights from case studies, literature reviews, and established accessibility and low-vision design guidelines, including ADA standards, appropriate for aging residents who want to age in place. These findings guided the development of the project, a residence that prioritizes wayfinding, visual contrast, and spatial clarity. Wainscoting in the living room provides tactile guidance throughout the home, while contrasting cabinet colors in the kitchen enhance visual differentiation. Door frames were intentionally designed in darker shades than the doors themselves to improve depth perception and increase contrast for individuals with reduced peripheral vision. The home's primary corridor forms a U-shaped pathway that naturally guides residents through the space and reduces disorientation. Additional rooms also incorporate

distinct color schemes to promote independence and safe navigation. Passageways and corridors are kept open and unobstructed to enhance visibility and spatial awareness for users with limited peripheral vision, improving overall safety. As a result, the project demonstrates how evidence-based interior design strategies can improve safety, navigation, and quality of life for individuals with glaucoma and other visual impairments. By focusing on accessibility and user experience, the home meets the users specific needs while fostering independence and safety in daily life.

Nicholas Blair

Discipline: Philosophy, Ethics, and Religious Studies

Authors:

Abstract Name: The Crisis of Modern Sport; Toward a Phenomenology of the Athletic

What does it mean to be an athlete? Philosophers of sport have largely focused on either the formal structure of games or the aesthetic unity of the skilled body in action, yet the concept of athleticism has been underdeveloped, often used to denote any participant in sport. This work develops a phenomenological conception of athletics and the athlete, as such. I argue that athletic pursuit puts our body out of its everyday functionality, revealing what is normally lost in the mundane. In this sense, athletics serves as a horizon for the disclosure of the body. With this understanding, I consider the ways in which this path of self discovery is put at risk by contemporary sporting structures. The tendency for commercialized sport to engage in its own simulation (televised events, sports video games, and the promulgation of sports betting) have made sports leagues billions of dollars, but misunderstand the purpose of sport. By returning to its phenomenological essence we arrive at a deeper appreciation for sport, and also a framework for an ethics of athletic pursuit.

Cynthia Blaise

Discipline: Psychology

Authors:

#1 Cynthia Blaise

#2 Jennifer Joy-Gaba

Abstract Name: Voting Choice as a Predictor in County Level Sexual Orientation and Gender Motivated Hate Crimes across the United States: A Latent Growth Modeling Approach

Animus towards LGBTQ (Lesbian, Gay, Bisexual, Transgender, and Queer) individuals remains high, exemplified through the growing incidence of hate crimes motivated by a victim's perceived LGBTQ identity. The increase in hate crime incidents may seem incongruous given recent polling data suggesting that attitudes towards the LGBTQ community are growing more positive year over year rather than negative. Recent work has proposed the importance of political factors influencing hate crime incidence in the United States, with jumps in occurrences loosely associated with major political events. Thus, my research seeks to clarify how one such event, the United States's 2016 presidential election, may relate to hate crime incidence for the following four years post-election. To answer my research question, I will assess whether hate crime incidence motivated by LGBTQ identities at a county level differs based on voting results in the 2016 election, such that Republican voting Republican counties have a higher incidence than Democratic counties over a four-year time span. My main analyses will consist of a mixed-effects ANOVA to quantify mean differences in incidence at a group level (Democratic county compared to Republican county) and in mean

differences over each time point. The second analysis will consist of a Latent Growth Model capturing intra-county changes in hate crime incidence across 16 timepoints from county election results.

Jasmine Blake

Discipline: Psychology

Authors:

#1 Jeffrey Berman

Abstract Name: Perceptions of Therapists Identified as AI Generated or Human

As artificial intelligence (AI) continues to advance, its integration into mental healthcare offers both promise and uncertainty. Although digital therapists such as Woebot and Wysa have demonstrated effectiveness in reducing symptoms of anxiety and depression, skepticism remains regarding the ability of AI to replicate the empathy and authenticity of traditional human practitioners. Previous research has shown that text-based digital therapists are perceived as warmer and more trustworthy when the user is unaware that the therapist is AI generated. This study used a randomized controlled design to examine whether perceptions of empathy, credibility, and expected treatment outcome differ based on whether a therapist is described as AI generated or human. In the study, participants (N=300) obtained from an online recruitment platform listened to two therapist audio recordings identical in content and both from a human therapist. However, in one of these recordings the therapist was identified as AI generated; in the other recording the therapist was identified as human. Half the participants heard recordings of male therapists and the other half of female therapists. After listening to each recording, participants evaluated therapist empathy, perceived credibility of treatment, and expectations concerning the success of the treatment. Analysis using a therapist identity × therapist sex analysis of variance revealed that participants judged therapists labeled as human more positively across all measures. Although the results did not vary reliably as a function of therapist sex, prior therapy experiences moderated perceptions when considered alongside therapist sex. These findings suggest that the belief that a therapist is AI generated results in less favorable perceptions even when actual therapy content is identical, revealing ongoing challenges for the integration of artificial intelligence in the field of psychotherapy. The study also highlights the need for continued exploration of factors shaping acceptance and trust in AI-based mental healthcare tools.

Hannah Blake

Discipline: Engineering

Authors:

#1 Dr. Chris Headley

#2 Elliott Rheault

#3 Espen Lunden

#4 Isaac Tucker

#5 Dr. Bradley Davis

Abstract Name: Spectral Warrior: Learning RF Through Gamification

Radio frequency (RF) concepts such as wireless transmission, antenna propagation, and propagation effects are ubiquitous in daily life but are inherently hard to conceptualize, due to their complexity and that they are invisible to the naked eye. The Spectral Warrior concept, built in partnership with the Naval Surface Warfare Center Dahlgren Division (NSWCDD), leverages state-of-the-art virtual reality hardware and software tools

in order to make the invisible, visible. Beyond simply visualizing RF concepts, Spectral Warrior also gamifies relevant concepts in order to engage users more effectively to learn how these concepts are applied in real-world applications. An exemplar of this concept is the developed electric warfare (EW) search and destroy game. Built in Unreal Engine 5.5.4, this scenario has the user interfacing with a dynamic linear phased array, which they must utilize to locate and terminate incoming missiles before impacting the vessel they are stationed on. Through learning to play the game effectively, the user sees the impact on the RF propagation based on the choices they make, and learns interactively how phased arrays work and are leveraged in mission critical applications.

Harmony Blake

Discipline: English and Literature

Authors:
Autumn Estes

Abstract Name: Let the Students Design: Building an AI Critical Literacy Course with and For Students

Note: The lead faculty mentor is proposing these presentations before students conduct research (Jan-May), due to the loss of funding in July 2026. Four student presenters and three faculty members in an English Department plan to attend NCUR. We propose a round-table or two presentations with two student presenters each. The students will show how collaborative, student-centered research and design can foster critical thinking, technological fluency, and equitable access to AI education while offering a model for integrating AI critical literacy into general education writing programs. The rapid spread of AI across communication and composing technologies has made it harder for faculty and students to maintain integrity and autonomy as writers. In response, faculty mentors and undergraduate researchers are collaborating to develop AI critical literacy. Student researchers will help formalize a relevant, accessible, evidence-based course and address our guiding question: How can collaboration between student research assistants and faculty mentors inform the design of an ethical AI critical literacy course that engages students while addressing evolving debates about machine learning and authorship? This project is grounded in work on digital ethics, critical information literacy, and student-centered curriculum design, particularly in HSIs where first-generation and Hispanic students often lack equitable access to emerging technologies. Students will present selections from their mixed-methods approach that incorporate the following: surveys and focus groups, analysis of existing AI literacy curricula, experimental piloting of assignments, and their evaluation of AI outputs for bias, accuracy, and rhetorical appropriateness. The presentations will demonstrate how student-centered design can foster critical thinking, technological fluency, and equitable access to AI education. Expected results include a modular course proposal with units on ethics, authorship, and algorithmic bias; a digital portfolio of adaptable materials; and recommendations for inclusive pedagogies that foreground student voices in course design.

Gladys Blanco Choque

Discipline: Business

Authors:
#1 Dhruva Banjade

Abstract Name: The Role of Blockchain in Finance: Enhancing Fraud Prevention and Data Integrity

Fraud and data manipulation in finance and accounting remain global challenges that cost organizations billions each year. As industries strive for transparency and trust, blockchain technology offers a

revolutionary approach to strengthening financial integrity. This research explores how blockchain's decentralized and tamper-proof ledger can prevent fraud and improve accuracy in financial reporting. By recording transactions across multiple nodes, blockchain eliminates the possibility of altering data without network consensus, making every financial record verifiable and permanent. The study examines how key features such as triple-entry accounting, smart contracts, and immutable transaction records can address weaknesses in traditional systems. Real-world examples, including implementations by JPMorgan Chase and Deloitte, demonstrate how blockchain enhances auditing, reduces intermediary costs, and enables real-time verification. Moreover, the integration of artificial intelligence with blockchain has the potential to detect irregularities and prevent financial crimes before they occur. While the technology faces regulatory and scalability challenges, its promise to create a transparent and fraud-resistant financial ecosystem positions blockchain as a transformative force in modern finance. This project invites readers and conference participants to envision a future where financial trust is built not on paper trails or intermediaries, but on secure, self-verifying digital systems designed to protect both institutions and individuals.

Cambria Blanton

Discipline: Biology

Authors:

#1 Cambria Blanton

#2 Caden Helona

#3 Ashlyn Kennedy

#4 Annie Mowry

#5 Traesha Robertson

#6 Jacqueline Dove

#7 Stephanie Lockwood

#8 Naomi Hammond

#9 Stephanie Randell

Abstract Name: A Longitudinal Study of Macroorganism Associations and Health Status of Demospongiae Species in Roatán, Honduras

Sponges are some of the most prevalent and vital members within coral reefs. Some poriferan species possess a spongocoel and large protuberances, which provide refuge for marine organisms. Species such as *Niphates digitalis*, *Callyspongia plicifera*, and *Xestospongia muta* are notable for these features. Associations between sponges and macroorganisms are generally incidental or opportunistic. However, interactions between brittle stars and poriferans can be mutualistic to parasitic. The association between macroorganisms and sponges and sponge health is unknown. This study examined macroorganism associations and health status for Demospongiae species in Roatán, Honduras between May 2024 and 2025. In 2024, *X. muta* displayed noteworthy macroorganism diversity, with one individual harboring ~130 fish (92.9%). Of note were seven juvenile threespot damselfish (*Stegastes planifrons*), a species typically associated with staghorn corals. Over 60% were algae fouled or diseased. *N. digitalis* were predominantly healthy (75%), but brittle star presence correlated with lesions in 61.9% of hosts. All *C. plicifera* were found healthy and unassociated with macroorganisms. In 2025, *X. muta* health status increased, with 51.8% being healthy. *N. digitalis* was consistent in health (90%), while *C. plicifera* showed increased stress with only 50% being healthy. Across both years, *X. muta* exhibited the greatest number of macroorganism associations (311 fish, 8 crustaceans). Five juvenile threespot damselfish were observed with *X. muta* in 2025. *N. digitalis* primarily hosted brittle stars (60%) and crustaceans (7%), and *C. plicifera* had minimal associations. This research serves as a foundation for future studies on sponge health and microorganism associations.

Ella Blau

Discipline: Biology

Authors:

#1 Joel Rodwell-Bullock

#2 Gail V.W. Johnson

Abstract Name: BAG3 Modulates Clathrin-Mediated Endocytosis and Tau Uptake in Astrocytes

One of the major hallmarks of Alzheimer's disease (AD) is the abnormal accumulation of the protein tau. Tau becomes abnormal and dysfunctional when it is hyperphosphorylated, leading to the polymerization of its natively unfolded structure. In both healthy and pathological neurons, dysfunctional tau can be released to protect the neuron. In healthy individuals, pathological tau that is released by neurons and taken up by astrocytes is trafficked to the endosome-lysosome complex, where it is degraded and thus fully removed from the extracellular space. Previous studies have determined that cells affected by AD have lower levels of the protein quality control factor Bcl-2-associated anthanogene 3 (BAG3) in both neurons and astrocytes when compared to wild-type (WT) cells. Additionally, proteomic analyses of proteins co-precipitating with BAG3 showed numerous proteins involved in clathrin-mediated endocytosis (CME) and the endosome-lysosome pathway, including clathrin heavy chain, dynamin, and subunits of the AP2 complex. To extend these findings, we used a proximity ligation assay (PLA) to observe that there is an association between BAG3 and clathrin (<40nm) and that when BAG3 is depleted, there is also a decrease in the interactions between clathrin and AP2. Using flow cytometry, we demonstrated the importance of BAG3 in this endocytosis pathway, as BAG3-depleted astrocytes endocytose significantly less tau than control astrocytes. We have also identified trafficking differences between control and BAG3-depleted astrocytes. We hypothesize that with lower expression of BAG3, astrocytes are not able to protect neuronal health due to a compromised ability to take up and traffic tau that had been released by neurons. This would increase the likelihood of the uptake of pathological tau by other neurons, resulting in the propagation of tau pathology and progression of the neurodegenerative characteristics of the disease.

Kate Bleakley

Discipline: Psychology

Authors:

#1 Kate Bleakley

#2 Jennifer Ratcliff

Abstract Name: Impact of Clothing on Perceiving Masculinity and Sexual Orientation

Extant research suggests that judgments of sexual orientation based on brief nonverbal interactions are more accurate than chance. Those who identify as heterosexual tend to dress in more gender-stereotypical attire than those who identify as a gay man or lesbian, and observers use this to infer sexual orientation. Research also shows that appearance can be used to infer personality characteristics. In this study, participants were randomly assigned to view one of four possible target photos in a 2(Target Gender: Man vs. Woman) X 2(Attire: Masculine vs. Feminine) design, and then they rated the target individual on perceived level of masculinity and sexual orientation. Participants were expected to perceive targets in gender-typical attire as more likely to be heterosexual compared to targets in gender-atypical attire, and rate targets in masculine attire as more masculine. Results indicated that targets dressed in masculine attire were perceived as more likely to be heterosexual. Male targets were perceived as more masculine, and this was moderated by the type of attire. The results were driven by the male targets, the perceived differences in the female targets were negligible. Results supported predictions, but highlighted the need for further research on perceived personality traits in females.

Alexander Blevins

KY - University of Kentucky

Discipline: Engineering

Authors:

#1 Philip Lee

Abstract Name: Engineering Ferroelectric Field-Effect Transistors for Artificial Intelligence-Enhanced Edge Computing Systems

Given the importance of memory efficiency in Artificial Intelligence (AI), reducing the latency between computation and memory is imperative for the demands of reliable, high-performance non-volatile memories in AI. The current mainstream computing devices are built on the Von Neumann architecture, but other architecture can reduce delays and improve efficiency. Computer-in-memory architecture addresses these issues by enabling memory to be accessed closer to the source of computation. As the semiconductor industry pushes toward energy-constrained edge computing and embedded memory integration, ferroelectric field-effect transistors have emerged as a promising edge-computing candidate due to their scalability, fast switching, and low-power operation. To further improve device designs, using interface materials that can mediate trap states at the interface and bandgap engineering allows for a larger memory window for read operations. The memory window is crucial because it minimizes reading errors, thereby improving overall performance and reliability. I developed compact models using interface materials, including HfO₂, ZrO₂, Al₂O₃, and La₂O₃ to evaluate the impact of ferroelectric material parameters on remanent polarization (Pr) and coercive field (Ec) using Synopsys Technology Computer-Aided Design simulation and modeling tools. Based on physical parameters from experimental devices, I developed and calibrated physics-based models to capture ferroelectric hysteresis and nonlinear dielectric behavior. Additionally, I will use these models to investigate the mechanism of charge trapping kinetics and field-dependent polarization fatigue, enabling simulations of device behavior under various conditions. Ultimately, this research aims to deliver a set of experimentally validated ferroelectric devices capable of reliable low-voltage operation, suitable for integration into scalable, reliable embedded hardware platforms. Beyond device optimization, the work will contribute to a deeper understanding of interface-dependent ferroelectric switching, charge trapping dynamics, and voltage scaling. These findings will inform design strategies for next-generation embedded memory, compute-in-memory, and AI hardware platforms, where energy efficiency and integration density are paramount.

Katherine Blom

Discipline: Computer Science

Authors:

#1 Matthew Yanez

#2 Benjamin Larrieu

#3 Kate Blom

Benjamin Larrieu

Matthew Yanez

Abstract Name: Vulnerability Assessment of Smart-Grid SCADA Systems

Protecting U.S. critical infrastructure is a national security imperative. However, many operational

technology (OT) environments still run legacy, geographically dispersed SCADA systems. Catastrophic impacts could be realized if those systems' weaknesses were to be exploited. Therefore, there is an urgent need to provide the ability to test both hardware and software in realistic environments. The research team developed a SCADA smart-grid testbed prototype that mirrors real-world OT network configurations and equipment, enabling controlled analysis of high-value attack surfaces. This is the result of phase 1 in a larger effort to build next generation cyber-physical modeling simulating multi-domain exploitation, including integration with Large Language Models (LLM) and Extended Reality (XR) User Interfacing (UI). The system architecture consists of one SEL-2411 field-interface device and two SEL-3505 Real-Time Automation Controllers (RTAC) configured to represent Level 0–2 interactions within a power-system environment. This phase seeks to identify the operational attributes and communication behaviors—timing intervals, tag-state transitions, dependency relationships, and protocol-specific message structures—that will be most valuable for comprehensive evaluation in later stages. In addition to behavioral baselining, the research design team incorporates protocol-level analysis and ICS red-teaming methodologies. Planned protocol testing will examine the operational characteristics of common SEL and utility communication standards, such as DNP3, Modbus, and IEC 61850, with an emphasis on message timing, error handling, and field-device interaction patterns. The testbed will also be structured to support controlled red-team activities intended to evaluate the robustness of logic execution, field-device interactions, and supervisory dataflows against realistic adversarial techniques. A further component of the project involves integration with embedded Linux environments used for supervisory control and data aggregation. This includes designing mechanisms for logging, data extraction, and real-time monitoring using Linux-based hosts coexisting with the SEL hardware stack.

Tara Blue

Discipline: Biology

Authors:

#1 Jordan Metzgar

Abstract Name: Forecasting Future Foraging: Comparing Flowering Strategies of Related Species in a Changing Climate

Appalachia is a foraging hotspot home to many plants with culinary and medicinal uses, but climate change could cause range shifts that impact access to these native plants. Throughout history, Appalachian foragers have relied on over 170 native plant species, from winemaking with muscadine grapes to treating headaches with American ginseng. We will create Ecological Niche Models to study the impact of climate change on native plant accessibility. This will illustrate possible habitat range shifts of significant Appalachian plants by combining reported species occurrence data with predicted climate conditions based on future greenhouse gas emissions. We will use the Global Biodiversity Information Facility website to compile species occurrence data from iNaturalist, museums, and herbaria. Ecological Niche Models will be constructed using a R script that employs the dismo package to combine climate conditions with reported species occurrences and calculates suitable habitat in eastern North America. We will model habitat range shifts resulting from future climate conditions predicted in the Representative Concentration Pathways (RCPs), then map species occurrence probability using QGIS to illustrate shifts in habitat ranges across the eastern United States. Range shifts may hinder forager access to native plant species and cause a decrease in edible plant and folk medicine traditions. We found no correlation between flowering times and resistance to climate change with the eight species examined thus far. We will test species that are more closely related and have similar morphology to better understand impacts of shared lineage on resilience to a changing climate, allowing us to predict which native plants and foraging traditions are most at risk.

John Blum

Discipline: Biology

Authors:

#1 JT BLlum

Abstract Name: Developing an enzymatic biomarker for cyanotoxin exposure in the round goby (*Neogobius melanostomus*)

The presence of harmful algal blooms (HABs) in the Lake Erie watershed has repercussions for humans and wildlife. Due to the negative health effects of HAB cyanotoxins, local waterbodies are frequently sampled to prevent human exposure, but this does not account for impacts on aquatic wildlife. One way to estimate this is by measuring a trait that is directly affected by exposure, also known as a biomarker. Because exposure to cyanotoxins is known to affect the liver, the quantification of detoxifying liver enzymes like glutathione S transferase (GST) could be a biomarker. The objective of this project is to determine if GST activity is a good biomarker for cyanotoxin exposure in the invasive round goby (*Neogobius melanostomus*). Round gobies will be collected from six different sites in Lake Erie and its tributaries as well as an additional site at an inland lake (LeBoeuf Lake). The activity of GST from homogenized liver tissue will be measured in vitro using a plate reader. If GST activity is a good biomarker for cyanotoxin exposure, then these measurements should correlate with the reported HAB levels across the sites. This research is an important step toward understanding the consequences of HABs in affected waterbodies.

Daniel Boateng

Discipline: Nursing and Public Health

Authors:

Abstract Name: Nursing Shortage Affects Quality of Care

Abstract Background and Significance: For many years, the shortage of nurses has been a problem around the world. Most healthcare facilities are facing staff shortages which lead to higher patient-to-nurse ratios. This situation seriously affects the quality-of-care patients receive. **Aim:** The goal of this project is to emphasize how important it is to review nurse-to-patient ratio to determine interventions to help alleviate or minimize the impact of the problem. Dorothy Orem's Self-Care Deficit Theory provides the theoretical foundation for this research, highlighting the essential role nurses play when patients are unable to meet their own self-care needs. **Methods:** This cross-sectional study combines both qualitative and quantitative methodologies and to identify the relationship and patient outcomes. Quantitative data will be gathered through structured surveys measuring nurse workload, burnout, and perceived quality of care. In contrast, qualitative data from interviews will provide insight into nurses', patients', and administrators' lived experiences regarding staffing challenges. Ethical consideration, including confidentiality, anonymity, and informed consent, will guide all data collection processes. **Conclusion:** The findings of this project will contribute to policy development and workforce planning strategies to mitigate nursing shortages and enhance the quality of patient care. It will inform healthcare leaders, policymakers, and professional organizations about the urgent need to implement interventions that address staffing shortages, strengthen nurse retention, and enhance the overall quality of patient care. **Keywords:** 'Nursing Shortages', 'Patient Care', 'Patient Safety', 'Nurses burnout and stress', and 'Affecting Quality of Care'.

Trace Boggs

Discipline: Mathematics

Authors:

#1 Ioannis K. Argyros

#2 Dillan Gibbons

#3 Kaila Keithley

#4 Landon Holley

Abstract Name: Developments on the Local Convergence of Newton-Like Methods in Normed Linear Spaces with Applications to Motion Problems

Numerous problems from computational sciences are converted using mathematical modeling to solving an equation iteratively. Newton's method (NM) and its variants are the most popular methods for generating a sequence approximating a solution of a nonlinear equation defined on the real line or more abstract domains. However, the convergence conditions in the literature may not be satisfied. So, the convergence cannot be assured although the method converges. In this project, we extend the applicability of (NM) by providing weaker convergence conditions than before. Our approach allows for a wider choice of initial points and requires fewer iterations to reach a desired error tolerance. Applications are provided from diverse disciplines where the new results are compared favorably with earlier ones.

Hillary Bogyah

Discipline: Health and Human Development

Authors:

Abstract Name: A Closer Look at Substance Use: Understanding Abstinence in Social Gatherings

Abstract: Purpose: This study investigates the landscape of alcohol and drug use within social contexts, focusing on why many individuals choose abstinence. By exploring these dynamics, we aim to empower students to make informed decisions about substance use and understand the factors that influence their choices. **Methods:** Utilizing secondary data from participants involved in an outpatient treatment program with wrap-around services, we analyzed survey responses measuring substance use over the past month. This included assessing individual usage patterns and the impact of social interactions, with specific attention to questions about drug and alcohol use, social connectedness, as well as instances of concurrent use. **Results:** The findings reveal that a significant majority of respondents reported no recent substance use; specifically, 60.7% indicated abstaining from drugs, and 59.9% reported not consuming alcohol. Additionally, 64% of participants stated they had not used drugs and alcohol together. Notably, we examined how many participants selected "not applicable" in response to questions concerning combined use, despite undergoing treatment for substance use. **Conclusions:** The data indicate that many individuals surveyed do not regularly engage in substance use during social interactions, presenting a more nuanced perspective than typically captured in public health literature. These insights suggest that abstinence may be more common than previously recognized and highlight the need for further research. Analyzing contextual influences, motivational incentives, and demographic impacts will enhance our understanding of the choices made regarding substance use, ultimately fostering environments that promote healthier decision-making.

Annaliese Bol

Discipline: Biology

Authors:
#1 Clara Stuligross

Abstract Name: Effects of Heat Wave and Geographic Origin on Ovary Development in *Osmia lignaria*

Climate change is a major driver of global species declines, and heatwaves are particularly concerning because they are becoming more frequent and intense and can suddenly push organisms beyond their thermal limits. Cavity-nesting solitary bees may be especially vulnerable, as they develop immobile within above-ground nests with limited protection from extreme heat. Many bee species also span broad geographic ranges, experiencing diverse local climates that may shape their thermal tolerances; yet, we still lack a clear understanding of how heatwaves impact bee fitness across life stages and populations. To address this gap, we exposed developing *Osmia lignaria* from three western U.S. populations to experimental heatwaves during larval development. We assessed survival and development during and after the heat wave, and the following spring, we evaluated adult outcomes, including emergence timing, ovary maturation, and thermal tolerance. Heat wave exposure during larval development reduced survival and altered developmental timing, with variation among populations in the magnitude of these effects. These findings provide insight into the vulnerability of solitary bees to heatwaves and highlight the importance of life stage and geographic origin in shaping thermal resilience. Understanding these patterns is crucial for predicting the impact of future climate extremes on bee persistence and pollination services in both natural and managed ecosystems.

Krithi Bolledula

Discipline: Psychology

Authors:
#1 Holly Bowen

Abstract Name: Examining Heart-Brain Connections: The Link Between HRV and Frontal Lobe Function in Older Adults

Heart Rate Variability (HRV) is the fluctuation in time between heart beats and is thought to reflect activity in the autonomic nervous system. HRV is useful for monitoring health status and predicting future health outcomes, with lower HRV associated with compromised health and lower morality. HRV also reflects vagus nerve functioning which influences the prefrontal cortex and neural circuits that support executive functions. Building on this, we wanted to test whether better scores on neuropsychological tasks that involve the frontal lobe are correlated with higher HRV and therefore better cognitive health in older adulthood. Older adult participants (age 60+) completed visits with two parts. First, we recorded resting physiological metrics such as heart rate and respiration rate to calculate standard HRV indices at rest. Second, participants complete a brief battery of frontal-lobe tasks: Digit Span, Mental Arithmetic, Mental Control, and Verbal Fluency. We then examine correlations between HRV, and the scores taken from these tasks. We predicted that higher HRV would be correlated with higher frontal lobe scores, but this was not supported potentially because of a small, and generally healthy sample.

Hrishikesh Bollini

Discipline: Engineering

Authors:

#1 Hrishikesh Bollini
#2 Faizi Zaidi
Faizi Zaidi

Abstract Name: Utilizing AI/ML to Develop a 3D Printing Performance Predictive Framework

Recent advances in 3d printing have increased the need for data-driven tools capable of predicting how process parameters influence material behavior. In earlier work, we developed a machine learning model that utilized 3D printing parameters, including layer height, print speed, infill density, and temperature, to predict key mechanical properties of printed parts (surface roughness, tensile strength, and elongation) using a dataset from Kaggle. However, a key limitation of this initial model was that it required the material type (ABS/PLA) to be known beforehand. To address this constraint, a second model was developed that reframed the problem as a classification task. This model predicted the material type itself. By combining two datasets and applying a Random Forest Classifier, the system achieved an accuracy of approximately 85% in distinguishing ABS from PLA, demonstrating that material identity can also be inferred from process conditions. With the two fully developed models, we had the foundation needed to construct a unified predictive framework for 3d printing. The framework first identifies what material the part is made of, and then immediately predicts how that material will behave under a chosen set of printing conditions. This pipeline eliminates the main limitation of the first model, the inability to predict properties without knowing the material type, and transforms the two separate models into a coherent, end-to-end tool. This framework simulates the way engineers make decisions in practice. Experimental work was also conducted to generate our own data. 3D printed dogbones (~500 PLA/ABS) were tested for output parameters such as tensile strength, and the corresponding input parameters were recorded. In our future work, we will be using in-house-generated data to develop predictive models for various 3D materials.

Salvatore Bonasia

Discipline: Psychology

Authors:
#1 Dominic Fareri

Abstract Name: How Do Humans Experience Social Rejection and Acceptance From Artificial Intelligent (AI) Agents?

As artificial intelligence (AI) agents become increasingly integrated into everyday life, understanding how humans socially respond to them is essential in identifying potential psychological risks and ensuring that proper ethical safeguards can be placed in future models. By bridging the gap between social psychology and human-computer interaction, this study examines how humans experience social rejection and acceptance from AI agents. Current literature implies that within human-human interaction, conversational response time is an important signal of social rejection. Long response gaps, longer than four seconds, are associated with feelings of awkwardness and disconnection between strangers; however, close friends do not experience these negative effects. This project extends this idea into AI to see if humans will respond similarly to these temporal cues during their conversations with an AI agent. The methodology includes a mixed-methods design. Participants first complete a pre-task survey measuring weekly AI usage, rejection sensitivity (RSQ), attachment styles (ECR-12), anxiety (GAD-7), parasocial interaction, and intolerance for uncertainty (IUS-12). Afterwards, participants engage in a lab-based task involving three distinct conversational blocks with an AI bot: an 'acceptance condition' (1-2s response, warm personality), a 'rejection condition' (8-12s slow response, cold personality, simulated rejection by intermittent typing indicators), and a 'neutral condition' (4-5s response). The participants' emotional state, feelings of awkwardness, and willingness to re-engage with the bot will be assessed in between conversational blocks through self-report surveys. It is hypothesized that participants will show negative psychological responses (e.g., increased anxiety, awkwardness) to simulated AI rejection, and these effects will be moderated by pre-existing individual differences, such as rejection

sensitivity and attachment style. These findings would suggest that humans are beginning to apply complex social cues, typically reserved for human interaction, to their interactions with AI agents.

Ciara Bond

Discipline: Health and Human Development

Authors:

Abstract Name: Struggling in Silence: The Distrust of Doctors Among Southern Black Americans

This project explores the deep-rooted distrust of doctors and medicine among Southern Black Americans, a topic that carries personal significance within my own family. The central research question asks: How have historical injustices and generational experiences shaped the ongoing mistrust of healthcare systems within Southern Black communities? Growing up, I witnessed many older relatives choose to endure illness or pain rather than seek medical attention. This behavior reflects not only personal choice but a broader legacy of fear and skepticism built over generations. Drawing on historical events such as the Tuskegee Syphilis Study and ongoing racial bias in healthcare, this project aims to connect personal family narratives to larger social and historical forces that continue to affect health decisions today. The research employs a qualitative approach, incorporating family interviews, narrative reflection, and historical analysis to examine how stories passed down through generations shape health attitudes. Preliminary findings suggest that this distrust is not rooted in ignorance or stubbornness, but in generational trauma and self-protection. Understanding these experiences reveals how cultural memory influences modern healthcare relationships. The project seeks to emphasize the need for culturally responsive and empathetic medical care that acknowledges history while rebuilding trust between healthcare providers and Black patients.

Marina Bontrager

Discipline: Interdisciplinary

Authors:

#1 Brian Lagotte

Abstract Name: Overworked and Underpaid: A Study of Migration Intent in South Africa's Young Medical Professionals

Brain drain, or the loss of skilled laborers, causes South Africa to lose a significant number of medical professionals annually due to specific push and pull factors influencing migration to more developed countries. The proposed research analyzes how pre-established migration factors, such as working conditions and wages, encourage young medical professionals in Cape Town to consider migration from South Africa for work. Upon review of the current literature on the South African brain drain, few studies focus on young medical professionals, such as medical students and nursing students. Moreover, the current literature fails to consider how young medical professionals make migration decisions based on the push and pull factors perpetuating South African brain drain. Therefore, the proposed research uses current literature to develop a list of five push and pull factors medical professionals must consider when migrating. Through six semi-structured interviews of medical students and nursing students studying in Cape Town, interview data will be thematically coded to determine which factor most significantly contributes to the migration decisions of young medical professionals. Findings may reveal that poor working conditions are the most significant push factor causing medical students and nursing students to migrate from Cape Town for work. The proposed

research will confirm the significance of poor working conditions on healthcare worker migration and thus inform workplace-improving legislation that targets the source of brain drain in South Africa.

Jemma Booth

Discipline: Biochemistry

Authors:

#1 Jemma Booth

#2 Lucia Villalobos

#3 Emmanuel Adusah

#4 Michael Beck

Abstract Name: Illuminating Human Drug Metabolizing Enzymes Through Structure–Activity Relationship Studies of Carbonate-Based Fluorogenic Chemical Tools

Human carboxylesterases (CESs) are key enzymes in drug metabolism that catalyze the hydrolysis of multiple classes of drugs and play a particularly key role in the activation of prodrugs. Responsible for over 80% of the total hydrolytic activity in the liver, CES1 plays a dominate role in the first-pass metabolism of drugs. To study CES1's role in drug metabolism our group has previously developed a carbonate-based fluorogenic chemical tool based on a fluorescein scaffold that is specific for CES1 over CES2 in a live cell model of CES-mediated drug metabolism. Here, we seek to optimize our tools by developing a structure–activity relationship (SAR) for the hydrolysis of carbonates by CES1. Fluorogenic carbonates were synthesized in a single step reaction with fluorescein and the corresponding chloroformate. After confirming the purity and structure, each tool was evaluated for suitability for use in live cells. In vitro results found several carbonates with improved specificity than carbonates used in our current generation chemical tools. The more specific CES1 substrates developed in this work will enable the development of better fluorogenic chemical tools capable of studying CES1 in live cells. Studies utilizing these tools will be used to illuminate the intricacies of CES1-mediated drug metabolism providing safer and more effective treatments for patients.

Mireille Bordeaux

Discipline: Psychology

Authors:

#1 Rossella Traversa

Abstract Name: Omnipresence: the UWG Journal in Psychology of Gender and Sexuality

Omnipresence aims to identify and fill a critical void in undergraduate publishing: the specific psychological study of gender and sexuality. Though there are numerous journals that concern either psychology or gender and sexuality studies, very few focus specifically on their intersection. We accept submissions from diverse disciplines—strictly contingent upon a dual focus on psychological inquiry and gender/sexuality frameworks—and invite contributions from institutions worldwide. To capture a large net of submissions, we intend to accept papers from institutions across the world. Beyond location, we also intend to accept submissions besides the typical paper. More specifically, creative nonfiction, fiction, poetry, and visual art. Creative projects must be coupled with a statement of intent, which explores the academic themes of their work, while allowing for unique approaches to the topics at hand. This decision allows for a much wider variety of eligible submitters, and makes submission more approachable for undergraduates of numerous disciplines. The purpose of the journal is to provide a specific outlet for spreading the research and content

related to our topics. As the title concepts researched are “omnipresent” in our lives. Prejudice, exclusivity, and blatant hostility against those of minority communities within the world make the outreach of such research more important than ever before. A new journal requires much research into the framework of similar journals as well as understanding what resources are needed for an editorial board made up of similar undergraduates. Once the journal process begins and peer review starts, there will be an opportunity to provide a much wider scope into this process. Making decisions within an undergraduate board and inventing solutions as situations arise is also important to the process. I will be able to explore this in-depth within my presentation of the journal.

Jasmine Bordelon

Discipline: Interdisciplinary

Authors:

Abstract Name: Answering the Call for End of Life Care for Our Aging Population: A Community Engaged Approach to Improving Community Outreach and Volunteer Recruitment

End of life care is becoming all the more crucial as our population ages. However, there is a lack of volunteers or specially trained professionals who are willing and able to do this work. Without people to serve in this role, nonprofit organizations like the Joan Nicole Prince Home, a nonprofit that provides compassionate, no-cost care for individuals at the end of their lives, are struggling to meet the needs of their patients. To address this gap, an interdisciplinary team of students from Siena University’s Nonprofit Excellence and Transformation Fellowship partnered with the Joan Nicole Prince Home to evaluate and modernize their outreach methods, analyze prior marketing performance, and redesign promotional materials to authentically represent the organization’s mission. By combining evidence-based analysis with community-based learning, this project enhanced the Joan Nicole Prince Home’s marketing strategy, increased awareness across the Capital Region of Upstate New York, and strengthened the link between academic research and nonprofit transformation. The resulting recommendations focused on increasing community awareness, improving storytelling in marketing content, and building stronger relationships with potential volunteers. For example, students created a new flyer and logo that accurately represents the organization’s mission and developed a sustainability document that provided evidence-based suggestions, such as to center specific audiences in all outreach materials. Through this partnership, students applied classroom concepts to a real-world setting, strengthening both their professional development and the Joan Nicole Prince Home’s capacity to serve the community. This project highlights how academic-community collaborations can foster meaningful social impact and sustainability in nonprofit work.

Liam Bordoni

Discipline:

Authors:

Daniel Trego

Abstract Name: How Digital Twin Models Support Public Access and Preservation: Analyzing User Behavior Within Immersive Virtual Spaces

By creating compelling and accessible digital twin models, we aim to integrate user-focused design methodology with immersive documentation. Using Matterport 3D capture technology, we’ve documented museums and historical locations to examine how spatially accurate virtual environments can function as

tools for public access and preservation. The models function similarly to Google Street-View, immersing users in freely navigable spaces, with the inclusion of interactive “tags” providing information and suggested guided paths or “tours”. The goal of such models is to provide users with high levels of agency while upholding high constraint in best-practice interactions. Our primary case study is of the Archeological Museum and Site of Isthmia, Greece. Here we created a comprehensive digital walkthrough of the museum galleries and active archeological site. The scale and layout of the site posed a unique challenge in that it lacks the traditional confines of a single building or exhibit, creating space for innovation in how the creation of the model is approached, and how users are guided through the final product. To assess how users interact with these environments, we’ve conducted iterative testing with students, educators, and non-academic user samples. By giving users a set task to achieve within the model, we are able to observe and measure both quantifiable interaction data, as well as qualitative user feedback to improve the balance between user agency and guided structure. Their responses informed design decisions related to interface layouts, point-to-point navigation, information layering, and visual guidance. This process treats 3D capture not only as a tool for documentation, but as an interactive design medium shaped by user needs with the goal of refining approachability and accessibility in immersive virtual spaces.

Victor Borowski

Discipline: Engineering

Authors:

#1 Victor Borowski

#2 Karl Sandeman

Abstract Name: Optimizing Mechanical Advantage in Climbing Rescue Systems: An Analysis of Rope Tension and Mechanical Advantage in Pulley-Based Systems

In rock climbing and rescue scenarios, multi-pulley systems are essential for creating mechanical advantage, dividing the weight of a load across multiple strands of rope to lift heavy climbers. The simplest mechanics theory suggests that adding pulleys linearly divides the load. However, real-world applications introduce counteracting forces, such as friction and the weight of the equipment being used. This project addresses a critical optimization question: At what point does adding more pulleys to a system become disadvantageous? By analyzing the difference between theoretical and actual mechanical advantage, this project identifies the optimal configuration where force reduction is maximized before counteracting forces overpower. Due to the practical limitations of using a full-scale system, a controlled, miniaturized model has been constructed using rigid fishing line and varying pulley configurations. A digital force gauge is used to measure the input tension required to lift varying calibrated masses. The input force required to overcome static friction and initiate movement in each configuration is recorded and compared against the theoretical value. The initial hypothesis is that while increasing the number of pulleys will initially reduce the required input force, the cumulative friction introduced by additional pulleys will cause the efficiency to drop non-linearly. This presentation will document the search for a pulley configuration in which the addition of another pulley results in negligible force reduction or increased resistance, making the addition of more pulleys counterproductive. This study will therefore quantify the difference between ideal and actual mechanical advantage and will pinpoint the threshold at which counteracting forces outweigh the force reduction achieved through mechanical advantage. The establishment of a pulley configuration of optimized efficiency could inform best practices for rescue scenarios and other situations that require moving heavy loads.

Nitya Borra

Discipline: Psychology

Authors:

Abstract Name: Mood Disorders and Physical Health in Pediatric Populations: Correlations Across Pre- and Post-Adolescence

Even though the connection between the mind and the body is increasingly acknowledged, the current pediatric care is still very much in silos where mental and physical health are treated as separate clinical domains. This masks the fact that mood disorders have significant physiological effects and should be classified as multisystem illnesses that have aetiology in the psychological domain. This study highlights the strong and bidirectional relationship between pediatric mood disorders and long-term physical health and emphasizes that the associated psychosocial morbidity is a public health crisis which calls for integrated, holistic care. Mood disorders can deeply and biologically profoundly influence physical health by elevating stress on the Hypothalamic–Pituitary–Adrenal (HPA) axis and changing neuroendocrine signaling resulting in the accumulation of significant physiological costs. The period of Adolescence, which is already characterized by developmental vulnerability, magnifies these effects. Research shows that emotional dysregulation is the main driver of adverse trajectories which include substantial BMI variations and increased cardiometabolic risk (e.g., insulin resistance even at the same BMIs), particularly for adolescent girls with a family history of mood disorders. Additionally, these conditions interfere with pubertal timing as evidenced by the psychiatric risks linked to Central Precocious Puberty, thus, pointing to an important developmental mismatch. Moreover, the physiological load is also evident from the immune system perspective, where chronic, low-grade inflammation is detected in raised levels of C-reactive protein (CRP) that correspond to depression severity. As this morbidity affects multiple systems - metabolic, developmental, and immune pathways, often with sex-specific inflammatory signatures, the fragmented care model is far from being sufficient. A swift move towards holistic pediatric models that emphasize early, interprofessional screening—where psychological evaluation is done together with metabolic and hormonal monitoring—is important if the long-term health side-effects of youth mood disorders that are both severe and costly are to be averted.

Ian Bos

Discipline: Engineering

Authors:

Abstract Name: Open Source Modular Volumetric Additive Manufacturing

Volumetric additive manufacturing (VAM) is a method of 3D printing that creates entire geometries in one step, often through some kind of optically cured resin. Rotational VAM uses a vial of resin rotated under an optimized projected video to selectively cure resin to the desired geometry. Current models and methodology involving VAM require expensive and complex setups, which limit its actual application and development. Printers are in the thousands of dollars and require moderate software/scripting ability. Our model of VAM 3D printing is able to be constructed under \$200 and uses open source software for optimizing projections. The physical construction is built around modularity to allow the use of a variety of projectors, limiting the cost. This is made possible by the focus on traditionally 3D printed parts or consumer products. A consumer projector was also modified to allow the transmission of 405nm UV wavelength light, appropriate for the resin chosen. Due to the nonlinear nature of VAM resin, we attempt to use an ambient light source to reduce the required power output of the projection. A UV ambient light source assists the consumer projector by lowering the required projected power threshold for curing. This reduces the required dose given by the projector by having the entire volume sit right below the curing point. Ambient light also proves to speed up the curing process with weak projection, with moderate penalties to quality. Future steps are to improve open source software to allow fluid workflow within VAM manufacturing. Additional outreach is being done to trial printer and software capabilities. Our method hopes to spread the capabilities of VAM.

Nina Bouche

Discipline: History

Authors:

#1 Nina Bouche

Abstract Name: Racial Governance and Affective Histories of Japanese Peruvian Detainees during World War II

This research explores the often-overlooked history of Japanese Peruvian internment during World War II. Over 2,200 Japanese Latin Americans were uprooted from their homes and relocated to U.S. detention centers operated by the Immigration and Naturalization Service (INS) following Pearl Harbor. Focusing on the experiences of Japanese Peruvians, who comprised approximately 80% of these deportees, this study delves into their everyday realities within United States detention camps and their postwar struggles for national belonging and legal recognition. Existing scholarship on Japanese internment predominantly focuses on Japanese Americans, while the few studies on Japanese Peruvians primarily address hemispheric diplomacy and the exchange of individuals among Latin American and U.S. governments. A significant gap remains in the historical record regarding their personal experiences within INS camps and the diasporic identity-making of Japanese Peruvians. Specifically, this paper highlights that despite the seemingly haphazard and improvisational managerial perspective of U.S. policy, the resulting displacement, fractured identities, and lasting psychological scars were profoundly impactful for detainees. Analysis is constructed through first-hand accounts from the Densho Digital Repository, mainly oral histories and autobiographical narratives conducted 50-60 years after the war. First, this research examines the interplay of diplomatic pressures and racial prejudices that led to the forced removal and detention of Japanese Peruvians, highlighting their living conditions in transit to the U.S. and in temporary Latin American detention centers. Mainly, it reveals the contradictory experiences of individuals who were stripped of their agency and forced to navigate survival and identity in the very country that confined them; detainees often grappled with ambivalence and sought to overcome this inexplicable tragedy by identifying as American, even as feelings of “otherness” persisted. This work integrates how these wartime internments served as a laboratory of racial governance, where inclusion was engineered without true empowerment.

aidan boudreaux

PA - Lafayette College

Discipline: Biology

Authors:

#1 aidan boudreaux

#2 Casey Schmidt

Abstract Name: Role of Mxc Phosphorylation in Histone Locus Body Function and Structure

Histone proteins are essential to the mechanisms of chromatin: they provide structure and can be post-translationally modified to adjust the wrapping of DNA. Histone gene expression is cell cycle dependent, specifically being produced in S phase. Histone RNAs are made and regulated through a nuclear body called the histone locus body (HLB) and are unique because they have a stem loop structure instead of a poly A tail. The HLB is made up of several constituents, one of which is a key scaffolding protein called Mxc. Previous research has shown that Mxc is phosphorylated by CyclinE/Cdk2, and although we know the HLB is

phosphorylated during S-phase of the cell cycle, it is still unknown how this phosphorylation affects the structure and function of the HLB. We performed mass spectrometry to analyse HLB members, which revealed two putative phosphorylation sites on the protein Mxc within its N terminus. We obtained a plasmid that contained Venus-tagged Mxc. Using site-directed mutagenesis, we mutated these 2 sites from serines to alanines so that they could no longer be phosphorylated. We generated single mutants and a double mutant in which both serines were mutated to alanines. We are currently testing different protein lysis and western blotting conditions to show that these constructs are expressed in S2 cells. Our future experiments include: (1) determining if the mutants show a lack of signal from the MPM-2 antibody, which targets phosphorylated Mxc; and (2) determining if the phosphomutants have altered localisation in cells using immunofluorescence experiments. The results of these experiments will shed light on the effect of phosphorylation on Mxc as well as expand our knowledge of how the HLB functions.

Benjamin Bouffard

Discipline: Psychology

Authors:

#1 Joshua Barton

Abstract Name: The Developmental Dance: How Genes and Environment Interact in Trait Expression

This study aimed to investigate the complex interplay between genetics and environment, and how resulting trait expression is affected by it. While previous scientific knowledge suggested genetics and environment act exclusively from one another, modern scholarly works have started to find an intricate relationship between the two factors. Existing literature has begun to uncover segments of a theory known as gene-environment interaction. This paper compiled multiple studies, and created a cohesive argument supporting gene-environment interaction theories. Furthermore, this study analyzed manifestations of gene-environment interactions, such as socioeconomic status. Additionally, this article examined differences of gene-environment interplay of various traits, including intelligence and personality. Over the course of several months, a wide array of sources were collected and examined. After consideration, works were synthesized and argumentation was developed. Following careful evaluation, this article found that genetics sets a palette of genetic potential that can be dynamically changed by surrounding environmental factors. A strong example of this phenomenon discovered was socioeconomic status. Moreover, epigenetic theories apply to the same interplay. In terms of specific traits, intelligence is affected from genetics more compared to personality; as such, personality is more susceptible to environmental changes. These results have many implications. Considering how traits have different sensitivities to environment, parents can allocate appropriate resources to produce an environment that benefits specific traits. Properly comprehending the interaction between genes and environment can help develop medications and other treatments, mitigating disease and suffering for many. Further research should investigate the same interaction to reproduce results, as well as develop methods to apply these theories to modern medicine.

Benjamin Bouffard

Discipline: Psychology

Authors:

#1 Jennifer Frank

Abstract Name: Investigation of Differences Between Perception of Cell Phone Usage and Actual Cell Phone Usage Among Adolescents in Senior and Freshman Grade Levels

This study investigated the difference between the perception of cell phone usage and actual cell phone usage among teenagers in the ninth and twelfth grade levels. Existing literature focuses largely on the effect of screen usage on different aspects of health, including mental health and developmental changes in children. However, the relationship between the perception of screen time and actual screen time use has not been extensively studied. Under the guidance of Dr. Jennifer Frank, 111 freshmen and seniors at the Woodbridge Academy Magnet School in Woodbridge, New Jersey completed two online surveys. The first asked for their estimation of daily screen time over the past ten days; the second instructed subjects to check their iPhones for their actual daily screen time average over the previous ten days. The difference between perception and actual use of cell phones was quantified using a 2-tailed matched-pairs t-test for means. Using an alpha level of $\alpha = 0.05$, the p-value calculated was 0.00001326345565, suggesting statistically significant results. The null hypothesis was rejected and in this sample there was a difference in a subject's perception of screen time usage and their actual screen time usage. This study brings into light the possible inaccuracies with public surveys that ask for self-reported data, especially health studies. Cognitive bias in teenagers can be studied further to see the effect it has on other aspects of teenagers' lives beyond screen time usage. Furthermore, this information can be used to create applications and other technologies that can assist teenagers struggling with mental health and a lack of self-control in their daily lives. Although these results are significant, studies with larger sample sizes and more diverse subject demographics should be conducted to observe if results can be replicated.

Maxwell Bouffard

Discipline: Psychology

Authors:

#1 Jennifer Frank

Abstract Name: Early Exposure to the Outdoors Results in Higher Levels of Adventurousness in High School Students

This study examines the relationship between early childhood exposure to the outdoors and a high school student's current sense of adventurousness, particularly in outdoor activities. While existing literature has proven the benefits of the outdoors and nature on emotional and cognitive development, there has been limited research conducted on whether childhood outdoor experiences affect a person's willingness to try unfamiliar activities later in life. To investigate this, an analytical cross-sectional study was done using two surveys given to freshmen and seniors at a competitive magnet school in central New Jersey. The first survey measured the level of outdoor exposure a student had before the age of eight, and the second survey measured the student's current sense of adventure through scenario-based questions on a Likert scale. Each student received a composite score from both surveys. An independent t-test was conducted to compare the average adventurousness composite scores between two groups: students with greater childhood outdoor exposure and students with lesser exposure. The p-value from the test was 0.003, which fell below the significance level of 0.05. This supports the hypothesis that more early exposure to the outdoors is associated with a stronger sense of adventure. Two more t-tests were conducted comparing gender and grade level against level of childhood outdoor exposure; only the gender comparison yielded significant results with a p-value of 0.03. These results have profound implications, as early interaction with unfamiliar outdoor environments may help individuals embrace uncertainty and risk-taking later in life. Although the study supports this relationship, it was limited by self-reported data, recall bias, and a homogenous sample population. Further research should include more heterogeneous populations and account for potential confounding variables such as socioeconomic status and parental influence.

hamza Boujemaoui

Discipline: Engineering

Authors:

#1 Hamza Boujemaoui

#2 Basel Alsayyed

Abstract Name: An Interactive Physical Model for Visualizing Fundamental Statics Principles

This project presents a physical prototype designed to improve the way students learn key concepts in a statics course. Many students see statics as only mathematical and abstract, which makes it difficult for them to connect the equations with real physical behavior. The goal of this project is to create a hands-on teaching aid that helps professors explain core statics topics through clear visual demonstrations. Additionally, it makes it easier for students to grasp and interpret the calculated values based on the physical model. The prototype includes four main learning modules: (1) Reaction forces in beams, where the system calculates the reaction forces at the support points based on loading scenario; (2) Tension in cables, which display the tension changes based on the cable angle; (3) A friction model, consists of an actuator and sensors to illustrate the resistance to motion and measure the coefficient of friction between different surfaces in real time; (4) A moments module, which shows how changing the lever arm length affects the resulting moment. The system uses an Arduino controller connected to infrared sensors, load cells, and an actuator to measure forces and motion accurately. All calculations are done automatically in the background. The user can switch between the four learning modules using simple push buttons. The measured values and results are displayed on an LCD screen in multiple formats, depending on the user's choice. This prototype allows students to directly observe how forces, friction, and moments behave, turning theory into something they can see and interact with. By connecting mathematical equations with real physical responses, the system helps students build stronger intuition and improves classroom engagement. The model gives professors a practical tool to demonstrate difficult statics concepts and makes students understand topics by creating a more interactive and meaningful learning experience.

Sophia Bourgeois

Discipline: Biology

Authors:

#1 Al Nahian Khan Majlish

#2 Shu Hui Lye

#3 Saul Landaverde

#4 Emilia Cytron

#5 Megan Cline

#6 Harris Bolus

#7 Robert Correll

#8 Atulya Iyengar

#9 Stanislava Chtarbanova

Abstract Name: Role of an Ion Transporter in Temperature-Sensitive Behavior and Neurodegeneration in a Fruit Fly Model

Proper calcium (Ca^{2+}) regulation is fundamental for the function of neurons. Seizure disorders and age-related neurodegenerative diseases are associated with disruptions in ion transporters that maintain Ca^{2+} flow in cells. However, the mechanisms that control these disruptions are still not fully understood. The common fruit fly, *Drosophila melanogaster*, is a powerful genetic model for the studies of such neurological conditions. Flies have facilitated the discovery and characterization of mutants in displaying temperature-sensitive (TS) convulsions — a phenotype related to epileptic activity — along with progressive neurodegeneration similar to vertebrates, providing new insights into their underlying mechanisms. In a genetic screen, our lab identified the gene *Nckx30c* which encodes a potassium (K^{+})-dependent sodium/calcium ($\text{Na}^{2+}/\text{Ca}^{2+}$) ion transporter that is predominantly expressed in brain tissue. This gene also shares homology with the mammalian Solute Carrier Family 24 A2 (SLC24A2) gene. We found that flies carrying *Nckx30c* mutations exhibit TS convulsions, age-dependent neurodegeneration, and a shorter lifespan. Locomotor behavior was analyzed using an automated video tracking system equipped with a heated plate. Our findings revealed that in comparison to their wild-type controls, *Nckx30c* mutants displayed increased temperature sensitivity resulting in abnormal locomotion. As a result, *Nckx30c* mutants exhibited reduced velocity and lower percent active time. Such phenotypes worsened with age and also appeared when *Nckx30c* was specifically knocked down in neurons. Since the function of the mammalian ortholog of *Nckx30c*, SLC24A2, in the central nervous system remains poorly defined, our results in *Drosophila* could provide novel insights about how this gene contributes to calcium homeostasis, seizures, and age-dependent neurodegeneration in mammals, including humans.

Natalie Bowen

Discipline: History

Authors:

Abstract Name: "Politics! Not My Thing!": The Misrepresentation of Anne Boleyn in 'SIX: The Musical'

With the rise of *Hamilton* and *Come From Away*, stage musicals have become the next hottest form of historical reenactment, and the six wives of Henry VIII are no exception. These modern spins on Tudor history are typically riddled with inaccuracies that leave audiences with a skewed idea of Tudor England. The wives of Henry VIII, in particular, are the victims of centuries of historically inaccurate fictional media. *Six: The Musical* is a modern musical spin on this centuries-old story, following the six wives of Henry VIII as

they reclaim their narratives in a pop concert competition on who had it worst. Anne Boleyn, Henry's second and most famous wife, is a prominent figure throughout SIX, beyond her own solo musical number. However, her characterization falls short of the modern feminist reclamation the musical claims to portray. Using surviving correspondence from King Henry VIII and other notable figures in the sixteenth century written to or about Anne, this paper compares primary texts to the lyricism and characterization of Anne Boleyn's on-stage persona. Additional biographical sources are used to comprehend Anne's upbringing, question the validity of primary accounts, and understand Anne through a more feminist lens. This research reveals that after nearly five centuries, Anne's story is still told through a biased, misrepresentative, and misogynistic lens. The stereotypes and misconceptions that characterize Anne Boleyn in SIX are an amalgamation of past perceptions of Anne that were shaped by the limited surviving documents detailing her life, most of which are littered with biases and defamatory statements that lack the evidence necessary to back them up. More attention and consideration by female Tudor historians to present Anne more accurately to her situation would help end harmful misconceptions about controversial women in history.

Natalie Bowen

Discipline: Gender, Ethnicity, Diversity, or Cultural Studies

Authors:

Abstract Name: "A Couple Days in the Life of What It's Like In Washington Heights:" The Representation of Latine Immigrants in Lin-Manuel Miranda's 'In the Heights'

The United States of America is a nation built by and made up of immigrants, being home to one-fifth of all migrants across the world. Anti-immigrant prejudice and xenophobia have long defined the American people and national policy, but the target demographic is constantly changing to reflect current narratives and fears. In recent years, Latine immigrants have been a prominent topic of concern in American politics. Lin-Manuel Miranda's 2021 movie musical *In The Heights* aims to celebrate the existence of immigrants in Washington Heights, a neighborhood in New York City. Using peer-reviewed scholarly sources and movie reviews, this comprehensive literature review analyzes the representation of the Latine community in *In The Heights*. This research paper also examines over a century of American government legislation on immigration in order to discover if the challenges faced by immigrants in the musical are based on historical accuracy. *In the Heights* shines as a musical representation of Latin American immigrant communities by avoiding harmful stereotypes, emphasizing the panethnic Latine identity, and normalizing issues faced by Latine populations in America. Despite the musical's positive contributions to Latine media, there are still some areas where the film falls short, including the sexualization of female characters, absence of Afro-Latine representation, and the lack of conversations surrounding accountability and consequences in terms of federal policy. *In The Heights* celebrates the beauty of Latine culture, normalizes a minority group that is historically stigmatized in America, and highlights many struggles that come with being an immigrant. While *In the Heights* reveals a detailed chronicling of the realities of being an immigrant in America, the musical falls short in representing the diversity that is the Latine community and the potentially devastating political immigration crisis that currently looms over America, when sensitivity and inclusion are imperative for representative media.

Frederic Bowen

Discipline: Mathematics

Authors:

#1 Thomas Bieske

Abstract Name: Viscosity Solutions in the Martinet Space

In this project, I establish the existence-uniqueness of viscosity solutions to the infinite Laplace equation and the infinity(x)-Laplace equation in Martinet spaces, which are sub-Riemannian spaces that lack both the algebraic group law of Carnot groups and the triangular vector fields of Grushin-type spaces. In addition, existence-uniqueness of viscosity solutions to uniformly elliptic equations are proved.

Jasmine Bowie

Discipline: Biology

Authors:

#1 Jasmine Bowie

#2 Katherine Hendricks

#3 Elizabeth Emmert

Abstract Name: Roots of Origin: Geographic Imprints on Poplar Tree Microbiomes in the Popup Poplar Gardens

Soil microbes play an essential role in supporting plant health, influencing nutrient cycling, disease resistance, and resilience to environmental stressors. Poplar trees (*Populus* spp.) are especially valuable for studying plant-microbe interactions as they are fast-growing commonly used in ecological restoration, carbon sequestration studies, and bioenergy production. This project proposes a comparative study of soil microbiota associated with poplar trees planted in the Popup Poplar Gardens, a National Science Foundation-funded collaborative network spanning 18 sites across the United States. At Salisbury University (SU), 100 poplar trees have been planted from cuttings originally collected from 50 locations across Alaska, Canada, and the Northwest United States. My research group will analyze the root-associated microbiomes of 20 trees in five geographically distinct groups. Although all 20 trees are growing side by side at SU under shared conditions, we hypothesize that their root microbiomes may still reflect the trees' original geographic adaptations. By investigating whether the rhizosphere communities differ between trees derived from the five distinct locations, we aim to determine whether geographic origin leaves a lasting imprint on microbial associations. Ultimately, this project will generate foundational microbial profiles for the Popup Poplar Garden trees that can be used as a reference point for future research studies across different geographic sites and climates, advancing both ecological research and community science engagement.

Andrea Bowling

Discipline: Engineering

Authors:

#1 Chung-Hao Lee

Abstract Name: Shape Retention and Recovery In Shape Memory Polymer Foams: Implications for Aneurysm Treatment

A brain aneurysm is a bulging brain artery that can rupture, often causing severe debilitation or death. A potential patient-specific treatment involves using a polyurethane shape memory polymer (SMP)-based foam that can be compressed for endovascular surgical insertion and then expanded with heat to maximally fill the aneurysm space. By blocking blood flow into the aneurysm, our customizable SMPs reduce rupture risk and improve patient outcomes. However, their long-term durability and recovery capabilities must be well

understood before they can be safely implemented in medical applications. The goal of my project is to examine the durability, shape retention, and recovery time of SMPs through repeated compression tests, so this material can eventually be used to treat patients. In this project, I will fabricate eighteen (n=18) SMP foams with 10%, 15%, and 20% infill densities using fixed ratios of three monomers: (i) hexamethylene diisocyanate (HDI), (ii) N,N,N',N'-tetrakis (hydroxypropyl) ethylenediamine (HPED), and (iii) triethanolamine (TEA). Nine samples will undergo 15 compression tests at 60 °C to obtain stress-strain data, with recovery time recorded by a camera and microscope images taken every five cycles to assess any structural changes/damage. The remaining nine samples will undergo compression tests after recovering only 50%. The stress-strain results will be compared across infill densities and recovery levels using a two-way ANOVA test to determine how repeated compression influences the SMPs' thermo-mechanical properties. In a well-designed SMP, repeated compression should minimally affect shape retention and recovery time. The findings of this research will provide critical insights into the feasibility of SMPs for long-term medical use, ensuring their reliability in high-stakes biomedical applications. In addition, this project could expand SMP use beyond aneurysm treatment, enabling applications in other areas of the body, such as cardiovascular stents, tissue scaffolds, or minimally invasive orthopedic implants.

Peter Bowman

Discipline: English and Literature

Authors:

#1 Peter Bowman

Abstract Name: "It's Monday Night:" Class From the Twentieth Century to Today

Over the course of American history various authors have written about the fractures of class in American society. From the turn of the nineteenth century, when Upton Sinclair wrote of Lithuanian immigrants working the meatpacking factories of Chicago, to the Great Depression, when John Steinbeck wrote of sharecroppers moving from Oklahoma to California for a chance at a better life, to the very end of the 1990s, when George Saunders wrote of the struggles of a male stripper trying to support his poverty-ridden family. Many of these works have also been explored by scholars like William Brevda, who explores how Tom Joad from *The Grapes of Wrath* becomes a ghost who represents the lower classes and the ghost of socialism, and Orm Øverland, who examines how Lithuanian immigrant communities in early 1900s Chicago were stripped of their identities by an aggressive capitalist society. Using these works of literature and their accompanying scholarly articles, I explore class in the modern era through my own short story, "It's Monday Night," following the character Thomas as he navigates a shift as a caterer on his college campus. The story is built upon the works of Sinclair, Steinbeck, and Saunders, as well as my own personal experience working a catering job. In the accompanying essay, I discuss "It's Monday Night," analyzing how Sinclair, Steinbeck, Saunders, and the scholarly articles written on their works, contributed to inspiring my short story and its themes regarding class: how divides still endure in the twenty-first century, how these divides are enforced and operated, and the various influences that keep people trapped in poverty.

Elyas Boyan

Discipline: Sociology

Authors:

Abstract Name: Creativity and Repetition in Contemporary Violinmaking

In this paper, I aim to understand how contemporary violinmakers experience creativity. Sociologists have studied the experience of creativity within other art fields, but violinmaking is a particularly useful lens through which to understand this question because of its fixed nature: a beautiful and well-functioning violin was defined 300 years ago, so violinmakers must work within a narrow set of parameters. To answer this question, I conducted in-depth interviews with eighteen full-time luthiers based in Europe and the US who attended the Oberlin Violin Makers Workshop, a prestigious two-week workshop that has been running for over 35 years. I found that some luthiers experience making as creative, even within these narrow parameters, and tend to think on the scale of the process involved in making a single instrument. Others do not experience it as creative, instead understanding it as repetitive. These luthiers tend to think on a larger scale of progress and improvement over the course of a career. I conclude that a violinmaker's experience of creativity and repetition is related to the level of abstraction at which they think about their work. This allows us to reimagine our understanding of repetitiveness as a goal oriented process without negative connotation. Repetition becomes a long-term complement to creativity that allows one to develop consistency and expertise, which is crucial in preserving artisanship in contemporary society.

Mary Boyes

VA - Virginia Commonwealth University

Discipline:

Authors:

#1 Varsha Penumalee

#2 Sheila Nguyen

#3 Temm Phan

#4 Mary Boyes

Varsha Penulmee

Kadija Kourouma

Abstract Name: Developing of a Large-scale Teaching Assistant and Mentor Program to Foster Support and Community in Research Writing Courses

Because universities are hierarchical structures, it can be easy to lose sight of their central purpose: engaging students in the creation of knowledge, ideas, and relationships. Faculty often report up a chain rather than to students, which can create distance from daily student experiences. We have found that an effective way to stay student-centered is to give students real authority to share their expertise. My empathy-based pedagogy prompted me to reimagine a co-curricular teaching assistant (TA) program for a required research writing course from one TA per section to a large community of 25+ student mentors/TAs. The model distributes responsibility, reduces individual pressures, builds belonging and professionalism, and taps into the expertise of students across disciplines. Clear roles ensure each TA knows their purpose and how to collaborate effectively. TAs run breakout sections, record class notes, offer assignment feedback, and co-teach complex research concepts. The program retains 80% of mentors annually, with many students opting to serve as TAs until graduation. Incorporating student expertise yields meaningful payoffs for faculty and, more importantly, for students. Students in our research writing courses consistently describe the TA program as a course highlight. The expansion of this program gives TAs autonomy to co-create communal, high-demand study groups and breakout sessions. Each year, over a dozen new TAs join and about 25 return. Students want to be part of this community because they were supported, and now want to support others. Our proposed presentation highlights how we foster a healthy academic future by investing in students beyond traditional markers of excellence. A panel of TAs and I will discuss their roles and share what motivates them to remain engaged in the program. We will offer tips to others who wish to start their own, large-scale TA/mentor programs for research.

Riley Bozman

MD - Salisbury University

Discipline: Biology

Authors:

#1 Riley Bozman

#2 Dr. Kirsten Guckes

Abstract Name: Impact of VasX on Type-VI Secretion System-Dependent Interactions in *Vibrio fischeri*

The type VI secretion system (T6SS) is a toxin-release mechanism used by many Gram-negative bacteria to kill neighboring cells. In *Vibrio fischeri*, T6SS helps maintain its symbiotic relationship with the Hawaiian Bobtail squid (*Euprymna scolopes*) by releasing antibacterial toxins that destroy competing bacteria lacking key immunity factors. VasX, a T6SS toxin found in the related bacterium *Vibrio cholerae*, contributes to the virulence of cholera. A homolog of VasX exists in nearly all *V. fischeri* strains, such as FQA001. However, since *V. fischeri* is not a pathogenic bacterium, the specific role of this homolog in T6SS function and bacterial competition remains uncertain. Additionally, each strain contains a unique number of immunity factors, also varying in structure, making the mechanisms of neutralization unclear. To address these gaps, this research employs computational models in conjunction with cloning studies to explore these questions from multiple angles simultaneously. Our data suggests that the VasX homolog is highly conserved in two key regions. One is a putative Pleckstrin Homology domain, believed to interact with cell membrane lipids in eukaryotic cells, and the other is a colicin-like pore-forming domain targeting Gram-negative membranes. By developing a membrane modeling workflow, we were able to test the functions of each region more efficiently *in silico*, thereby guiding future research. Additionally, we found that all immunity factors are expressed within FQA001 in two polycistronic transcripts. Future work will be needed to determine whether both transcripts are necessary to neutralize VasX. Overall, our data support the idea that VasX acts as a trans-kingdom effector, designed to target both eukaryotic and prokaryotic membranes, and that several immunity factors help prevent autotoxicity and bacterial killing during inter-bacterial competition. Furthermore, future research is needed to evaluate the impact of the VasX homolog on interactions within the host system.

Joseph Bozo

Discipline: Engineering

Authors:

#1 Joseph Bozo De Leon

#2 Alexis Tejedor De León

Abstract Name: Green Technological Innovation for the Utilization of Tropical Fruit Waste, Agglomerated as Sustainable Biocomposites for Aquaculture Applications in Rural Areas.

The Materials Science plays a fundamental role in the development of agro-industrial products for the aquaculture industry, among others. In this context, the need for the development of new agro-industrial biocomposites was addressed, taking the Panamanian context as a reference. On one hand, this responds to the local reality, and on the other, to the growing emphasis on sustainability, enabling students to research, develop, and propose new products that reduce the environmental impact of aquaculture. To preserve their antioxidant compounds, the mango peels underwent a freeze-drying process followed by pulverization and agglomeration using a binder based on banana peel starch, as previously mentioned. The pellets were used to feed juvenile Nile tilapia (*Oreochromis niloticus*) for over a month. Based on the results obtained during the manufacturing process and the potential of this alternative feed for aquaculture species—considering that the juveniles were exclusively fed with this material—it is necessary to continue this project, particularly in terms of scalability and funding. By the other hand, part of the work was presented at WEEF & GEDC 2025

(World Engineering Education Forum & Global Engineering Deans Council Annual Conference) in Daegu, South Korea, last September in the Education Track session: Real-World Connection through Engineering Education where we were able to share the main findings, opportunities, and challenges with the participating community. In short, Materials Science provides a solid foundation for addressing challenges and opportunities, such as the aquaculture industry, giving students opportunity to contribute to the development of new, more efficient and sustainable agro-industrial products. Given the results obtained in the manufacturing process of this potential alternative feed for aquaculture species, and considering the maintenance of fry fed exclusively with the same feed, it is necessary to continue this project from a scalability and funding perspective.

Natalia Bozyn

Discipline: Criminology/Criminal Justice

Authors:

Abstract Name: Coping Mechanisms of Individuals on Death Row

Capital punishment in the United States has gone through numerous periods of opposition or support. The individuals on death row in the United States experience abhorrent physical conditions, including extreme solitary confinement, little privacy, and abuses from both other inmates and guards alike. These conditions can have severe repercussions on mental health, producing symptoms like a distinct loss of identity, which reduces the individual to something similar to an animal. These people must also deal with the deaths of the friends they make on death row, as well as their own impending executions. Death row phenomenon occurs as a result of three components: temporal, physical, and experiential. Death row syndrome comes from death row phenomenon, and refers to mental effects suffered by an inmate on death row. People on death row cope in a variety of ways. They may turn to educational pursuits, which include reading and writing. Escapist strategies are very popular, constituting methods like sleeping, drugs, suicidal ideation, and "tripping", or actively and vividly imagining oneself in the outside world. Religion is also very popular, and many people use their faith as a way to cultivate positive relationships with other parties. Many use exercise as a way to keep themselves busy as well, though this has seen limited success among individuals. The research into life on death row, and specifically the coping mechanisms of the individuals that live there, is far from complete, and much more needs to be done to fully understand how people in death row facilities live their lives.

Reid Bradley

Discipline: Psychology

Authors:

#1 Francesca St. Pe

#2 Cathy Stough

Abstract Name: College Student Opinions and Moral Convictions related to Abortion Rights.

The right to abortion is a controversial issue. Understanding levels of moral conviction regarding abortion opinion is important for understanding potential political behaviors, given the association between moral conviction and intolerance, polarization, and inflexibility. The present study sought to describe opinions of a sample of college students on abortion and their levels of moral conviction. Students (n=480) at a Midwest university participated in a survey. Participants had an average age of 19 years (M=18.99), were majority Christian (64.6%), female (63.5%, 23.5% male), white (66% white/Caucasian), and represented a variety of

political preferences (47.2% democrat, 27.8% independent, 25% republican). Participants self-described abortion opinion using a six-point Likert scale. Moral conviction was reported using 2 items: “To what extent are your feelings about the legal right to abortion a reflection of your core moral values and convictions?” and “To what extent are your feelings about the legal right to abortion deeply connected to your beliefs about ‘right’ and ‘wrong’?” The two items were assessed with five-point Likert scales. Descriptive statistics were calculated on demographics, abortion opinion, and moral conviction. The right to abortion was supported by the majority of students (n=298; 69.1% support, n=133; 30.9% oppose). More than half (n=229; 53.2%) of students held “strong” opinions on the right to abortion, with 41.8% strongly supporting (n=180) and 11.4% strongly opposing (n=49); Students overall showed moderate moral conviction regarding their opinion about abortion (M=3.48, SD=1.06), and students with “strong” opinions showed greater moral conviction. The majority of college students supported abortion, and stronger opinions were associated with greater moral conviction. Given the relationship between moral conviction and political behaviors such as intolerance, the prevalence of strong opinions on a contentious issue and levels of moral conviction should be of interest to researchers studying these behaviors.

Reid Bradley

Discipline: Psychology

Authors:

#1 Francesca St. Pe

#2 Cathy Stough

Abstract Name: Political Intolerance: Opinions and Moral Conviction in a College Sample

Political intolerance is widespread in the U.S, yet there is sparse literature regarding opinion on political intolerance. Further, moral conviction is important to understand in the context of intolerance given the known associations between moral conviction and polarization. The present study describes opinions of a sample of college students on political intolerance and corresponding moral conviction. Undergraduate students (n=480) at a Midwestern university participated in a survey. Participants had an average age of 19 years old (M=18.99), were majority Christian (64.6% Christian, 20.6% atheist/agnostic), female (63.5% female, 23.5% male), white (66% white, 12.5% Black/African American), and represented a variety of political preferences (47.2% democrat, 27.8% independent, 25% republican). Participants answered, "Is it okay to be intolerant of other's political beliefs and ideas?" using a four-point Likert scale. Moral conviction was reported using 2 items: “To what extent are your feelings about political intolerance a reflection of your core moral values and convictions?” and “To what extent are your feelings about political intolerance deeply connected to your beliefs about ‘right’ and ‘wrong’?” Participants responded using five-point Likert scales which were averaged to create a moral conviction scale. Descriptive statistics on demographics, intolerance opinion, and moral conviction were calculated. The majority of students stated political intolerance is “sometimes okay,” (n=222; 51.5%). 30.2% stated intolerance is “never okay” (n=130). Remaining students stated that intolerance was “often okay” (n=60; 13.9%) or “always okay” (n=19; 4.4%). Participants held moderate moral conviction regarding intolerance opinions (M=3.25, SD=1.01). The majority of participants stated political intolerance is “sometimes okay,” although a large portion stated intolerance is “never okay.” Moral conviction levels were moderate. Given the relationship between moral conviction and political phenomenon such as polarization, opinions on intolerance and corresponding moral conviction should be of interest to researchers studying these behaviors.

Kamilah Bradley

Discipline: Political Science

Authors:
#1 Sharon Alston

Abstract Name: Policy Implications for Relocating Socially Vulnerable People Out of Public Housing

The relocation of residents from public housing remains a central concern for policy analysis. Over the past several decades, federal initiatives such as Moving to Opportunity, HOPE VI, and Choice Neighborhoods have attempted to transform distressed public housing developments and expand access to greater opportunity. Yet these efforts have also produced substantial challenges for residents who are economically disadvantaged, people of color, and individuals who are socially vulnerable. Relocation frequently disrupts long-standing social networks, diminishes access to essential services, and creates uncertainty as families attempt to navigate unfamiliar environments. These consequences raise important questions about equity, justice, and the long-term well-being of affected communities. As cities continue to redevelop and adopt mixed-income housing strategies, it is essential to critically examine how displacement and relocation shape the everyday lives of the populations most directly impacted. Ensuring that redevelopment efforts promote social justice requires a comprehensive understanding of the lived experiences of relocated residents, as well as the structural barriers that shape their ability to adapt and thrive in new settings. This longitudinal study investigates the ongoing effects of a major relocation effort on a socially vulnerable urban community in Virginia. Drawing on data collected across multiple phases of the Choice Neighborhood relocation project, the research traces how residents' experiences, access to resources, community stability, and perceptions of neighborhood change evolve over time. By following participants throughout the relocation process, the study captures both immediate and enduring impacts, offering insight into how policy decisions reverberate through individuals' lives and within the broader community. Because the analysis is still in progress, the findings presented reflect emerging patterns rather than final conclusions. Nonetheless, the study contributes to ongoing discussions about equitable redevelopment, the unintended consequences of relocation, and the need for policy frameworks that prioritize the stability, dignity, and well-being of displaced residents.

Charles Bradshaw

Discipline: Computer Science

Authors:
#1 Giulia Franchi

Abstract Name: Mobile Manipulator Performance Under Dynamic End Effector Payloads

Mobile manipulators are poised to enhance automation of repetitive tasks in fields such as agriculture, construction, and manufacturing. Adoption of mobile manipulators for these tasks depends on achieving high position and orientation accuracy in unstructured environments with dynamic impairments. Examples of these impairments could include vibrations from connected tools or nearby machinery. To measure the effects of these disturbances, the National Institute of Standards and Technologies developed repeatable methods of testing a disturbance's impact on mobile manipulator functionality. For example, the Mobile Manipulator Workpiece Agitator applies repeatable disturbances to a workpiece to test the mobile manipulator's capability to correct for the applied disturbance. An extension of this work is to instead apply a disturbance to the manipulator itself. Therefore, the contribution of this project was the creation and validation of an apparatus that induces a repeatable and measurable disturbance on a mobile manipulator end effector. Such disturbances could be representative of vibrations caused by dynamic payloads such as power tools and robotic grippers. The repeatability of the induced disturbance was validated using data collected from an accelerometer and optical tracking system, considered a ground truth, to measure the g-force of the end effector during a 22 factorial experiment. While results of the experiment have yet to be analyzed, they are expected to show that the apparatus has created a repeatable disturbance that is able to be scaled by adjustments of speed and weight.

Neal Brady

Discipline: Biology

Authors:

Isabella Koch

Abstract Name: Exploring Kinematics of Quadrapedal Locomotion in Captive and Wild Chimpanzees

Chimpanzee locomotion is often used in reconstructing the positional behavior of the last common ancestor of humans and chimpanzees. However, chimpanzee locomotor kinematics have been primarily studied in captivity with limited understanding of how locomotor performance of these individuals compares to those in the wild. As wild individuals are more active, and often moving quadrupedally on uneven terrain compared to their captive counterparts, we measured the forelimb and hindlimb kinematic performance of individuals in the wild and compared this to both published results from captivity and captive individuals from a local zoo. This study uses video capture of wild chimpanzees from Uganda and captive chimpanzees from Virginia. All sequences were filmed with individuals quadrupedally walking orthogonal to the camera. Shoulder, hip, and knee joint angles were measured at touchdown, midstance, and toe-off and trunk angle measured at midstance in 20 adult and adolescent individuals (15 males, 5 females) with 5 of these individuals representing averaged values from repeated sampling. We anticipate that most of our angle measurements will overlap between our wild and captive samples at each part of step. However, due to increased daily activity and therefore potentially longer strides in our wild sample, we anticipate finding larger shoulder angles at touch down and larger hip angles at toe off in wild individuals compared to their captive counterparts. If wild chimpanzees do move differently than their captive counterparts, this needs to be taken into consideration when using captive data in modeling “typical” chimpanzee locomotion and for further investigation to determine if this disparity is due to differences in subject demographics, methodology, or environmental factors.

Adrian Brainos

Discipline: Engineering

Authors:

#1 Manula Pathiranage

Abstract Name: Custom Analog ASIC Prototyping with SKY130: An Open-Source VLSI Design Pathway for Undergraduates

Modern integrated circuits are usually designed with expensive, proprietary software, which limits hands-on chip design experience for many undergraduate students and smaller institutions. In this project, we investigate whether a complete, fabrication-ready custom analog application-specific integrated circuit (ASIC) can be designed, simulated, and verified using only open-source tools and an open-process design kit. We use the open SkyWater SKY130 nm CMOS process together with Xschem, Ngspice, Magic VLSI, and Netgen to implement a full custom design flow that is accessible to undergraduates. As a first step, we design a simple CMOS inverter at the schematic level in Xschem and run pre-layout simulations in Ngspice to verify correct operation, focusing on the voltage transfer curve and switching threshold. We then create the physical layout of the inverter in Magic VLSI, placing and routing the NMOS and PMOS transistors and interconnect to satisfy the foundry’s design rules. Design rule checking (DRC) and layout-versus-schematic (LVS) verification using Netgen confirm that the layout is both manufacturable and electrically equivalent to the schematic. Next, we extract parasitic capacitances from the layout and rerun post-layout simulations in

Ngspice, including process-corner analyses (typical, slow, and fast devices), to study how layout-dependent effects and fabrication variations modify delay and logic thresholds. To extend the study beyond a single cell, we plan to design and simulate a simple ring oscillator using the same open-source flow, allowing further analysis of timing behavior and the practicality of the toolchain for larger circuits. By completing this open-source design flow, we aim to document a detailed step-by-step procedure for custom layout design, highlight its advantages and limitations, and show that undergraduate students can carry out realistic integrated circuit projects without access to commercial electronic design automation tools.

Alli Brandon

Discipline: Education

Authors:

#1 Alli Brandon

#2 Jill McSweeney

Abstract Name: Exploring Coordination Between School Staff: Supporting Elementary School Students Experiencing Homelessness in North Carolina

Elementary school students experiencing homelessness are at a higher risk for lower learning outcomes in both math and reading, and for more behavioral struggles than their housed peers. With student homelessness having risen by over 40% in the past ten years in the state of North Carolina, we are seeing increasingly more elementary school students experiencing mental health challenges, including suicidal ideation, and lower rates of high school graduation long-term in this population. The McKinney-Vento Homeless Assistance Act provides a range of essential services for students to ensure their learning is not disrupted, but organizational barriers often prevent these supports from reaching students. Through sequential mixed-methods, this study will examine the experiences of collaborating MVA appointed liaisons, teachers, and principals in North Carolina elementary schools, in order to better understand the barriers and facilitators to implementing the Act. Phase 1 of the study consisted of a survey to MVA liaisons, teachers, administrators, which included an adapted version of the MVA Implementation Scale to assess perceptions of effective integration of the legislation. This scale consists of 26 close-ended questions and has been repeatedly verified as a reliable metric. Phase 1 results will inform a series of semi-structured interviews (Phase 2) conducted in Summer 2026 with teachers, in order to better explore the learning experiences of students experiencing homelessness, and how teachers support them in their classrooms. This data will be used to propose recommendations aimed at increasing the efficacy of staff partnerships in such a way that homeless students receive the support they are federally designated, and liaisons, teachers, and principals are better equipped to implement these supports. This presentation details the preliminary responses of Phase 1.

Emerson Brasfield

Discipline: English and Literature

Authors:

Abstract Name: The Great Work Begins: An Exploration of Sexuality and the Promise of Sexual Utopia Within Tony Kushner's Angels in America

I am combining my English major with my theater minor to make my thesis a psychoanalytical critic of Tony Kushner's Angels in America. I aim to explore how the show depicts sexuality within the plot, specifically how the show represents the endless battle within man's psyche between the forbidden desires of the

unconscious and the controlling superego that defends civilization as we know it. From there I will propose the question: “Is it possible for humanity to return to a state of nonrepression? Could we experience a sexual utopia where sexual desire can be acted upon without complicating factors like guilt and shame which aim to restrict us?”. The answer that I have come to is unfortunately no. Civilization has progressed too far and we can no longer separate ourselves from these structures. Just as Prior assures the Angels that God isn’t coming back, humanity must also try to accept the loss of a past age of sexual freedom. This conclusion however opens us up to exploring a new question: “In what ways can we closer to exercising freedom over our desires, if not all the time then under specific contexts?”. Outside of my primary source of Angels in America, my main theoretical source is Sigmund Freud. From there, my primary scholars that expand upon utopian thinking are Leo Bersani, Jose Estaban Muñoz, Micheal Warner, and Herbert Marcuse. I will be comparing the arguments of these scholars with the events of the play and analyzing how the struggles of the characters connect to what these critics observe about the nature of sexuality. My work has already been presented at the Georgia Undergraduate Research Conference but I would like to use this opportunity to present it on a larger scale and receive additional feedback.

Natalie Brattain

Discipline: Biology

Authors:

Abstract Name: Evaluation of Antimicrobial Resistance in Pathogens Relevant to Long-Duration Space Missions

Antimicrobial resistance is a growing global concern that necessitates the development of effective strategies for selecting appropriate antibiotics, especially in the context of future long-duration space missions, where infection control and treatment options are limited. This study employs the Kirby–Bauer disk diffusion assay to evaluate the antimicrobial susceptibility of *Pseudomonas aeruginosa* and other clinically and spaceflight-relevant bacterial pathogens such as *Klebsiella pneumoniae*, *Staphylococcus aureus*, and *Streptococcus pneumoniae*. These pathogens will be tested with commonly used antibiotics and potential natural compounds. The pathogens will be cultured and isolated onto Mueller–Hinton agar plates. Antibiotic disks, along with various flavonoids disks, such as Quercetin, will be used to evaluate its potential antimicrobial activity against the pathogens. The bacteria and disk will be placed on the plates then incubated at 37 °C overnight. Zones of inhibition will be measured to determine susceptibility patterns and to assess the comparative effectiveness of conventional antibiotics versus natural compounds like Quercetin. Due to preliminary findings, it is anticipated that *P. aeruginosa* will exhibit low susceptibility to penicillin-streptomycin due to its resistance mechanisms, while showing greater sensitivity to gentamicin. Understanding the susceptibility patterns of these pathogens has both terrestrial and spaceflight implications. On Earth, multidrug-resistant infections are a major public health issue, especially in the hospital environment. In space, the risk is amplified by the immune dysregulation experienced by astronauts, the closed spacecraft environment, and the reduced availability of treatments. Characterizing resistance trends and researching alternative therapeutics such as Quercetin could help guide targeted treatment strategies and inform future countermeasure development for spaceflight-associated infections. Ultimately, these findings will help inform infection prevention and treatment strategies that are critical for safeguarding crew health during long-duration space missions.

Leah Braun

Discipline: Engineering

Authors:

#1 George Pins
#2 Glenn Gaudette
#3 Antonio Freitas dos Santos
#4 Jeannine Coburn
#5 Catherine Whittington
#6 Bryanna Samolyk

Abstract Name: Leaf-Derived Vascular Scaffolds (LeaVS) Functionalized with Pro-Angiogenic Factors Support Endothelial Recruitment

More than 6.5 million Americans suffer from chronic wounds annually. To restore quality of life and reduce mortality, engineered skin substitutes are often necessary. However, currently available options have insufficient vascular networks, which can lead to graft failure. Previous work has shown that decellularized spinach leaves (leaf-derived vascular scaffolds, or LeaVS) are a promising alternative, as their vascular structures are retained and similar to that of human skin. With the novel contribution of pro-angiogenic factor functionalization, we hypothesize that neovascular network formation in LeaVS can be enhanced. Toward this goal, this work evaluates the adsorption rate, release kinetics, and endothelial recruitment of passively functionalized LeaVS as well as a method of covalent functionalization. Using Transwell migration assays, we found that functionalizing LeaVS with sphingosine-1-phosphate (S1P) results in a 5-fold increase in endothelial migration, which is a crucial step towards vascularization. Additionally, 1-cyano-4-dimethylaminopyridinium tetrafluoroborate (CDAP) chemistry was used to covalently bind bovine serum albumin (BSA) to LeaVS, and results were verified with Fourier transform infrared (FTIR) spectroscopy. This conjugation method is applicable to molecules containing amino groups such as S1P and may promote sustained release as the scaffold degrades. Taken together, these results provide a promising methodology for enhancing neovascular network formation in LeaVS.

Victor Bravo

Discipline: Biology

Authors:

#1 Andrew Brenner

Abstract Name: Establishing an In Vivo Model of Leptomeningeal Disease Using Tamoxifen-Resistant MCF7 Cells

Leptomeningeal disease (LMD) is a devastating complication of solid tumors, affecting 5–15% of patients with metastatic breast cancer, particularly in the estrogen receptor–positive (ER+) subtype. Prognosis remains poor, and treatment is complicated by the frequent emergence of endocrine resistance after prolonged tamoxifen therapy. Imlunestrant (LY3484356), a next-generation, brain-penetrant oral selective estrogen receptor degrader (SERD), has shown potent ER α degradation in resistant models and is under clinical investigation. This study establishes a novel in vivo model of LMD using luciferase-expressing, tamoxifen-resistant MCF7 cells to evaluate imlunestrant's therapeutic potential. Cells (5,000–20,000) were stereotactically injected into the cisterna magna or lateral ventricle of immunodeficient SCID mice. Tumor growth was monitored with bioluminescent imaging, neurologic assessment, and weight tracking. Once engraftment was confirmed, mice were randomized to imlunestrant (10 mg/kg, oral, daily $\times$ 5/week) or control groups. Longitudinal imaging and histopathology will assess treatment efficacy. Preliminary findings demonstrate successful modeling of therapy-resistant LMD and support the feasibility of this system as a preclinical platform. Ongoing studies will determine whether imlunestrant reduces tumor burden and improves survival, offering insights into therapeutic vulnerabilities in this otherwise intractable disease setting.

Discipline: Biochemistry

Authors:

#1 Diana Abarca Palma
#2 Bailee Higgins
#3 Kara Katch
#4 Madi Shafman
#5 Claudia Stipe
#6 Erin Yager
#7 Sudeep Bhattacharyay
Mac Wick

Abstract Name: Examining the Link between Molecular Hardness and Binding Affinity for Rational Drug Design

Proteins are a primary target for developing drug therapies to address certain diseases. Understanding the link between ligand characteristics, such as molecular hardness, and binding affinity could provide a more effective way to design drugs for use in treating disease. Thus, this study involved the subset of diverse proteins (Acetylcholinesterase, AmpC Beta-Lactamase, Cytochrome P450 3A4, Glucocorticoid Receptor, HIV Reverse Transcriptase, and Serine/Threonine Kinase 1) from the Database of Useful Decoys: Enhanced (DUD-E), with a focus on ligand binding sites. The active site of was probed with computational docking of more than 50 molecules for each protein. Separately, electronic structure calculations were also carried out, and the molecular hardness values of these ligands were determined. The combined results are being used to generate a quantitative scale of active site hardness with greater predictability of ligand binding.

Julie Brelsford

Discipline: Psychology

Authors:

#1 Evan Smith

Abstract Name: Social Support and Resilience and Its Impact on Academic Self-Efficacy and Academic Performance

Social support and resiliency are important among college students, since these factors can impact their academic self-efficacy and overall academic performance. Social support can come from multiple different sources: institutional, familial, and peer. From these separate support facets, college students can have improved academic self-efficacy and increased academic performance. Resiliency has been seen as a need among college students, especially since 2/3 of students report experiencing moderate to high levels of stress due to strenuous conditions of college. This study takes a central focus on comparing the differences between first-generation college students and continuing-generation college students. First-generation college students are known to have lower retention rates as well as have lower academic self-efficacy. With increased social support, they can have an increased resiliency and higher self-efficacy, which is not just limited to academics. The overall purpose of this study is to explore the impact of social support from different groups and resiliency to stress to see how it affects self-efficacy and academic performance. The hypotheses of this study are that first-generation college students, specifically, will have higher resilience against stress if they have stronger social support systems. College students overall will have higher academic self-efficacy and performance if they have stronger social support. Finally, higher resilience among college students will correlate with higher academic self-efficacy and performance. The study will be conducted via self-reported

survey with relevant social support, academic self-efficacy, and resilience scales and open-ended questions. If these hypotheses are fulfilled, all students would benefit from resiliency building lessons and social support programs. It could also indicate the need for institutions to provide transition programs with support avenues for first-generation college students, while also providing educational programs about building resiliency to prevent negative reactions to high levels of stress.

Abigail Bressette

Discipline: Biology

Authors:

#1 Lesley Bulluck

Abstract Name: Linking Vegetation Structure and Composition to Food Resources for Declining Songbirds in the Virginia Appalachians

Non-native, invasive plants displace native species in human-altered landscapes, reducing biodiversity. Early successional habitats (ESH) are important, declining ecosystems that are susceptible to non-native plant invasion. Non-native plants cannot replace native plants as hosts for caterpillars, an important source of food for birds, including golden-winged warblers (*Vermivora chrysoptera*; GWWA) and chestnut-sided warblers (*Setophaga pensylvanica*; CSWA), two threatened early-successional songbirds. Associational effects occur when insect herbivore abundance increases or decreases due to the vegetation neighborhood surrounding a focal plant. To understand if neighborhood density, composition, and diversity affects food availability for songbirds, we collected clippings from three tree species preferred as foraging substrates by GWWA and CSWA and conducted vegetation surveys across private properties in Highland County and Bath County, Virginia. We found no relationship between the proportion of non-native vegetation in a neighborhood and caterpillar abundance or biomass. Overall, black locust trees had the most caterpillars. There is a negative relationship between caterpillar abundance and neighborhood diversity and density, as well as between caterpillar biomass and neighborhood diversity. These results show that dense, diverse vegetation neighborhoods provide trees with an associational resistance to herbivory by caterpillars. This could be because these neighborhoods block visual and chemical cues used by insects to locate their host species. Diverse vegetation may also reduce herbivory on the focal tree by generalist herbivores. This study emphasizes the importance of black locust as a foraging substrate for early-successional songbirds as well as the need to maintain patchy, open landscapes for insect herbivore and songbird populations.

Dylan Brettin

Discipline: Biology

Authors:

#1 Benjamin Clarke

#2 Shannon RedBrook

Abstract Name: *Borrelia burgdorferi* (Lyme's Bacterial Spirochete) Means & Understanding of the Method of Entry into HEK (Human Embryonic Kidney) Cells through Confocal Microscopy.

The bacteria that causes Lyme's Disease is in the deer tick *Ixodes scapularis*, A single tick bite is capable of multiple systemic problems resulting from inflammation. Infection in the kidneys leads to Lyme Nephritis, a condition leading to hyponatremia. This condition is more prevalent in dogs and is the leading cause of death in dogs. The goal of this research is to determine if the spirochete directly interacts with isolated Human

Embryonic Kidney(HEK) cells. Recent research in the Clarke Lab has shown significance in understanding how this spirochete interacts with various types of culture cells to begin identifying the target tissues in Lyme Borreliosis Our experimental approach was to coinubate HEK cells (ATCC####) with *Borrelia burgdorferi* (strain B19) that constitutively expresses Green Fluorescent Protein (gfp-Bb) at 37oC for XX hours. HEK cells were seeded onto cover slips at XX x 10⁶ cells/ml, incubated overnight to form a lawn of HEK cells. Coinubate was initiated by adding gfp-Bb to different final ratios of HEK:gfp-Bb to assess an optimum MOI. Cells were sampled by aspirating the supernates, and washing the adherent cells with ice cold Phosphate Buffered Saline. These cells were fixed with Paraformaldehyde (PFA). The cover slips were treated with DAPI to label the nuclei then inspected by confocal microscopy to determine if the gfp-Bb could be identifiably associated with the HEK cells. The overall significance is to understand how the Bb is actively interacting with a kidney cell.

Fiona Brightman

Discipline: Chemistry

Authors:

#1 Alexandrina Ligia Focsan

#2 Gopeekrishnan Sreenilayam

Abstract Name: Carotenoid Extraction from Spinach Using Deep Eutectic Solvents

Carotenoids are innate pigments located in algae, plants, and photosynthetic bacteria. Fruits and vegetables that are rich in carotenoids include spinach, watermelon, carrots, kale, oranges, and tomatoes. Carotenoids are widely used in the pharmaceutical and food industries worldwide due to their health benefits. For instance, carotenoids are used as antioxidants in the human body to help prevent chronic diseases. Due to their fat-soluble nature, carotenoids are contained within lipid molecules at the cellular level and are stored throughout the body, including in the skin, eyes, liver, and adipose connective tissue. Humans cannot naturally synthesize such pigments, so they must be consumed through fruits and vegetables. This research focuses on using green solvents, commonly known as deep eutectic solvents (DES) to successfully and efficiently extract carotenoids from spinach, which is a model plant widely used in scientific research. The advantages to using these “green friendly” DES include their inexpensive cost, biodegradability, contain non-toxic compounds, and straightforward preparation. Such DES prepared consist of choline chloride mixed with either glycerol, ethylene glycol, propanediol or urea, and betaine mixed with ethylene glycol or glycerol respectively. The carotenoid extracts were analyzed using a high-pressure liquid chromatography (HPLC) instrument with a C30 carotenoid column to determine the most efficient deep eutectic solvent for carotenoid extraction.

Emilie Brisco

Discipline: Biology

Authors:

#1 Robert Charvat

Ava Salvant

Abstract Name: Repurposing Anti-Cancer Drugs as Antiparasitics Against *Toxoplasma gondii*

Toxoplasma gondii is an obligate intracellular parasite and the causative agent of toxoplasmosis, an infection that damages the brain, eyes, and other organs. *T. gondii* lives asymptomatically in roughly thirty percent of the global population, except for immunodeficient individuals, who often experience substantial adverse

effects. The objective of this study is to develop novel treatments by evaluating anti-cancer drugs, a class of compounds that have previously exhibited anti-parasitic activity. *T. gondii* possesses several kinases critical for survival; therefore, current FDA-approved cyclin-dependent kinase (CDK) inhibitors targeting breast cancer, including Palbociclib HCl, Ribociclib HCl, and Abemaciclib, were examined. Experimental methods to test the efficacy of the CDK inhibitors as a potential treatment include doubling assays of the compounds at varying concentrations. Results indicate that two of these drugs show a significant reduction in parasitic growth and replication of *T. gondii* while preserving the viability of the host cells. To further assess inhibitory activity, derivatives of the effective inhibitors were tested in luciferase assays, with preliminary results indicating a potential effect on parasite growth and replication. This research contributes to the development of novel therapeutics by focusing on anti-cancer agents and provides evidence for the repurposing potential of CDK inhibitors.

Evelyn Brittin

Discipline: Biology

Authors:

Abstract Name: Investigating Neurotransmitter Packaging in Dual Neurotransmitter Neurons

The mechanism of communication between neurons is largely understood to begin with a presynaptic neuron packaging one type of small-molecule neurotransmitter (SMN) into synaptic vesicles for release at chemical synapses. These types of neurons are referred to as single neurotransmitter neurons (SNTs). Interestingly, there is a subset of neurons that signals using two types of SMNs, known as dual neurotransmitter neurons (DNTs). Despite being discovered several decades ago, how DNTs are functionally different from SNTs is not well understood but the mode of neurotransmitter packaging for neuronal signaling has profound implications for how DNTs signal to downstream neurons. When neurotransmitters are co-packaged in DNTs (co-release), release is spatiotemporally synchronized, while separate packaging (co-transmission) allows distinct transmitters to signal independently across time and space. Thus, understanding how DNTs signal requires knowledge of their mode of neurotransmitter packaging. We hypothesize that different DNTs will utilize distinct modes of neurotransmitter packaging that underlies the functional differences in their mechanisms of signaling to downstream neurons. We have been exploiting the genetic advantages of *Drosophila melanogaster* to investigate the mode of neurotransmitter packaging in DNTs in the brain. The challenge with studying synaptic vesicle co-localization is the miniscule size of the synaptic vesicle, which measures ~30nm across. Since the resolution of confocal microscopy is only ~250nm, individual synaptic vesicles cannot be distinguished using this standard method of imaging. To solve this, we use a technique known as expansion microscopy that isotropically expands tissues tenfold. This allows for visualization of separate vesicles within one synapse at a resolution of ~25nm, and thus a determination of whether a given DNT co-packages or independently packages its neurotransmitters. These studies will yield insight into understanding normal behavior in *Drosophila* and other species, as well as have potential implications for psychiatric and neurodegenerative diseases in humans.

Wade Brock

Discipline: Architecture, Construction Management, and Interior Design

Authors:

Abstract Name: From Efficiency to Ecology: The Changing Definition of “Sustainability” through the Lenses of 20th-century Modernism and 21st-century “Material Ecology”

As the changing climate refocuses the architect's moral obligations, the idea of sustainability has evolved from efficiency and moderation towards stewardship and reciprocity. A comparison of the works of the modernist architect Frei Otto and the "material ecologist" designer Neri Oxman reveals how two, distinct forms of experimentation --- the structural and biological, respectively --- highlight the moral necessity of design through empirical inquiry. Modernist architects of the 20th century, such as Ludwig Mies van der Rohe, advanced "Less is More" as an aesthetic of ethical economy: efficiency equated to virtue, a refutation of past epochs. Rejecting the fascist aesthetics of Germany's Third Reich, Frei pursued a minimization of matter through exhaustive form finding, developing tensile structural systems and lightweight envelopes, with the goal of an egalitarian and democratic built form. Presently, twenty-first-century designer Neri Oxman advances matter to the position of collaborator. Through her theory of "material ecology," Oxman integrates biological and computational methodologies to produce forms and structures that grow, calcify, and decompose, highlighting the environmental and architectural needs of the new millennium. This paper examines this shifting definition of sustainability through a comparative analysis of Otto's and Oxman's respective works. Drawing on their writings and projects, including Otto's Munich Olympic Stadium and Oxman's Aguahojá I & II, an argument is formed that suggests Otto's ethic of efficiency and Oxman's framework of symbiosis exist within two distinct ecological paradigms. Ultimately, Otto's sustainability is quantitative; Oxman's is qualitative. Together, their work traces the disciplinary shift from a modernist efficiency to a posthuman ecology: from "less is more" to "what if the built environment lived with and beyond us?"

Madison Brooks

Discipline: Physical/Occupational Therapy and Speech Language Pathology

Authors:

Abstract Name: Prospective Study of Auditory Neuropathy Spectrum Disorder

ANSD presents unique diagnostic and intervention challenges that require coordinated management across audiology and speech-language pathology. However, limited research has examined speech-language pathologists' preparedness to assist this population. This prospective study investigates the perceptions of practicing SLPs regarding: the level of their current understanding of ANSD, the extent and quality of their preliminary and in-service education concerning ANSD, and their perceived positions in the assessment, treatment, and interprofessional collaboration. Research findings suggest considerable variability in training exposure, with many respondents describing minimal formal instruction related to ANSD despite serving children who presented with Auditory-Neuropathy Spectrum Disorder. Key responsibilities identified by participants included monitoring speech and language development, including individualized communication strategies, supporting family education, and collaborating closely with supplemental professionals regarding technology outcomes and intervention planning. The results of this study suggest the need for increased educational resources and targeted professional development to better equip SLPs to serve individuals with ANSD. This study attempts to explore the necessity of enhancing clinical preparation and interdisciplinary communication to optimize outcomes for affected children and families.

ZION BROOKS

Discipline: Sociology

Authors:

Abstract Name: Did the CIA win or are you a tool of Conservatism: The Rise of Conservatism in Black Youth

AbstractThe political climate of the United States has been cyclical since the inception of this country. We are now encroaching a period reminiscent of post reconstruction within the Black community. The rise of conservatism is experiencing a resurgence in black youth. My research seeks to explore this phase in our history through an Afro-pessimistic lens. The wonderful works of the talented tenth and scholars of literature written by 20th century scholars and theorists served its purpose to inspire formerly enslaved peoples and extricate the Black identity from enslavement. Although, the belief that co-opting the ideologies Anglo-Saxon Americans about what is expectable seemed like a good idea at the time, now, it has proven to do more harm than good. Today amongst the black youth the ideals are described as conservatism. Questions about lifestyle choices, child rearing, public spending are all leading us down a path of conservatism that is influenced by religion and white supremacist indoctrination. In this research I aim to explore and explain - the memefication and use of conservative social thought in casual interactions has led to the rise of conservatism in Black Youth. The use of an afro-pessimistic framework serves to highlight the ways that conservative doctrine is contradictory to black identity. Afro-pessimism, while flawed in explaining all the way the other races and identities are impacted by this viewpoint, explicates the perception of blackness. Simply put Blackness is subhuman because to be black is to be property. The origin of Blackness in this country has been enslavement and ownership, so to be black is to be owned. Through this lens conservatism by black youth is irrelevant. Adopting the thoughts of your owner will not buy you freedom. The only way to truly be free is to reject blackness as we know it.

Zania Brooks

Discipline: Criminology/Criminal Justice

Authors:

#1 Kofi Afrifah

#2 Kasia Coleman

#3 Azsa Jenelle Farmer

Abstract Name: Genotyping Nuclear DNA From Rootless Human Hair

Human hair is one of the commonly found biological evidence at crime scenes. Genetic analysis of rootless hair is challenging due to extremely low nuclear DNA content and increased susceptibility to degradation from environmental factors and keratinization. This research examined the effectiveness of extracting and genotyping nuclear DNA from 10cm of rootless human hair samples. Recent reports suggests that advancements in chemical lysis and purification may improve recovery, though the reliability of rootless hair for STR genotyping remains a challenge. This research aims to contribute to this discussion by evaluating an extraction and amplification workflow optimized for rootless human hair. Twelve naturally shed, rootless human hairs were collected, trimmed, and washed with a 5% Terg-a-zyme solution to remove contaminants. DNA extraction followed a multiphase protocol including chemical lysis with Buffer ATL, Proteinase K, and DTT, prolonged incubation to encourage the release of DNA, and purification through a MinElute column following ethanol and buffer washes. Recovered DNA was dried, rehydrated with TE-4 buffer, quantified, and subjected to qPCR quantitation and STR amplification to assess the presence and quality of amplifiable nuclear DNA. Obtained results showed that autosomal STR profiles could be generated from four rootless hair shaft, but the overall success rates for generating informative STR profiles from more than 8 STR loci for eight hair samples was low. These results suggest that when DNA extraction procedure is optimized with right volume of proteinase K, addition of optimum amount of DTT, and extended incubation time for proteinase K, STR profiles can successfully be generated from rootless human hair.

Andrew Brower

Discipline: Geography/Geology

Authors:

#1 Veera Holdai

#2 Mara Chen

Cailin Snider

Heather Sweeney

Abstract Name: Investigating the Impact of Socioeconomic and Environmental Factors on Life Expectancy in 2023: Top 20 vs. Bottom 20 U.S. Counties

More than 30 years of discrepancy in life expectancy between the top and bottom 20 U.S. counties led us to investigate influential factors. This study compares 23 different socioeconomic and physical environmental variables on life expectancies in 2023. We conducted statistical analysis using RStudio, including descriptive statistics, two-sample t-tests and Wilcoxon Ranked-Sign tests, and correlation tests to identify which variables significantly distinguish the two groups. Visualizations such as box plots and correlation scatterplots were also used to support pattern recognition. The results show that the top 20 counties have clear socioeconomic advantages. Statistical tests revealed significantly lower poverty rates, higher rates of college graduation, and much higher median household incomes compared to the bottom 20 counties (p -value < 0.05 for each). In addition, correlation analysis further indicated strong positive relationships between life expectancy and both income and education, while poverty and unemployment showed strong negative correlations. Environmentally, high life-expectancy counties also tended to have a higher rate of people living near greenspaces and greater forest coverage, although these factors displayed weaker statistical relationships. The bottom 20 counties, many of which are located in rural South Dakota, North Dakota, and Appalachia, showed consistently higher poverty rates, lower graduation rates, and lower median incomes. Although some environmental factors such as air pollution were favorable, the statistical analysis suggested that these advantages do not counteract the impact of socioeconomic hardships. Overall, the statistical results highlight socioeconomic factors as the most influential predictors of life expectancy, as well as certain environmental factors. Thus, we conclude that a combination of socioeconomic and environmental inequalities drive much of the life expectancy gap across U.S. counties. Our results could be shared with policymakers to improve quality of life amongst vulnerable communities.

Amelia Brower

Discipline: Psychology

Authors:

#1 Sierra Joseph

#2 Alayna Furman

Abstract Name: The Personality Profile of Business Leader Elon Musk

This poster presents the results of an indirect personality assessment of business leader Elon Musk, from the conceptual perspective of personologist Theodore Millon. Psychodiagnostically relevant data about Musk were collected from biographical sources and media reports and synthesized into a personality profile using the Millon Inventory of Diagnostic Criteria (MIDC), which yields 34 normal and maladaptive personality classifications congruent with DSM-III-R, DSM-IV, and DSM-5. The personality profile yielded by the MIDC was analyzed on the basis of interpretive guidelines provided in the MIDC and Millon Index of Personality Styles manuals. Musk's primary personality patterns were found to be Ambitious/confident and Dominant/asserting, supplemented by secondary Dauntless/adventurous, Outgoing/congenial, and Contentious/resolute patterns and a subsidiary Conscientious/respectful tendency. An appropriate descriptive label for Musk's personality composite, given the prominence of the Ambitious and Dominant patterns in his

overall personality configuration, is “fearlessly ambitious innovator.” These individuals see themselves as extremely capable, talented, and deserving of success. They strive for achievement and recognition, prompting a surplus of arrogance and entitlement.

Octavia Brown

Discipline: Education

Authors:

#1 Charnell Long

Abstract Name: Multimodal Learning and its Impact on Elementary Student’s Understandings of Scientific Inquiry.

Research in learning sciences suggests that sound and high-quality science education heightens students' achievement, yet many students have limited opportunities to engage in science at the elementary level. As a result, many students do not acquire the building blocks necessary to succeed in STEM learning later in their academic journey. In our local community, Guilford County, 42% of the elementary schools scored below the average proficiency for science during the 2022-2023 school year. Thus, creating high-quality elementary science education research benefits students nationally and in our local community. In this study, I focus on scaffolding inquiry, specifically guided inquiry approaches to learning. Guided inquiry allows students to build knowledge and comprehension while following a structured plan laid out by the teacher. While some research has investigated closing the gaps in understanding with guided inquiry, most fail to focus on its application for elementary school. Further, continuing the prevalence of low science proficiency rates by ignoring the communication of foundational science concepts. My research explores how multimodal learning, such as incorporating multimodal text and mixed reality, impacts guided inquiry. Taking three groups of fourth graders, we will look at their pre- and post-tests to see how the different modalities (worksheet, multimodal text, and mixed reality) affect their understanding of conceptual knowledge during guided inquiry. While the results are preliminary, they suggest that mixed reality during guided inquiry enhances student outcomes and understanding of scientific content knowledge.

Faith Brown

Discipline: Biology

Authors:

#1 Noelle Potter

#2 Rodrigo Campos-Cardoso

#3 Kirstie Cummings

Abstract Name: Infralimbic GABAergic Interneurons Show Opposing Activity During High and Low Fear States in Pavlovian Fear Model

In 2019, 4% of the world population reported experiencing an anxiety disorder, such as severe anxiety, phobias, or post-traumatic stress disorder (PTSD). The rodent medial prefrontal cortex (mPFC) is known for its role in regulating fear. Specifically, the infralimbic (IL) region of the mPFC is thought to be a key site for fear suppression. Aside from the glutamatergic principal neurons, GABAergic interneurons (INs), such as somatostatin (SST) and parvalbumin (PV) INs, are present within the IL, suggesting influence on the IL’s function. To determine the roles of PV-INs and SST-INs in both high and low fear states, we exposed transgenic reporter lines PV-Cre/Ai9 and SST-FlpO-Ai65F—which express the red fluorescent protein,

TdTomato, in either PV-INs or SST-INs—to a cued fear conditioning paradigm followed by fear retrieval or extinction retrieval. After this, we immunostained their brain slices for the immediate early-gene cFos, to mark neuronal activity. We found that PV-INs were more activated during high fear states, while SST-INs were more activated during low fear states. These results suggest that PV-INs and SST-INs play opposing roles in fear promotion and suppression within the IL region[UC1] . For further confirmation, we optogenetically activated PV-INs and silenced SST-INs in PV-Cre and SST-Cre mice during extinction retrieval. We hypothesized that this manipulation would drive high fear responses; however, we found no significant difference in behavior between control and light-manipulated groups. This suggests that the IL may not play an important role in extinction retrieval. By investigating the roles of PV-INs and SST-INs in the IL's function, we highlight their importance in regulating fear suppression and driving both high and low fear states. [UC1]It is important to highlight this because in other brain regions and even in other subregions of the mPFC, the interneurons have different roles than they have in the IL.

Peter Brown

Discipline: Music

Authors:

Abstract Name: Addressing the Declination of Interest in Conscious Hip-Hop

During the Golden Era of the Hip-Hop movement, which is defined as the time between the mid-1980s to the mid-1990s, culturally conscious songs led the rap music charts. Conscious rap songs talk about societal issues within the community and how they affect the people. Well-known conscious rap songs include the song “Brenda’s Got a Baby” by Tupac and the song “Daughters” by Nas. Much of the hip-hop produced during that time promoted positive, affirming stories about the Black experience. It can be argued that too much of modern rap music promotes violence, drug use, and hypersexuality, and there is a need for hip-hop to experience a second renaissance. As a songwriter, rap artist, and producer, I want to join conscious hip-hop artists like Kendrick Lamar as an example of how art can be used to positively impact the Black community. My fourth album, *Save The Game*, aims to provide social commentary and awareness, and answers the question of whether the impact of modern hip-hop music on society is primarily negative or positive, and asks why. My album includes songs that are about various cultural, political, and personal introspective issues. For example, my song “Fear” is about how exposure to violence can impact a child and cause them to feel paranoid and uneasy. It includes my experience of witnessing police brutality and school shootings on the news, and how the realization that the world can be a dangerous place affected me. My reason for making the album was to further develop my career as an artist and effect change in my community.

Henry Brown

Discipline: Physics and Astronomy

Authors:

#1 Joel Berlinghieri
Mitchel Huott

Abstract Name: Analysis and Measurement of Trebuchet Projectile Using Quaternions

The purpose of this project is to analyze the motion of a projectile launched by a floating arm trebuchet with the aid of quaternions. Quaternions have been studied and are traditionally used for graphic design, but not for tracking physical projectile motion. This project is unique in that it uses the quaternions to establish the

accelerometer's rotated input into a readable reference frame to measure position over time. To measure this, a gyroscope and an accelerometer are placed inside of the projectile additionally a camera setup, a more common methods of analysis, is used in order to compare the results. The results from the sensor were compared to the camera setup and demonstrated an accurate representation of the projectile's rotation. The positional results from the sensor have not yet been utilized.

Jacob Brown

Discipline: Anthropology and Archaeology

Authors:

#1 Ryan Parish

Abstract Name: Sourcing Ancient Stone Tools from Parsons, TN.

The current study examines the source of prehistoric stone artifacts to determine if past humans utilized local rock resources at the archeological sites located on the Townsend property. The Townsend property has several prehistoric sites which provide evidence that this area was used and occupied for millennia. The Townsend property would likely have been an appealing landscape due to its location near the Tennessee River and the abundance of natural resources including duck/wild game and chert, a rock similar to flint used to make stone tools. Reflectance spectroscopy is the method used to source the chert artifacts, and the results show that past humans were predominantly using local chert resources, but from a different outcrop than expected. This method produces spectra based on the reflectance of stone artifacts. Those spectra were analyzed with R to produce two different statistical models that identify a source. The study provides insight into past human behavior and how ancient humans were using the resources in this area. The current study also contributes to a larger body of research into reflectance spectroscopy stone sourcing. This body of research could significantly improve insight that archeologists could obtain about past human interaction with their landscape.

Nathaniel Brown

Discipline: Biology

Authors:

#1 Maryann Herman

#2 Fernando Ontiveros

#3 Jenny Fisher

Abstract Name: Exploring Freshwater Bacterial Communities: Culturing Challenging Isolates with Selective and Differential Media

Freshwater bacterial communities are influenced by environmental factors such as temperature, pH, organic matter, and pollutants. Because these ecosystems have direct ecological and public health relevance, systematic identification of microbial populations—including potential pathogens—is essential. Over the past decade, our team has collected water samples from the Rochester Lake Ontario Embayment, isolating more than 1,300 bacterial specimens. Of these, 1,023 isolates were sequenced using 16S rDNA, with approximately 200 showing contamination or mixed cultures. This project focused on isolates with poor sequencing results. Cultures were plated on selective and differential media (MacConkey and Mannitol Salt agar) and quality of resulting sequences assessed. DNA sequences from these samples were used to characterize bacterial diversity and assess genus-level prevalence; GIS mapping will be used to examine the

geographic distribution of key taxa. Particular attention is given to isolates from taxa with known pathogens. This work contributes to our long-term goal of developing a predictive model that integrates microbial data with satellite imagery to forecast the presence of specific bacterial taxa. By combining molecular analysis with geospatial tools, this study advances understanding of freshwater microbial ecology and provides a foundation for monitoring water quality and safeguarding public health.

Hailey D Brown

Discipline: Education

Authors:

#1 Nelson Pham

#2 Tatianna Duperier

#3 Arielle King

#4 Christopher Graziul

#5 Clinton Griffin

Abstract Name: (Re)Framing Police Data: A Mixed Methods Study through the Lens of Black STEM Students on Policing, Safety, and Data Justice

Policing in communities of color, especially Black communities, remains a persistent civil rights and public health issue marked by racial bias, excessive force, and declining trust (Cooper & Fullilove, 2016; DeVolder et al., 2022). However, much policing research emphasizes administrative data over community perspectives. This study aims to shift that focus by centering the voices of Black undergraduate students in STEM fields at HBCUs and generating evidence based on their lived experiences. We employ an exploratory sequential mixed-methods design, beginning with a qualitative phase that includes a brief screening survey, in-depth interviews, and focus groups. This phase collects personal narratives about STEM identities and interactions with policing among those most affected. These insights guide the development of research questions for the quantitative phase, which uses open-records administrative data from the Chicago Police Department. The study demonstrates how counter-narratives influence research priorities and challenge dominant interpretations of policing data while highlighting gaps often overlooked by traditional approaches. Our work is based on the Phenomenological Variant of Ecological Systems Theory (PVEST) and QuantCrit. PVEST explores how young Black adults interpret and respond to racialized encounters and how environmental stressors affect identity, well-being, and academic paths. QuantCrit highlights that quantitative data are neither neutral nor objective and must be interpreted with attention to racial systems and lived experiences. These frameworks shift policing research from studying “on” communities to studying with them. They support a participatory co-researcher model where qualitative findings become measurable, context-aware analyses that directly address community concerns. We expect the qualitative phase to reveal patterns linking racialized stress, STEM identity, and daily navigation of policing encounters. Quantitative results will contextualize these experiences within broader enforcement trends and predictive policing systems. Together, the findings will support discussions on public safety, equity, and data justice, guiding safer, more inclusive environments for Black STEM students.

Janayah Brown

Discipline: Psychology

Authors:

#1 Valiyah Henry

#2 Ashley Segbefia

#3 Arlenis Santana

#4 Aya Caballero
#5 Terri Sullivan
#6 Chelsea Derlan Williams

Abstract Name: Relations between children's skin tone and skin tone satisfaction and outcomes via children's peer victimization and competency

Colorism, or prejudice against darker skin tones, has been a systemic standard upheld in U.S. society since its inception (Abrams et al., 2020); however, few studies have explored the implications of colorism, especially in terms of skin color, among youth. It is possible that the ways in which youth think about their skin tone may impact how they interact with peers and/or how they are treated by their peers which may, in turn, predict their self-concept. Although the associations between the peer context predicting academic outcomes and self-esteem have been tested (e.g., Spyropoulou & Giovazolias), there is limited research on whether skin tone and skin tone attitudes inform the peer context. To address gaps, the current study tested the associations between skin tone and skin tone attitudes (i.e., skin tone, skin tone satisfaction, and desire to change skin tone) and self-esteem via the peer context (i.e., peer competence and peer victimization). Participants included 275 Black and Latine children ages 5 to 11 who participated in a larger study. Results indicated that none of the children's skin tone factors informed their self-efficacy or self-esteem when the peer context was taken into account, highlighting the importance of examining mediating variables. Several significant mediation pathways emerged. Skin tone was associated with greater peer victimization and lower peer competency. Lower peer competency was, in turn, associated with lower academic self-efficacy and self-esteem, while greater peer victimization was, in turn, associated with lower self-esteem. Another significant mediation pathway emerged, which indicated that children's increased desire to change their skin tone was associated with greater peer victimization, which was, in turn, associated with less self-esteem. Findings highlight the importance of focusing on children's racialized experiences early in development as they have implications for their peer interactions and outcomes.

Morgan Brown

Discipline: Psychology

Authors:

#1 Dylan Li
#2 Justin Riddle

Abstract Name: Modulating Cognitive Control Networks Using Frequency-Specific Transcranial Magnetic Stimulation

Hierarchical cognitive control involves managing multiple layers of rules and goals, enabling us to flexibly switch between and nest these rules to guide context-appropriate behavior. Distinct neural mechanisms have been identified in this process, particularly in the prefrontal cortex. Prior research has established that delta oscillatory activity is often implicated in contextual control, whereas theta oscillatory activity is associated with control demand - both of which are key components of hierarchical cognitive control. Given these findings, the present study seeks to examine the behavioral effects of modulating these distinct oscillatory dynamics through transcranial magnetic stimulation (TMS), a safe, non-invasive brain stimulation tool. Among a sample of young adult participants, we expect that delta frequency stimulation will enhance performance regarding rule contextual control while theta frequency stimulation will improve behavioral metrics related to control demand. Our future aims are to analyze neurophysiological data collected with high-density EEG to assess the causal role of delta and theta oscillations in underlying hierarchical cognitive control.

Braeden Brown

Discipline: Computer Science

Authors:

#1 Braeden Brown

#2 Jamie Wallenfang

#3 Brad Tran

Jamie Wallenfang

Brad Tran

Abstract Name: Embedded Linux in SCADA Systems

Supervisory Control and Data Acquisition (SCADA) systems run much of the infrastructure and industrial equipment we rely on; from factory lines to networked controllers. Because many SCADA devices and appliances use lightweight or embedded Linux distributions, they can inherit software flaws that attackers could exploit. This project scanned several Linux distributions commonly found in embedded and SCADA contexts (OpenWrt, Yocto-built systems, Buildroot, RHEL, BusyBox-based systems, and Tiny Core) to measure how many known vulnerabilities appear in readily available images. We pulled container images for each distribution, deployed them on Virginia Tech's CS Launch/Kubernetes resources, and scanned them using automated tools (Trivy and Gype) plus targeted testing with Kali tools. The scans returned different results across distributions; some images produced many vulnerability hits, and others failed to scan cleanly; highlighting differences in packaging, available metadata, and how scanners enumerate software. We then cross-checked hits against public CVE records and examined example exploits to show realistic attack paths (e.g., buffer overflows, improper permissions, escape sequence issues). This work shows that embedded Linux images can carry significant risk unless images and packages are tracked and updated. For practitioners, we recommend: (1) include vulnerability scanning in the deployment pipeline, (2) pin image versions and record SBOMs, and (3) treat embedded images like any other system when it comes to patching and monitoring. We will continue follow-up testing and practical exploit validation on RHEL, BusyBox, and Tiny Core images based on security-professional recommendations.

Roland Brown

Discipline: English and Literature

Authors:

#1 Mark Celeste

Abstract Name: Narrative in the Anthropocene

We as a species have so immeasurably changed the face of our planet that it may be widely argued we are presently in the Anthropocene, a new age inaugurated by our species, and our extensive domination of the Earth. Despite this, many people continue to struggle to grapple with the effects and causes of climate change, as it exists today in the Anthropocene. Why then, do we struggle little when it comes to narrativizing events within our own history, inaugurating ages that come and go with the passage of time, yet struggle in narrativizing the stories of the Anthropocene? Ecological and literary critics such as Amitav Ghosh have referred to the emergence of "a failure of imagination" within society as a whole. Seeking to address this failure, there have emerged new schools of thought among those in the humanities, particularly within fields of ecological literature, which I believe is key to addressing the present crisis of narrativization. It is the lack of a holistic vision, I contend, which perpetuates our failure to adequately narrativize the climate crisis. In this study, I tie together varying threads from within these new fields, titled the "Blue Humanities" or "Ecological Humanities" as a whole, with writers such as Hester Blum and Steve Mentz, to provide a narrative that

explains the origins of our “failure of imagination”, its systemic origins, and how the humanities play a vital role in narrativizing the already extensive scientific and sociological research on climate change. The findings of the study, through a close reading of post-growth ecological works such as Abigail Larkin’s “A Séance in the Anthropocene”, provide a powerful vision for what narrativization of the Anthropocene could look like within the humanities as a whole, and how they play a vital role in the fight against climate change.

Sarahjean Brown

Discipline: Engineering

Authors:

#1 Mahdi Vaezi

#2 Ryan Mueller

#3 Ian Janusz

Mike Nasser

Abstract Name: Transparent Soy Protein Composite Films For Sustainable Food And Pharmaceutical Packaging

Transparent soy protein composite films are presented as a sustainable alternative to conventional plastic packaging. These protein-based films are intended for direct contact with food and pharmaceutical products and combine safety, optical clarity, and flexibility with mechanical strength that approaches common commodity plastics. At the NIU Bioplastics Lab we formulate composite films from soy protein isolate SPI and cellulose nanofibers CNF recovered from soy hulls using an alkaline extrusion process that upgrades low value agricultural residues. Glycerin is incorporated as a plasticizer to provide flexibility. Acetic acid is used as a food grade multifunctional acid that forms ester and amide linkages with SPI and CNF, while sodium hypophosphite monohydrate acts as a benign catalytic salt that promotes this crosslinking at moderate temperatures without loss of transparency or edibility. The resulting formulations are cast from aqueous solutions by tray casting and controlled drying. The transparent SPI CNF films produced in our lab reach tensile strengths of at least 25 MPa, comparable to petroleum plastics such as low density polyethylene about 24 MPa. Reinforcement with CNF and acetic acid mediated crosslinking assisted by sodium hypophosphite substantially improve toughness, reduce solubility, limit water driven swelling, and decrease moisture sensitivity while preserving optical clarity. These balanced mechanical and barrier properties, combined with the use of abundant soy processing coproducts, position this system as a promising platform for sustainable packaging, including fresh produce wraps, edible or dissolvable films, and protective packaging for food and pharmaceutical products.

Joseph Bruccoleri

Discipline: Business

Authors:

#1 Yoshie Lord

Abstract Name: A Comparison of Industry Leaders’ Effective Tax Rates with Key Competitors Across Three Flagship Industries

Most common criticisms of the current corporate tax system suggest that large corporations do not pay their fair share. This project does not consider the possibility of direct increases in tax rates, rather it seeks to analyze manipulations of income of top-performing publicly traded firms against other large key competitors

in the same industry to benchmark the Effective Tax Rates (ETRs) in three major industries. This analysis allows us to make claims that leaders of industries may or may not have more tools for tax avoidance and comparatively identify their Effective Tax Rates. This project can test claims of excessive tax avoidance relative to other firms and highlight the strategies involved in the tax planning process, including tax havens. Previous research in this area has focused on firm differences such as large vs. small, public vs. private, and multinational vs. national. Other research highlights specific tax avoidance strategies of only one or two firms and has not specifically analyzed major firms in the same way as this study. Pulling competitors for the three industry leaders of Apple, Nike and Starbucks from expert-agreed sources—such as IBISWorld, Bloomberg Terminal and 10k documents—we can create a sample for which we will benchmark ETRs. Using the COMPUSTAT tool, we can begin our data collection of ETRs and related information. Our analysis might find that the industry leaders will have lower ETRs year after year due to various reasons such as economies of scale for tax planning, political influence, ability to offset income against failing segments, ability to hold foreign income abroad, ability to create subsidiaries and transfer income and expenses between themselves and more. If this is true, the country must strive to create a more equitable tax revenue collection system for the public good through policy change targeting these leaders.

Victoria Brunetti

Discipline: Chemistry

Authors:

#1 Shubhankar Kundu

#2 Haitao Liu

#3 Lauren Loeffert

Abstract Name: Covalent Immobilization of DNA Nanostructures on Surface Modified with Self-Assembled Monolayers (SAMs)

Understanding protein-protein interactions is crucial for unraveling cellular mechanisms, with broad implications in biomedical applications, evolutionary biology, and beyond. DNA nanotechnology enables the localization of biomolecules like proteins at tens to nanometer scale precision. In the field of surface modification techniques like patterning and lithography, DNA nanotechnology is being widely explored as an alternative approach. In this project, we have used DNA nanostructures due to their ease of modification, high biocompatibility, and ability to enable selective targeting. Previous work from our group has shown that stability of the nanostructures is influenced by surface wettability and mixed silane SAMs, one of the widely used surface modification techniques, with a higher concentration of polar amine-terminated silane, results in the maximum density of DNA nanostructures with maintained structural integrity once deposited onto it. Our project explores the covalent attachment of DNA nanostructures to silicon dioxide (SiO₂) surface via click chemistry. We have modified surfaces with alkyne terminating SAMs using 2-propyn-N-(triethoxysilylpropyl) carbamate (PTESC) silane. ssDNA modified with azide-terminating nucleobase has been used for simplifying the condition in the first place, to verify the covalent transfer. To investigate the successful attachment, we have extensively used surface-characterization techniques, including Atomic Force Microscopy (AFM), ellipsometry, video contact angle measurements, and X-ray Photoelectron Spectroscopy (XPS). Early data provides evidence suggesting covalent binding, and our ongoing experiments aim to quantify the binding efficiency as well as the localization of target proteins via covalently attaching DNA nanostructures modified with selective strands. These results contribute toward creating programmable bio-functional surfaces for applications in molecular evolution, construction of artificial cells, understanding cell-free signal transduction, and protein-interaction studies in the future.

Keyle Bryant

Discipline: Environmental Science and Sustainability

Authors:

#1 Francesca Leasi

#2 Nyssa Hunt

Abstract Name: Evaluating the Effects of Urbanization on Meiofauna Biodiversity in Chattanooga's Lentic Ecosystems Through GIS Applications

Lentic ecosystems—such as ponds, lakes, and wetlands—differ from flowing systems like rivers due to their stagnant waters, which accumulate sediment and organic matter, creating nutrient-rich habitats. These ecosystems are crucial for biodiversity, providing homes for diverse species, regulating water quality, storing water, and supporting human activities like fishing and agriculture. However, they face growing challenges from pollution, invasive species, habitat destruction, and climate change. Meiofauna—microscopic animals that inhabit these ecosystems—are key players in nutrient cycling, sediment stabilization, and food web dynamics. Due to their diversity, abundance, and short generation times, meiofauna serve as effective bioindicators of environmental change and provide valuable insights into ecosystem health. Despite their ecological importance, meiofaunal communities remain understudied, particularly in freshwater ecosystems. This study focuses on meiofaunal biodiversity across 10 lentic water bodies in the Chattanooga area, with an emphasis on understanding the impact of human activities on their communities. Using environmental DNA (eDNA) techniques, we assess biodiversity, including richness, community composition, and phylogenetic diversity. Additionally, GIS models are employed and integrated to quantify human influences such as population density, traffic, and land use in these ecosystems. The goal is to evaluate how human activities shape meiofaunal communities and contribute to the overall health of lentic ecosystems. The results will inform strategies for mitigating the negative effects of human impacts, supporting the development of sustainable practices to preserve the health and functionality of these vital ecosystems for future generations.

Chadwick Bryant

Discipline: Interdisciplinary

Authors:

#1 Chadwick Bryant

#2 Jackson Bostian

Abstract Name: Playing with Chance: Tuning Artificial Probability to Affect Player Engagement

Games frequently rely on randomness to generate excitement, suspense, and replayability (Goodman et al., 2025). However, developers often weight or present probabilities in deliberately misleading ways, simultaneously enhancing players' perception of fairness while amplifying emotional tension and engagement (Game Developer Staff, 2016; Myers, 2010). This research aims to investigate how players perceive and respond to such manipulations. Players' interpretations of chance are shaped by predictable biases: the gambler's fallacy, the hot-hand effect, and the near-miss effect (Dixon et al., 2024; Polin, 2023). These phenomena help explain why games that deliberately misrepresent in-game probabilities remain compelling and why players often overestimate their sense of control. To examine these effects, the research utilizes an experimental game in which participants roll virtual dice to earn points. The control group completes 90 rolls with truly random probabilities. The experimental group completes 30 baseline rolls with fair dice, followed by 60 rolls with subtly manipulated probabilities (specifically, adaptive streak-breaking and enhanced near-miss frequency). Throughout gameplay, behavioral measures are collected, including response times,

voluntary continuation decisions, and betting patterns. Post-gameplay, participants complete structured questions assessing perceived fairness, enjoyment, frustration, and pattern detection, followed by open-ended questions about their strategies and surprising moments. Quantitative data will be analyzed using mixed-model ANOVA to examine both between-subjects effects (control vs. experimental group) and within-subjects effects (across gameplay phases), while qualitative responses will be coded for thematic patterns related to fairness, strategy, etc. It is hypothesized that players who are exposed to weighted or near-miss conditions will report greater active involvement, enjoyment, and control with an equivalent or greater perceived fairness than those rolling unweighted dice. These findings will illustrate how cognitive biases interact with game mechanics, providing insights into the perception of randomness and future guidance for game designers seeking to create engaging experiences.

Maegan Brylski

Discipline: Psychology

Authors:

#1 Maegan Brylski

Abstract Name: Assessing Self-efficacy, Mental Toughness, and Perceptions of Performance after Sport Injury

Prior research indicates sport injury impacts athletes physically and psychologically (Tamminen & Watson, 2022). However, those with higher mental toughness levels experience less pronounced consequences from sport injury (Levy et al., 2006). This study investigates how self-efficacy and mental toughness impact perceptions of performance after a sport injury. It is hypothesized that those with higher mental toughness levels will demonstrate higher self-efficacy during sport injury, thereby mitigating the adverse effects of injury on perceptions of performance. Data was collected from 49 student-athletes who had experienced at least one sport related injury at a small private university through an online survey assessing history of injuries, self-efficacy, mental toughness and perceived performance. Initial correlational analyses were performed. Surprisingly, the number of injuries and severity of injuries were unrelated to self-efficacy, mental toughness or perceived performance. To examine whether mental toughness is associated with self-efficacy, multiple regression analyses were performed. Consistent with the hypothesis, mental toughness was positively associated with self-efficacy ($F(4,45) = 30.31, p < .001$). Professional Thoughts ($t(49) = 2.80, p = .007$) and Psychological ($t(49) = 2.91, p = .006$) were the components of self-efficacy most related to mental toughness. Additional regression analyses found mental toughness was associated with athletes' perception of performance ($F(3,46) = 18.08, p < .001$). In these analyses, the following components of perception of performance were strongly associated to mental toughness: Guilt ($t(49) = 1.87, p = .069$), Shame ($t(49) = -2.70, p = .01$), and No Concern ($t(49) = 2.57, p = .013$). These analyses suggest that mental toughness is associated with self-efficacy as well as perceptions of performance. The results highlight a need for fostering mental toughness, specifically in times of recovery from injury. This could allow athletes to better maintain self-confidence and performance perceptions in the face of adversity.

Connor Buchanan

Discipline: Biology

Authors:

#1 Agnieszka Rynda-Apple

#2 Heather Walk

Abstract Name: Effect of diet on functionality of anti-viral response in bats

Bats are unique among non-rodent mammals for their ability to host zoonotic viruses, such as influenza, Hendra, Nipah, SARS, MERS, and likely Ebola, without developing severe illness. Understanding how they achieve this homeostasis could reveal new insights into immune regulation and the factors that influence viral spillover to other species. Evidence from longitudinal studies conducted in Australia suggests that nutrition plays a role in controlling viral shedding by flying fox bats. In our studies, we found that Jamaican fruit bats fed diets supplemented with various compounds vary in their immune response and control of influenza A virus shedding. This project asks: How does the quality of bats' diet affect their control of anti-viral immune response and virus spread? Current research suggests that type I interferon (IFN-I) cytokines, proteins produced by cells as part of early anti-viral defense, play a central role in controlling viral shedding in bats. However, whether and how the IFN-I pathway is regulated in bats remains poorly understood. Here, we investigated how the IFN-I pathway induced in response to influenza virus infection is controlled in bats fed different diets. Specifically, we investigated whether inhibitory ISGs, specifically USP18 and SOCS1/3, increase in activity before the antiviral gene MX1 declines in expression. The existence of this trend would suggest that bats' immune system intentionally suppresses their anti-viral immune response to prevent overactivation while also suppressing viral expression. To test this hypothesis, gene expression was analyzed using quantitative PCR (qPCR) on rectal samples from bats collected under various experimental conditions. The project also examines whether diet influences immune regulation, potentially shaping patterns of viral shedding and environmental transmission. The expected results will provide evidence clarifying how bats fine-tune their antiviral responses. This research contributes to a broader understanding of bat immunology and offers insights into zoonotic disease spillover.

Allie Buchanan

Discipline: Psychology

Authors:

#1 Allie Buchanan

#2 Dr. Jane Jacob

Abstract Name: Cross-Modality and Visual Impairment

When taking in sensory information, visual stimuli is often the most dominant within the hierarchy of senses. However, when visual input is unavailable, specifically in those who are visually impaired, evidence of cross-modal plasticity and reorganization is present. Cross-modal reorganization in visually impaired individuals has been linked to the rewiring of the occipital lobe and other visual cortical areas to further support the processing of tactile and auditory information in the brain. This has led to strengths reported in sound localization, spatial attention, sound categorization, and haptic imagery. However, these findings are also dependent on the time onset of visual impairment, as the presence of visual experience impacts the potential for cross-modal reorganization, exhibited through the differences noted between congenital and late-onset blindness. By examining existing research, we aim to clarify both the functional advantages and the constraints of cross-modal reorganization in individuals with visual impairment.

Isaiah Buchberger

Discipline: Anthropology and Archaeology

Authors:

#1 Isaiah Buchberger

Abstract Name: Beyond Masses, Multitudes, and Interests: Escavating the Subjects of Contemporary Politics

This paper responds to the tactical and conceptual impasses faced during the student movements of May 2024. One such impasse was political disavowal—the gesture of declaring care for a cause in the register of “I would love to...” immediately undercut by “...but nevertheless.” Following Lisa Wedeen, this can be read as the mark of split attachments to order and change. Yet I suggest it may instead reflect a dissonance between organizers’ expectations of how politics ought to unfold and the unruly ways it actually does. The “expected” model assumes individuals, as members of groups, articulate interests and press them into social reality. Despite its seeming obviousness, this model is a contingent construction whose emergence is peculiar and whose persistence demands interrogation. To that end, the paper traces its genealogy, contemporary variants (from the World Social Forum to the World Bank), and the implications these hold for organizing today. It is at once a history of theorists and organizers, concepts and tactics, phantasmic movements and actually existing ones. Its critical grounding is in David Scott’s problem-space and Stuart Hall’s notion of conjuncture; its method draws from André Drainville’s *A History of Global Order and Resistance* and C.L.R. James’s *Notes on Dialectics*. By situating related fieldsites across four historical moments, the paper tracks organic transformations in the terms of order and change where “world ordering meets social forces.” Its merit lies not in adding any new concepts to the Left’s repertoire, but in recovering dormant ones and reanimating their relation to movements that have since lost them.

Lillian Budny

Discipline: Psychology

Authors:

Abstract Name: An Evaluation of the Difference Between Déjà Vu and Déjà Rêvé in Comparison to the BFI Personality Test

Many people experience a phenomenon commonly known as “déjà vu,” where they feel they are experiencing something again, despite knowing it has never happened. Much of the research on this subject suggests this is likely due to a malfunction in memory recall. However, there is often a misunderstanding of what déjà vu is, as there are some people who experience a different phenomenon. This phenomenon is known as déjà rêvé and can be described as the distinct impression that you are experiencing something from a preceding dream in your waking life. Though there is not as much research on this phenomenon, there has been a large study that looks at the connection between personality type and ability to experience déjà rêvé. A similar study was conducted with déjà vu. However, they have competing results both suggesting people who are curious and open minded are more likely to experience one of these phenomena. The goal of this study is to see if a distinction can be made between the likely personality type of each phenomenon. A questionnaire was sent out to college students enrolled in psychology classes. There were 39 responses from these participants, 17 of which experienced déjà rêvé and 15 who experienced déjà vu, with some participants in both categories. Participants were asked if they had experienced either phenomenon and about the frequency of its occurrence. They were also given the BFI personality test and asked questions pertaining to their dreams. Preliminary results seem to show that there is unlikely any statistically significant correlation between the personality types, demonstrating no distinctive difference between a specific personality type for each phenomenon. However, there seems to be a significant negative correlations between ability to experience déjà vu and one’s ability to experience both dreams and déjà rêvé.

Kalli Bue

Discipline: History

Authors:

#1 Erik Huneke

Abstract Name: Underbelly of a Beast: Joseph Leidy's Anthropodermic Bibliopeggy and Curious Donations to the Mütter Museum

This project explores how one of Philadelphia's most respected scientists also became linked to some of the most unusual and troubling objects in the history of American medicine. Joseph Leidy, who lived from 1823 to 1891, is well known for his major contributions to paleontology, anatomy, parasitology, and medical research. However, he also left behind a book that has been proven to be bound in human skin, as well as many questionable medical specimens that later became part of the Mütter Museum. These items raise important questions about how medical knowledge was created in the nineteenth century and how human remains were treated during that time. This study uses museum records, letters, and scientific information to understand how Leidy might have obtained or created these objects. It places his actions within the larger medical culture of the nineteenth century, when doctors often relied on human bodies for teaching and research, even when consent was unclear or completely absent. Practices that seemed ordinary to some scientists of the time now appear deeply unethical. Items that were once seen as scientific tools are now viewed as sensitive and sometimes disturbing artifacts. Museums like the Mütter must decide if and how to present them in a way that respects the people involved while still teaching the public about medical history. By studying Leidy's unusual donations, this work shows how museums carry the weight of past choices and how they can encourage more honest conversations about ethics, history, and the treatment of human remains. Moreover, this project aims to show how these findings deepen our understanding of the topic and point toward broader implications for future research and interpretation.

Grace Buettner

Discipline: Political Science

Authors:

#1 Alyssa Wagner

Abstract Name: Words & Warheads: Understanding Status vs. Security-Seeking Drivers of Chinese Nuclear Expansion

This paper examines why China is rapidly expanding and modernizing its nuclear arsenal and whether this growth is motivated more by external security threats or by a desire for international prestige and Great Power status. China's growing nuclear arsenal has been a persistent worry for many nations, especially the United States. The ambiguity surrounding the PRC's modernization efforts has led to a wide range of interpretations about its long-term strategic goals. Many scholars argue that security concerns drive China's nuclear developments, while others claim China is seeking to elevate its international status. This project contributes to that debate by systematically evaluating China's nuclear discourse across major government documents and speeches. Using both quantitative linguistic frequency analysis and qualitative discourse analysis, the study compares threat- and status-related terminology across PRC Defense White Papers (1995–2025) and key leadership speeches (1984–2025). The documents were categorized based on audience, domestic versus international, to assess whether rhetoric shifts depending on the target audience. This mixed-methods approach allows for capturing both broad linguistic trends and the contextual meaning behind China's nuclear language. The findings reveal an audience-based hybrid explanation: domestic-facing documents emphasize national prestige, while international communication places greater emphasis on deterrence and security. The data show that White Papers contain more status-driven language, whereas speeches directed at foreign audiences incorporate more threat and deterrence terminology. This suggests that the PRC simultaneously frames itself as a rising great power to domestic audiences and as a defensive,

stability-seeking actor to foreign observers. Understanding this audience-shifting rhetoric not only offers insight into the PRC's strategic behavior but also helps assess whether China's nuclear buildup is primarily reactive to U.S. actions or part of a broader effort to reshape the international system. These findings provide U.S. policymakers with a valuable tool for interpreting China's evolving nuclear intentions.

Kailey Buettner

Discipline: English and Literature

Authors:

#1 Kailey Buettner

Abstract Name: On Page and On the Stage: Landscape in Shakespeare's *The Winter's Tale* at the 2025 Stratford Festival

This project examines the relationship between literature, place, and performance through the Stratford Festival's 2025 production of Shakespeare's *The Winter's Tale*. Beginning with a close analysis of the written play, it investigates how Shakespeare's contrasting landscapes—Sicilia's constricted court and Bohemia's expansive pastoral world—establish thematic tensions that later take shape in performance. The project then explores how these landscapes are interpreted onstage and how those interpretations are influenced by Stratford, Ontario's own cultural and geographic identity. As a town named for Shakespeare's birthplace, bordered by the Avon River and neighboring the village of Shakespeare, Stratford offers an environment uniquely attuned to themes of transformation, exile, and renewal at the heart of the play. Through analysis of directorial choices, set and costume design, and the spatial dynamics of the Tom Patterson Theatre, this research considers how the Festival reimagines Shakespeare's landscapes in performance. It also investigates how Stratford's physical environment influences the audience's experience of *The Winter's Tale*, creating resonances between the play's imagined worlds and the town in which they are staged. By tracing these connections, the project highlights how the Stratford Festival engages with and reshapes Shakespeare's settings, offering interpretations that speak meaningfully to contemporary audiences and illuminate the powerful role of place in both literature and performance.

Yasmine Bulluck

Discipline: Psychology

Authors:

#1 Jimmy Green

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#4 Victoria Scott

Abstract Name: The Impacts of Funding Type on Telehealth Services Offered by School-Based Health Centers (SBHC)

School-Based Health Centers (SBHCs) have emerged as a health-promoting intervention by providing accessible primary and mental health care to address unmet health needs in school settings. Along with the growth in SBHC care, telehealth services have also increased after the COVID-19 era, ultimately furthering accessibility to care. Despite the evident growth in need for improved accessibility to care, few SBH programs offer developed and refined services via telehealth. SBHCs have a wide range of funding types including governmental, philanthropic, school system, and sponsor organization contributions. Funding type

may define operational flexibility, implementation capacity, and ultimately what services can be provided at specific SBHCs, such as telehealth provision. The purpose of the present study is to determine whether funding type impacts telehealth availability in SBHCs across South Carolina by analyzing needs assessment data. Data were collected utilizing an annual needs assessment developed by the Youth Access to Psychiatry Program. The survey was sent to School-Based Health (SBH) programs' administrators (N = 14) across South Carolina. Frequencies and counts assessed differences in telehealth availability across funding type and service type. Among 14 SBH programs, 3 reported having non-governmental funding while 8 had government funding. Of the government-funded programs, 100% provided services via telehealth, while 66.6% of programs who were not governmentally funded offered telehealth options. Results of the present study suggest that federal funding is not a barrier to telehealth service provision. Rather, a higher number of government-funded SBH programs had telehealth services in comparison to those with other funding types. By furthering an understanding of how funding type affects telehealth presence and quality, SBH program implementers can identify funding opportunities that have more potential in increasing sustainability and complexity of telehealth service provision.

George Burch

Discipline: Psychology

Authors:

- #1 George Burch
- #2 Jennifer Burch
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- #12 Todd Peterson
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Abstract Name: Assessing the Effects of Blast Traumatic Brain Injury on Olfactory Threshold Detection in Mice

Traumatic brain injury (TBI) is associated with numerous sensory and cognitive deficits, yet olfactory dysfunction remains one of its most overlooked consequences. Among individuals with moderate to severe TBI, approximately 15 to 30 percent develop post-traumatic olfactory dysfunction (PTOD), but the mechanisms responsible for this impairment remain poorly defined in preclinical models. PTOD is thought to arise from several pathways, including shearing of olfactory nerve fibers at the cribriform plate, disruption of olfactory bulb circuitry, and broader central nervous system damage. However, the relative contributions of these mechanisms, particularly following blast exposure, are not well understood. Because olfactory impairment is associated with TBI severity, odor detection measures may serve as a noninvasive indicator of blast-related neural injury and may provide a useful tool for identifying and monitoring TBI. The objective of this study is to examine how blast-related brain injury affects olfactory sensitivity in mice and seeks to establish a dependable paradigm for measuring olfactory thresholds using the KNOSYS olfactometer. C57BL/6 mice (N = 13; 9 females and 4 males) will be trained on an odor detection task using serial dilutions of ethyl acetate. Behavioral responses will be used to determine detection thresholds before and after exposure to a controlled blast. Following behavioral testing, brains will be collected for immunohistochemical analysis. Brains will then be analyzed for astrocyte and microglia coverage in the olfactory bulb, hippocampus, and cortex to evaluate TBI-related neuroinflammation. It is expected that blast-exposed mice will show reduced odor detection sensitivity accompanied by increased astrocyte and

microglial coverage, reflecting heightened neuroinflammation. By linking behavioral sensitivity with immunohistochemical markers, this study aims to evaluate olfactory threshold performance as a potential behavioral biomarker of TBI severity. These findings may deepen understanding of post-traumatic sensory dysfunction and support the development of translational tools for evaluating and diagnosing TBI-related olfactory deficits.

Sydney Burge

Discipline: Environmental Science and Sustainability

Authors:

- #1 Sydney Burge
- #2 Matthew Waters
- #3 Troy Clift
- #4 Kathryn Bowling

Abstract Name: Linking Human Development, Harmful Algal Blooms and Cyanotoxin Production in Lake Jesup, FL, USA over the last 150 years

The development of harmful algal blooms (HABs) in shallow lake ecosystems can cause dramatic decreases in ecosystem services such as anoxia, fish kills and the production of cyanotoxins. Whereas cyanotoxin production is generally linked to cyanobacteria abundance, the triggers of cyanotoxin production (nutrients, temperature, grazing, allelopathy) are still being determined. Here, we conducted a paleolimnological sediment core analysis to explore the onset and development of harmful cyanobacteria dominance and cyanotoxin production in Lake Jesup, FL, USA. Lake Jesup is a shallow (mean depth 1.2 m) and large (43.1 km²) lake with a history of harmful algal blooms and the cyanotoxin, cylindrospermopsin, located in central Florida. Lake Jesup has received excess nutrients from poor wastewater management and fertilizer runoff following the urbanization of central Florida during the 1960s. The primary objective of our project was to determine the temporal onset of cyanotoxin production in Lake Jesup and to identify the drivers of cyanotoxin production over the last 150 years. Our sediment core was dated using ²¹⁰Pb and each core section was analyzed for nutrients, cylindrospermopsin, and algal pigments. Results show that, while urbanization contributed to a cyanotoxin spike, cyanotoxin concentrations reached harmful levels prior to the development of Seminole County. Comparing cyanotoxin concentrations with nutrient data, algal pigments, and various elements suggest that a combination of biogeochemical and lake characteristics trigger cyanotoxin production through time. These findings will be useful for the identification of human activities that have decreased water quality through time and benefit future management of Lake Jesup and other lakes in central Florida with comparable water quality concerns.

Susana Burgos Meza

Discipline: Architecture, Construction Management, and Interior Design

Authors:

- #1 Susana Burgos Meza

Abstract Name: Built in Mexico: The Evolution of Mexican Architecture and Its Worldwide Impact

Built in Mexico: The Evolution of Mexican Architecture and Its Worldwide Impact
Susana Burgos Meza
1000 University Center Lane, Lawrenceville, GA, 30043 Architecture, Mexico, History

ABSTRACT:

This research explores the evolution and diversity of Mexican architecture across three major periods: pre-Hispanic, colonial, and modern. It also examines the global influence these traditions continue to have today. From the astronomical precision of Mayan observatories to the artistic fusion of Spanish colonial cathedrals and the rise of modernist works by architects such as Luis Barragán, each era has shaped Mexico's architectural identity. Pre-Hispanic civilizations, including the Maya and the Mexica (Aztecs), were pioneers in archaeoastronomy. Their structures were built to track celestial events that helped regulate agriculture and timekeeping. Their engineering achievements, such as the Mexica's hydraulic systems and aqueducts, demonstrate advanced craftsmanship still admired today. With the arrival of the Spanish and the establishment of Nueva España (New Spain), cultural blending became unavoidable. The forced and violent integration combined European and Indigenous styles, producing monumental structures like the Parroquia de San Miguel Arcángel and the Metropolitan Cathedral of Mexico City. These buildings reflect both fusion and conflict between two worlds. In modern times, Mexico's architecture continues to draw from its past. Architects such as Luis Barragán merged European Modernism with traditional Mexican aesthetics, creating emotional and spiritual spaces that have influenced architects worldwide. Through this research, the author aims to honor her Mexican heritage by sharing the richness, complexity, and global significance of Mexican architecture. By presenting this research and its lasting influence, the study seeks to spark curiosity, foster appreciation, and encourage others to recognize the profound impact Mexico has had, and continues to have, on the world of architecture.

Brooklynn Burke

Discipline: Law and Legal Studies

Authors:

Abstract Name: The Prematurity of Counter Small Unmanned Aerial Systems Legal Frameworks

Small unmanned aircraft systems (sUAS) have reshaped the modern threat landscape, yet the United States continues to develop legal and policy solutions that move faster than the technology required to support them. Although Congress, federal agencies, and the Department of Defense have proposed a wide range of counter-UAS (cUAS) frameworks, each of these efforts depends on a level of detection capability that the United States has not yet achieved. This paper surveys the major legal proposals currently under consideration, including the 2024 FAA Reauthorization Act's approach to low-altitude airspace, expanded federal mitigation authorities, and emerging state and local regulatory efforts. While these frameworks attempt to reduce risk and close jurisdictional gaps, they remain incomplete because none can function without consistent and accurate detection of sUAS activity. The analysis demonstrates that detection is the obstacle that shapes every other part of the cUAS mission. Existing sensors struggle to identify drones with enough accuracy to distinguish them from environmental noise or civilian objects. These shortcomings also create legal barriers, since unreliable detection data cannot meet constitutional or statutory evidentiary standards. As a result, policymakers lack the information they need to determine what authorities are necessary or how those authorities can be applied in a way that protects both national security and civil liberties. This paper concludes that meaningful cUAS governance is not possible until the United States first establishes reliable detection capabilities. Once detection is dependable, lawmakers can build legal processes that are enforceable and proportionate. In effect, detection is the foundation that determines whether any legal or policy framework can succeed.

William Burkey

Discipline: Biology

Authors:
#1 Laura Sipe
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Abstract Name: Rheological Effects of Microplastics on Biological Tissues

Microplastic contamination is becoming an increasingly important issue, but there is still little known about how they affect the mechanical properties of tissues. Blood, in particular, relies heavily on its rheological behavior to flow properly and deliver oxygen efficiently, so any disruption to its viscosity could have significant biological impacts. In this project, we measured how polyethylene terephthalate (PET) microplastics altered the viscoelasticity of biological tissues using rheological methods on the MCR 92 Anton Paar rheometer. Rheology provides a way to measure how biological materials respond to stress and strain, giving insight into how microplastics might physically interfere with the structure and function of soft tissues. Using controlled PET concentrations, we measured shifts in tissue mechanics such as viscosity under multiple types of stress. Across all samples, changes in viscosity indicated an interaction between microplastic presence and the microstructure of blood and cecum. These results show that microplastic contamination can be detected through quantifiable shifts in viscoelastic properties. For future endeavors, microscopic cell structure will be investigated before and after testing as well as in-vivo testing being used in hopes to measure a physiological effect of microplastics when introduced in a more dynamic system. This field is still vastly under-researched and the results of this project will be beneficial to future bio-materials research and microplastic research alike.

Sophie Burkey

Discipline: Dance

Authors:

Abstract Name: Strangers

Strangers is a contemporary dance piece set to Celeste's "Strange," exploring the quiet ache of emotional distance that grows between two people once deeply connected. The work reflects on shared memories, honoring past closeness and beauty while finding the strength to accept, release, and move forward from what can no longer remain. The choreography builds upon Celeste's soulful, aching vocals to bring the story to life, using grounded movement and expressive gestures to communicate both longing and clarity. The piece incorporates soloist sections, duets, and full ensemble choreography to show how these emotions shift between the intimate and the universal. Group patterns form briefly and dissolve again, symbolizing the movement between confronting the present pain and drifting into the warmth of remembered moments. The first duet embodies the positive memories, times of deep connection, harmony, and comfort. In contrast, the second duet represents the harder, fractured moments that reveal the instability of the relationship. Together, they reflect the flow of grief, from denial to recognition. A break in the music marks a break in the story. The soloist that emerges symbolizes the internal process of piecing together memories, breaking through delusion, and reaching acceptance. By the end of the piece, two dancers cross paths without acknowledgment, as if they have never met. This moment signifies the completion of grief: the understanding that although the relationship has ended, both individuals continue forward, now as strangers. Overall, Strangers captures the pain, nostalgia, and bittersweet clarity of letting go. The performance offers a poignant portrait of separation not just its sorrow, but the strange familiarity of learning to move on.

Rylee Burkhart

Discipline: Environmental Science and Sustainability

Authors:

#1 Rylee Burkhart

Abstract Name: Harmful Algae Bloom (HABs) Dynamics in Mixing Zones of Lake Superior

Phytoplankton, commonly referred to as algae, are found in water and create the base of the food web in aquatic ecosystems. When an ecosystem becomes unbalanced from excessive nutrient inputs, phytoplankton can grow too much, resulting in an algal bloom. One species of phytoplankton, cyanobacteria (also known as blue-green algae), can produce and release harmful toxins into the water and concentrate into scum called a harmful algae bloom (HAB). This research was conducted to identify spatial and temporal patterns in phytoplankton species in the St. Louis River Estuary and southern shore of Lake Superior, with an emphasis on cyanobacteria. The results of this work help us understand the phenology of phytoplankton and what causes shifts in distribution and abundance. This project worked in collaboration with the United States Geological Survey (USGS) to analyze cyanobacteria peaks in mixing zones of Lake Superior, and to incorporate technology and develop an algorithm for the remote detection and automatic sampling of HABs. Preliminary results of this study show brown algae species (diatoms) as the most abundant species at all locations over the sampling season, but algae community composition varies considerably among sampling locations. When present, peaks in cyanobacteria species were found at one sampling location at a time and their occurrence often lasted one day. This demonstrates that seasonal influences do play a part in algae communities through variation of environmental factors.

Ryan Burmesch

Discipline: Chemistry

Authors:

#1 Alexander Arnold

#2 Ethan Kowlaczyk

#3 Ravit Arav-Boger

Abstract Name: Synthesis of Human Cytomegalovirus Replication Inhibitors

With the high rates of infection of Human Cytomegalovirus (HCMV), specifically in transplant recipients, congenitally infected infants, and immunocompromised individuals, there is a great need for new treatment options. The effects of HCMV can be severe, causing organ rejection, intellectual disabilities, and vision and hearing loss. The contribution of our work conducted at the Medical College of Wisconsin and UWM is to synthesize new molecules that can then undergo further study to test for inhibition of HCMV. Specific molecules are targeted by taking the parent molecule, MLS000108969, and modifying parts of the structure. The molecules have then been analyzed to determine how the alteration in the structure of MLS000108969 changes its ability to inhibit HCMV replication to establish a structure-activity relationship. The synthesis of potential HCMV inhibitors requires methodically combining reactants to form the desired product. The impurity of this product is then removed using techniques such as column chromatography. After purification, the product can be analyzed using nuclear magnetic resonance (NMR) and mass spectrometry (MS). These methods are used to confirm the structure of the desired product and unknown compounds present in the sample. Following confirmation of identity, compounds are then sent to MCW to be tested against HCMV-infected Human Foreskin Fibroblast (HFF) cells to determine efficacy. It is anticipated that one of these compounds will be able to be used as a new treatment option for individuals affected by HCMV. All in all, while in normal and healthy adults HCMV infection is usually asymptomatic, certain populations as described before are vulnerable. The goal is to improve these individuals' outcomes and quality of life.

Austin Burnett

Discipline: Gender, Ethnicity, Diversity, or Cultural Studies

Authors:

#1 Hannah Dudley-Shotwell

Abstract Name: Abortion Funds: An Unexplored Keystone of the Reproductive Justice Movement

Abortion funds, which have provided financial support to abortion seekers since the 1960s, have long been imperative to the accessibility of safe abortions. In the 1973 Supreme Court case, *Roe v. Wade*, the court ruled that abortion was protected by an individual's right to privacy. *Roe* lifted a significant legal barrier for abortion-seekers, but legality does not ensure accessibility. Financial and practical hurdles persisted, and these hurdles were exacerbated by laws that chipped away at the protections *Roe* provided. For example, the 1977 Hyde Amendment bans the use of federal funds (including Medicaid) to pay for abortions. Over the next several decades, abortion costs skyrocketed and barriers to access increased tremendously. There is extensive scholarship about the importance of abortion access within the Reproductive Justice movement. However, there is minimal literature (no book-length study) about abortion funds and how they promote accessibility in response to the skyrocketing costs of abortion (many of which arose as a result of increased legislative barriers in the decades after *Roe*). To understand how funds impact abortion accessibility, I am conducting archival research at Duke University and reviewing social media posts and newsletters from abortion funds, as well as local and national print periodicals. I am also gathering oral histories from employees of various funds to gain a realistic understanding of how they operate. I expect this project to deepen our understanding of the ways abortion funds have been crucial to maintaining access in the US. Pregnant people turn to funds when they have decided that termination is the right choice for them but they cannot afford to make that choice. By providing financial and practical support, abortion funds have provided access to life-altering and even life-saving healthcare for thousands of people.

Matthew Burns

Discipline: Biology

Authors:

#1 Matthew Burns

#2 Tamara Marsh

#3 Kyle Bennett

Abstract Name: Isolation and Characterization of Anaerobic Microbes from Queen's Laundry

Thermal springs are believed to mimic the environment on early Earth when evolution of the earliest life forms was underway. Queen's Laundry is an alkali-silica spring and possesses significant microbial activity. Distinctive biomat sample were collected and served as inoculum to determine the metabolic capabilities of each biomat. These samples were then sequenced, revealing that a new species of bacteria was present in one of the samples. Phylogenetic mapping indicates that the organism is most similar to the *Anaerovirgula* and *Natronincola* genera. Attempts to recover this organism are ongoing with multiple enrichments established. DNA extraction will be performed to isolate DNA from each sample, followed by PCR using primers matching a unique segment of the species' DNA. Gel electrophoresis will then be used to separate the DNA segments with the goal of locating the species in one of the samples. Once the organism has been located, anaerobic roll tubes will be used to culture the bacteria within the sample(s). Unique colonies will then be

isolated until a pure culture of the new species has been obtained. A pure culture will be confirmed by DNA sequencing. Standard characterization tests will determine the growth requirements and characteristics of the species. The current scope of the study focuses on isolating and characterizing the organism of interest. We endeavor to isolate the organism using anaerobic cultivation techniques in order to determine its growth requirements, a process that will both reveal the nature of the organism and the biomat, or group of mutualistic bacteria, that it originates from. Understanding the biochemical characteristics of the isolate will provide insight into the community dynamics within the hot spring and potentially Earth's first species. The expected result is a profile of the new species of bacteria and an analysis of its ecological niche within the Queen's Laundry ecosystem.

James Burns

Discipline: English and Literature

Authors:

Abstract Name: Ernest Charles Jones and the Fate of Children and the Helpless in Unregulated Capitalism

Ernest Jones' "The Factory Town" remains a seminal piece of workers' advocacy in the period of Victorian hyper-industrialism. His depictions of the crampedness, the aching noise, the quivering toil of bodies in industrial environments are by-in-large bone chilling; to relegate this suffering to children is a horror without words, and a crime unparalleled in its detachment from reality. Jones posits that it isn't just that these working conditions delay, dampen, or stunt a child's physical and intellectual growth, but it is a system that calls for the elimination of childhood altogether, in exchange for a fresh, capable body to be added to the pile. By milling away a child's natural inclinations toward discovery and learning, the consequences of this stunting supersede trauma, toward something of an emotional hollowing, in many ways an incurable, hereditary disease. We can get a further sense of the peril and subsequent activism of Jones' period by joining it with that of Charles Dickens' *Bleak House*. The novel, whether in its deprecation of bureaucracy or deification of orphanhood, calls into question both the quality of life of working class Londoners as well as the mechanisms slowing down the rate of social progress. In conversation, these texts illuminate the crumbling of human dignity in the midst of "modernity"-- the promise of philosophical-political movements centered around notions of individual liberty, reason, and truth. In his almost sermonic poetical voice, Jones describes not just the quality of suffering for industrial workers, but why there is a systemic hold on the spirits of the people that prevent them from rising up for the sake of children. His mission-- as a force in the working-class Chartist movement-- is to emphasize a consideration of the less fortunate, and that reform can only be achieved with the conscious effort of the many.

Preston Burnside

Discipline: Engineering

Authors:

#1 Preston Burnside

#2 William Borges

#3 John Lagarde

William Borges

John Lagarde

Abstract Name: Simulation-Based Reinforcement Learning for Autonomous Rocket Landing Control

This project explores the integration of simulated reinforcement learning (RL) and mechatronic design to achieve complex physical tasks. Specifically, the team aims to perform an autonomous landing of a rocket-like device, inspired by the SpaceX Falcon 9 booster landings. The RL agent is first trained within a physics-based simulation environment using a subset of RL called Proximal Policy Optimization (PPO), allowing the agent to learn how to stabilize and execute a controlled descent by managing four motors and four aerodynamic fins. The trained agent is then deployed to a custom-built rocket prototype designed to emulate the dynamics of a rocket using brushless motors and onboard sensors. By bridging simulation-based learning with real-world implementation, this project evaluates the effectiveness of RL for autonomous control compared to traditional methods. In the current state of this project, the researchers observed a ~32% successful landing rate with another 35% in “soft impact” failed attempts over 350,000+ simulations. We plan to improve these numbers throughout the year by moving to a different simulation method that will allow us to have more processing power available to go towards larger training sets at a quicker rate. The team also plans to refine our physical design to improve stability and efficiency. These results contribute to the growing field of autonomy in aerospace and robotics, highlighting both the potential benefits and the challenges of applying reinforcement learning to complex dynamic systems.

benjamin burrell

Discipline: Exercise Science and Nutrition

Authors:

Abstract Name: Effects of Internal and External Verbal Attention cues on Concentric Barbell Velocity in the Bench Press

This research examines how focused verbal cueing can affect barbell velocity in the bench press. Verbal cues are employed by coaches to focus the athlete's attention in workouts; changing the cueing word slightly from internal to external focus may change an athlete's performance due to attentional-focus theoretical frameworks. This research study compares barbell velocity using internal cues (which direct attention to movements of the body) and external cues (which direct attention to the result or effect of body movements) while utilizing the attentional-focus framework. A randomized within-subject repeated measures crossover design will be utilized with resistance-trained adults (ages: 18-30) attending William Peace University. Participants will perform each cueing test condition in a counterbalanced order after completing a separate familiarization and one-repetition maximum (1-RM) session. During testing participants will complete two sets of three repetitions at 70 percent of their respective 1-RM for each cue type (internal and external). An internal cue would be "Drive through your chest and push elbows to lockout fast" and an example of an external cue would be "Punch the bar explosively toward the ceiling" cited verbatim (as scripted). Mean concentric and peak concentric barbell velocity will be measured using a GymAware FLEX device, with rep-to-rep variability and RPE deemed secondary outcomes. All variables in testing (grip width (1.5× biacromial distance), lifting cadence, and pre-testing routine) will be pre-standardized to control external variables. At this stage, it is anticipated that external cuing will produce faster barbell velocities, along with reduced rep-to-rep variability, in comparison to internal cuing. Overall findings in the study will clarify the understanding of how cue phrasing may impact an individual's movement efficiency and performance. The findings will translate into practical applications for strength and conditioning professionals to enhance the ability to verbalize instruction and increase athletes' overall power output.

Rebecca Burrows

Discipline: Political Science

Authors:

Abstract Name: The U.S. Campaign Finance System and Youth Underrepresentation

This research investigates why young people remain underrepresented in elected U.S. offices and why youth voter turnout has historically remained low. Motivated by persistent shortcomings in U.S. youth turnout, the dominance of older elected officials, and recent high-profile victories by young mayoral candidates, this study asks whether young candidates (<40) increase youth voter turnout in U.S. elections—and, if so, whether structural factors prevent these candidates from winning. Existing literature on descriptive representation and electoral inequality suggests that young candidates may energize youth voters yet face systemic disadvantages that hinder their success. This research contributes to the literature by exploring how the U.S. campaign finance system shapes young candidates' electoral viability. Using a qualitative comparative case study design, we analyzed four large U.S. mayoral elections: two with victorious young candidates (Boston 2021; New York City 2025) and two where no candidate under 40 appeared on recent ballots (Los Angeles and Columbus). For each city, candidate eligibility rules, ballot requirements, party bylaws, primary election methods, and campaign finance laws were examined using publicly available legal and institutional documents. This approach allowed us to identify structural barriers while remaining open to unanticipated patterns across cases. Our findings reveal no explicit legal or party rules that impede young candidates. Instead, obstacles lie implicitly in the U.S. campaign finance system's lack of limits on contributions, candidate spending, and the normalization of high-cost campaigning. These conditions allow older candidates—who are more likely to possess greater financial resources—to outcompete younger challengers, limiting youth descriptive representation and alienating youth from electoral politics. We conclude that youth underrepresentation is sustained less by overt legal barriers than by embedded systemic inequalities in campaign finance, an issue with broader implications for electoral integrity, representative democracy, and youth voter turnout in the United States.

Eden Burt

Discipline: Visual Arts

Authors:
#1 Carlee Bradbury

Abstract Name: Monster Grrrls: Visualizing the Monstrous-Feminine and Abjected Bodies Using Zinemaking

Femininity, long associated with "otherness," has been critically examined for decades. Barbara Creed, for example, described how the feminine is cast as abject, monstrous, or in need of suppression. Such ideas originate in the ways people societally defined as women are represented in film, literature, and other media. Therein, a cultural tendency to divide bodies into human, nonhuman, desired, and rejected parts has been shown. In *Monster Grrrls*, I use collage to explore these themes, presenting each collage as a separate page within a "zine." Zines, a term derived from "magazine," are handmade, self-published books that share art or information and often give voice to marginalized communities. Originating in the 1930s science-fiction scene, zines regained popularity through third-wave feminism and the Riot Grrrl movement. Publications like *GUNK*, *Girl Germs*, and *Candy Ass* became prominent in the 1990s. These zines acted as a medium to discuss the patriarchy, female objectification, or sexual abuse. The monstrous-feminine, comparatively, highlights the realities of the underrepresented. With the creation of a zine as a physical "body" for my work, viewers are enabled to engage with my art through touch. Literature and dialogue possess both function and vitality, similar to the human body. My collages draw inspiration from artists who explore the idea of female bodies, such as Rosa Verloop, Jessica Ledwich, and Alexandra Montclair, as well as from my personal experiences. The work of female "art monsters" and the concept of the monstrous-feminine empowers me to express my identity and experiences through art, even in a culture where censorship is normalized and those marked as "other" are deemed obscene. Art can transcribe our bodies, the abject, and force us to confront

what we reject. Through artmaking, I carve space for myself and am heard in a world that has labeled my existence "monstrous."

Nicholas Burtless

Discipline: Engineering

Authors:

#1 Nicholas Burtless

#2 William Morrison

#3 Liam Bantasan

William Morrison

Liam Bantasan

Abstract Name: Affordable Screw Based Modular Sports Prosthesis

Individuals with forearm disabilities often face barriers and limitations that prevent them from participating in common recreational and fitness activities, including but not limited to weightlifting and ball games. Existing prosthetic devices are often niche, expensive, unadaptable, or unavailable for a common population. This leads those with no connection to a possible manufacturer or those below the poverty line to have little success in finding and producing a prosthetic device for their situation and preference. Our research looks to introduce a modular forearm prosthesis designed to serve numerous functions through interchangeable wrist mounted attachments. The base of the design is a forearm mount with a secure screw mechanism on top, that allows users to attach and remove modular components with ease. This mechanism ensures that the attachment is firm and does not buckle under dynamic forces. A few prototype attachments include a curved bench-press hook that can encase a bar and dumbbells, and a scoop-shaped attachment optimized for tossing and receiving balls. Our design aims to reduce costs, increase accessibility, and give users freedom and adaptability over their equipment choice. Ultimately, the project addresses physical barriers faced by individuals with forearm differences, promoting participation and engagement in activity while offering a practical and low-cost solution for those facing these disabilities.

Tianna Burton

Discipline: Biology

Authors:

#1 Tianna Burton

Abstract Name: The Future and Health of Coral Reef Species located along the Florida Keys Reef Tract

According to Zeng, K., et al. 2025, the coral reefs world-wide are predicted to experience major losses over the next few decades. The study indicates that one of the major influences leading to these losses includes the increased stress from climate change. The increased stress from climate change has led to warmer ocean temperatures and an increase in ocean acidification. An increase in human activities including the overfishing of the reefs and ecotourism has also contributed to reef stress. Other parameters that impact coral performance include the physiochemical conditions of changes in pH, salinity, and sedimentation. An increase in algae that is not part of the normal coral endosymbionts also has an effect on healthy coral. The purpose of this study is to combine historical geological and climate data, coral fossil records from the Florida Keys along with current coral studies being investigated by the Mote Laboratory to make a prediction on the future success of the growth and health of the Florida Keys Reef Tract. Five, 10 meter transects were

used to study and record fossil assemblages found at the Windley Key Fossil Reef Geological State Park. Data was gathered on all identifiable coral found both crossing and below the transect lines to the genus level including *Montastraea*, *Diploria*, *Colpophyllia*, *Porites*, *Acropora*, and *Orbicella*. Data was also recorded on Mollusk, Bryozoan, and Echinoid fossils but not to the level of genus or species. Observational reef data was collected while snorkeling at Cheeca Rocks, Bahia Honda State Park, and Key West. Information on current reef restoration was observed as well as participation in reef microfragmentation practices at Mote Marine Lab in Summerland Key. All experiences were combined to make a prediction about the future and health of both current and future reef species located along the Florida Keys Reef Tract.

Darrius Bushe

Discipline: Psychology

Authors:

#1 Darrius Bushe

#2 Michael A. Owens

Abstract Name: Feasibility and Acceptability of Brief Behavioral Treatment for Insomnia Via Telephone in People Living with HIV and Chronic Pain and Insomnia

People living with HIV (PLWH) experience high rates of insomnia and chronic pain. Insomnia strongly predicts pain outcomes; targeting insomnia in PWH is important and outcomes and targeting it may yield downstream benefits to pain outcomes. Traditional non-pharmaceutical insomnia interventions like Cognitive Behavioral Therapy for Insomnia (CBT-I) often have high barriers to access, especially for patients with high medical burden. Brief Behavioral Treatment for Insomnia (BBTI) via telephone may be a feasible alternative. BBTI utilizes behavioral strategies like stimulus control and sleep restriction to improve sleep outcomes. This pilot study is evaluating the feasibility and acceptability of BBTI among PLWH experiencing insomnia and chronic pain. Thirteen adults have been recruited from a community-care HIV clinic and randomized to BBTI or a control group receiving mindfulness. Feasibility and acceptability is assessed by closely tracking participant matriculation and attrition. Additionally, participants will complete a feasibility and acceptability questionnaire collecting quantitative and qualitative data. One hundred percent of completed participants report “strongly agree” to being satisfied with the interventions and that participation was easy, convenient, and helpful. Among BBTI completers, 100% agree or strongly agree that the intervention improved their sleep, pain, and overall quality of life. Of the 13 recruited participants, only 2 participants did not complete all sessions of the intervention and were lost to follow-up after the first intervention. The non-completers were randomized to both BBTI and mindfulness groups equally. One participant requested to drop out of follow-up following the final intervention due to an unrelated medical emergency. These results provide support that a brief, behaviorally focused sleep intervention may be feasible and beneficial for PLWH experiencing chronic pain and insomnia. Participants report strong feasibility, satisfaction, and benefits with both interventions which highlights the benefit and importance of non-pharmacological interventions focused on improving quality of life and symptom management.

Georgi Butch

Discipline: Economics

Authors:

Abstract Name: Industry-Specific Effects of Job Lock

The notion of job lock refers primarily to the phenomenon in which an individual forgoes the opportunity for more productive employment due to the high opportunity cost of losing their current job, which offers some non-wage benefit that may be difficult to obtain elsewhere. In the United States, health insurance is a common fringe benefit provided by employers to employees. Previous studies examining whether job lock is prevalent in the United States have yielded varying results, but few, if any, question whether the phenomenon may have heterogeneous effects across industries; in other words, industry-specific factors may influence labor market mobility among individuals who receive health insurance benefits from their employer. In this paper, I will introduce a new model for understanding the role of job amenities in producing job lock. Then, using data from the Current Population Survey's Annual Social and Economic Supplement (CPS ASEC) and the Survey of Income and Program Participation (SIPP), I will assess the impacts of job lock following the natural experiment of the Affordable Care Act's Medicaid Expansion, which extended Medicaid access to those with incomes within 138 percent of the Federal Poverty Level in 25 states on January 1st, 2014. Using triple and quadruple differences regressions, I will determine the effects of the expanded Medicaid policy on job mobility for people within the eligible income bracket who were obtaining health insurance from their employer prior to the enactment of the policy. Furthermore, I will separate individuals by occupation to test the hypothesis that those in occupations with fewer amenities experience job lock at higher rates than those in more amenable occupations, and therefore should show higher levels of mobility due to the Medicaid Expansion's augmentation of non-employer sponsored health insurance options.

Storrie Butcher

Discipline: Visual Arts

Authors:

#1 Storrie Butcher

#2 Corinne Schob

Corinne Schob

Abstract Name: Qing & Nazca Pottery

Storrie: The surface paintings are specifically why I was drawn to the Qing dynasty for my recreation. The paintings on the pieces were so interesting and truly show such a range of images and symbolism. Some common things portrayed were dragons and phoenixes, representing imperial power. Landscapes and flowers such as peonies were commonly painted symbolising prosperity and feminine power. Then there were also human figures painted as well. Guanyin, a Buddhist goddess, is depicted on many different ceramics from this dynasty. When creating my piece, I have incorporated elements from three images. I adore the painting style of the white porcelain with the birds and flowers, especially knowing the significance of the images now. I have also used the structurally sound form of the dragon piece to ensure my piece will stand strong and hold its space well. Corinne: I decided to base my 12 inch vessel after the Nazca pottery style featuring literal imagery in a cartoonish approach while utilizing earth toned underglaze for a painterly effect typically with wide and flat walls in order to properly display the image. The Nazca people were a mainly nomadic group that took much creative inspiration from the Paracas who utilized complex tiles as well as similarly styled and decorated ceramic pieces. They typically lived on the southern coasts of Peru in river valleys of the Rio Grande de Nazca and Ica Valley though they did live a nomadic lifestyle giving us the Nazca or Inca lines they made, by stomping in uniform lines in order to make large shapes seen from a birds eye view, while they travelled. Overall, they are very creative people.

Augusto Butkewitsch

Discipline: Mathematics

Authors:
#1 Jonathon Peterson

Abstract Name: Exploring Optimization Strategies As Stochastic Processes: A Case Study on a Block Game Using Genetic Algorithms and Stochastic Gradient Descent

This paper investigates the behavior of optimization algorithms under uncertainty by modeling them as stochastic processes. Specifically, we examine Genetic Algorithms (GAs) and Stochastic Gradient Descent (SGD). Initially, GAs are conceptualized as discrete-time Markov chains, where each population of candidate optimization parameters (strategies) constitutes a state. The transition from one generation to the next is governed solely by the current population and the application of genetic operators like selection, crossover, and mutation, without dependence on prior generations. This memoryless property aligns with the Markovian assumption and enables a probabilistic analysis of GA dynamics. Subsequently, we extend the Markovian framework to analyze SGD, a widely used optimization method in machine learning. Despite its foundation in calculus-based optimization, SGD shares the Markov property with the GAs, as its updates depend only on the current parameter values and the stochastic gradient estimate. Furthermore, we explore the stochastic nature of SGD by modeling its noise component as Brownian motion in the continuous case, and as discrete approximations to Stochastic Differential Equations (SDEs) in practical implementations. This dual perspective allows for a richer understanding of SGD's convergence behavior and its capacity to escape local minima. To ground these theoretical insights, we conduct numerical experiments using a simplified block game as a toy problem. In this setting, both GAs and SGD are employed to search for the optimal playing parameters aimed at maximizing the game score. The experimental results are analyzed to assess the degree to which each algorithm adheres to its theoretical stochastic model, and to compare their relative performance in navigating uncertain environments. The paper concludes with a discussion of the implications of these findings and proposes directions for future research, including the exploration of more complex games with varying constraints to further test the robustness and adaptability of these optimization strategies.

Ray Butler

Discipline: Business

Authors:

Abstract Name: Understanding the Dialectics of AI Integration among Business Executives

AI is now in every industry with its use proliferating daily in organizations. The purpose of this project is to use Baxter and Montgomery's (1996) relational dialectics to investigate the AI-related dialectical tensions experienced among executives across multiple industries as these executives navigate implementation of AI into their organizations. Relational dialectics has been used extensively as a framework including for examining end of life communication (Amati & Hannawa, 2013), African American entrepreneurial experiences (Anderson, Sims, Shuff, Neese, & Sims, 2015), and inter-professional relationships (Mikkola, Peltola, & Apker, 2025). While these investigations are within professional and business contexts, no research has yet probed relational dialectics through an examination of AI within the experiences of executives. Through 24 personal interviews with executives and comparative analysis, the research methods yield themes that contribute to the body of progressive technological AI research. The themes gleaned from preliminary research findings reveal key tensions negotiated in the areas of AI's impact on jobs, AI's optimization of workflow processes, and AI educational gaps. Preliminary research results can help business executives avoid the detrimental effects of being AI stragglers, improve their AI implementation, and enhance AI decision-making processes through cross-sectional perspectives. This ongoing research provides insightful information for business professionals looking to advance their AI endeavors.

Mars Butler

Discipline: Mathematics

Authors:

#1 Lily Obenauer

#2 Matthew Remington

#3 Diego Becerra

#4 Esther Olurotimi

#5 David Kuehhas

Jason Clarke

Abstract Name: Simultaneous Approximation for Cryptography

Cryptography protects digital information by relying on mathematical problems that are difficult to solve. Many modern cryptographic schemes use lattices, geometric structures whose underlying problems are believed to be secure against classical and quantum computers. However, practical lattice-based schemes often require very large public keys, creating challenges for efficiency. Recent theoretical work suggests that a special class of lattices called simultaneous approximation lattices may offer a path toward reducing key sizes without sacrificing security. These lattices are compactly described by a single vector and one additional parameter and are proven to be as secure as general lattices. Our project explores how these objects can be implemented and used in real cryptographic schemes. This talk will outline the background of the project as well as projected paths forward.

Sicely Bybee

Discipline: Gender, Ethnicity, Diversity, or Cultural Studies

Authors:

#1 Sicely Bybee

#2 Kortney Koopman

#3 Ashlee Wiseman

Kortney Koopman

Ashlee Wiseman

Abstract Name: The Invisible Patients: Visual and Textual Representation of Human Diversity in Anatomy and Physiology Textbooks

This study seeks to identify how representation of the human body in the healthcare curriculum may impact students' understanding and perceptions of what constitutes a healthy, typical body. With many different textbook sources and AI resources available, undergraduates can study through a variety of methods with varying quality of representation. Focusing on the reproductive and integument systems, this study analyzes popular anatomy and physiology textbooks to assess the visual and textual coverage of normal anatomical variation by gender, race, age, and other physical characteristics. The textbook analysis quantifies: 1) the number and types of images and words representing diverse demographics, 2) compares coverage of male versus female reproductive anatomy and physiology, and 3) the total coverage of light skin tones and darker skin tones in integument chapters. Google Notebook LM was used in addition to self-analysis for comparison of word quantity. Findings reveal in the reproductive chapters a pronounced bias toward coverage of young, white, western-stylized individuals, often male, and frequently reflecting trends such as depilation and circumcision. The analysis of the integument chapters shows a substantial imbalance: images of light-skinned individuals outnumber those of dark-skinned individuals by roughly 9:1, meaning that fewer than 10% of visual examples depict darker skin tones. These conclusions identified problematic coverage, and this study

can advocate for improvements with both educators and publishers. Such representational gaps and biases risk narrowing undergraduates' understanding of human diversity and may affect the quality of care they provide to a broad patient population as future healthcare professionals. The goal is to help broaden the understanding of anatomy and physiology of undergraduates and enable them to become more informed and inclusive health care professionals who can provide care to all individuals.

Pamela Byrd-Williams

Discipline:

Authors:

#1 Pamela Byrd-Williams

Becky Green-Marroquin

Vivian Vy Le

Abstract Name: PURE-STEM: Expanding Research Pathways for Community College STEM Majors

The Preparation for Undergraduate Research Experiences in STEM (PURE-STEM) program is a pilot initiative designed to broaden access to STEM research opportunities for low-income, and first-generation students at Los Angeles Valley College (LAVC), a Hispanic-Serving Institution (HSI). Building on the success of the NSF-funded PaCES program, PURE-STEM addresses barriers that prevent community college students from participating in research experiences, which are critical for persistence and transfer in STEM disciplines. PURE-STEM leverages partnerships with R1 institutions to provide funded internships and scaffolded programming that introduces students to research culture, soft skills, and STEM identity development. Over three years, the program will engage Biology majors through a structured learning community, academic coaching, and exposure to diverse research environments. Key objectives include: (1) increasing the number of students with research experience; (2) boosting confidence and preparedness for Research Experiences for Undergraduates (REUs); (3) improving STEM transfer rates; and (4) fostering graduate school aspirations. The program employs evidence-based strategies such as mentorship, resume workshops, and symposia, complemented by immersive experiences in partnered research labs. Success will be assessed through mixed-methods evaluation, including pre/post surveys and qualitative focus groups, generating data to inform best practices for supporting marginalized students in STEM. Broader impacts include creating a replicable model for other two-year institutions, expanding internship pathways, and strengthening networks between academia and industry. By increasing opportunities in STEM and cultivating future scientists at the community college level, PURE-STEM contributes to a more experienced scientific workforce that enriches the innovative ecosystem.

Hannah Byrnes

Discipline: Psychology

Authors:

Abstract Name: Broader Autism Phenotype Traits and Alcohol Motivations in College Students

The Broader Autism Phenotype (BAP) consists of subclinical, autistic-like traits in individuals who do not meet the diagnostic criteria for autism (Bolton et al., 1994). BAP comprises three traits: aloofness, rigidity, and pragmatic language difficulties. Individuals with elevated BAP traits often experience challenges in social communication, adaptability, and emotion regulation, affecting relationship quality and social connectedness. Such difficulties may be particularly relevant during college, where social integration is

crucial for well-being and alcohol may serve as a social lubricant or maladaptive coping mechanism. The present study examines how BAP traits relate to alcohol use patterns in a cross-sectional survey of 618 college students (76% female; Mage = 19.4). Guided by the Incentive Motivational Model of substance use (Cooper et al., 2016), we hypothesized that higher aloofness and rigidity would be associated with greater coping motives, while pragmatic language difficulties would relate to social or conformity motives. Our hypotheses were partially supported. Higher rigidity was associated with drinking to cope with anxiety ($r = 0.093$, $p = .03$) and depression ($r = 0.10$, $p = .02$), supporting our prediction that people with more rigid personalities are motivated to drink by psychological distress. Similarly, higher pragmatic language challenges were associated with drinking to cope with anxiety ($r = 0.116$, $p = .007$) and depression ($r = 0.153$, $p < .001$). Though we expected pragmatic language difficulties to be linked to conformity and social motivations, results suggest that individuals drink to cope with distress from communication difficulties in social settings. In contrast, higher aloofness was negatively associated with drinking for enhancement ($r = -0.138$, $p = .001$) and social reasons ($r = -0.133$, $p = .002$), suggesting that aloof individuals avoid social drinking settings. Our findings indicate that BAP traits associate with distinct drinking motivations, highlighting the importance of considering individual differences when examining substance use in college populations.

Adriana Cabral

Discipline: Architecture, Construction Management, and Interior Design

Authors:

Abstract Name: An Equine-Assisted Environment Supporting Developmental, Sensory, and Emotional Well-Being in Neurodivergent and Special-Needs Children (Ages 8–15)

The project is grounded in research demonstrating that equine-assisted interventions can improve emotional regulation, communication, and sensory processing for neurodivergent children. However, most existing facilities are not designed to support these therapeutic needs. In addition to this research, an in-person interview with a parent of a child on the spectrum provided further insight into real-world sensory challenges, therapeutic barriers, and user priorities. Many studies indicate that structured interaction with horses can promote emotional stability, confidence, communication, and self-regulation, providing a supportive alternative to therapeutic settings. This project addresses that gap by proposing a neuro-inclusive, evidence-based facility that creates an approach to emotional safety, supports sensory regulation, and strengthens the overall therapeutic experience for children ages 8–15. This project translates these findings into spatial form through a carefully curated environment that promotes predictability, safety, and adaptive engagement. The design addresses the gap between social, emotional, and physical challenges faced by these users through evidence-based strategies that integrate equine therapy, sensory regulation, and environmental psychology. Through design, each space is shaped to reduce sensory barriers and support individualized comfort. The facility is designed to support ongoing growth, strength, and resilience, expressed through symbolic and functional upward movement. The design incorporates sustainable and wellness principles, emphasizing healthy air quality, lighting strategies, opportunities for movement, responsible material choices, and benefits for mental well-being. Key design features include sensory-friendly color schemes, acoustically supportive materials, biophilic elements, and flexible spatial layouts that accommodate a range of sensory needs. Spaces such as the therapy arena, observation lounges, sensory rooms, and reading zones provide varied ways to participate, observe, or engage hands-on. Wayfinding, privacy features, and controlled environmental conditions further enhance emotional safety and spatial understanding. These design strategies create a therapeutic environment where research-driven interiors support neurodivergent children by encouraging connection, empowerment, and meaningful growth.

Rafael Cabrices Rodriguez

Discipline: Visual Arts

Authors:

Abstract Name: The Art of International Fashion

This research consists of exploring different aspects of fashion and cultures across the world through the ages. Divided into three themes “Ancestry, Timeless Eras, and Modern Day.” Ancestry showcases the origins, the roots of our identity. A period of time when fashion started to develop across the world’s differences and deep cultural heritage. Timeless Eras showcases where cultures started to get more refined. Reflecting elegance, structure, and social status. Creating a balance of sophistication and cultural identity. Modern Day showcases the celebration of individuality, creativity, and broad access to global influence. Blending aesthetics from the early 2000’s, combining bold colors, metallic fabrics, and eye-catching accessories like chunky sneakers, crop tops, low-rise jeans, and mini handbags. Along with today’s minimalistic layering, innovative materials that give it a contemporary edge. The purpose of this research is to create a space where people can express their art and culture, sharing their stories through the way they dress. Promoting cultural appreciation, expanding representation, and encouraging a deeper understanding of universal fashion. Through digital platforms, exhibitions, and collaborations, this research has the potential to reach audiences well beyond a local level, spreading awareness about the significance of cultural preservation in a rapidly globalizing world. It also inspires younger generations to take pride in their heritage and use creative expression as a tool for social change. In this way, the project not only showcases fashion but also sparks meaningful conversations about identity, inclusion, and the importance of celebrating your culture and heritage in every corner of society.

Alyssa Cacace

Discipline: Biology

Authors:

#1 Paul Moosman

Abstract Name: How Widespread is the Fungus that Causes White-Nose Syndrome in Various Non-Karst Bat Habitats?

North American bats are threatened by white-nose syndrome (WNS), a disease caused by the fungus *Pseudogymnoascus destructans* (Pd). WNS primarily affects hibernating bats in caves and mines, where conditions are highly suitable for fungal growth. Pd is presumed to spread to bats in a variety of situations, but few studies have assessed the potential for transmission in places other than caves and mines. In our observational study, we assessed the prevalence of Pd DNA in bat feces collected from several habitat types and seasons. Guano samples were collected from bats captured in mist nets, roosts in bridges, and rock-crevice roosts on talus slopes in Virginia, Pennsylvania, Ohio, West Virginia, and Arkansas, between May 2012 and April 2025. We tested the presence of Pd DNA with PCR followed by gel electrophoresis, using positive and negative controls. Out of 169 guano samples, 97% were negative for Pd. We detected Pd in 3% of guano samples from Eastern Small-footed Bats (*Myotis leibii*) and Big Brown Bats (*Eptesicus fuscus*) on talus slopes in Virginia that served as roost sites throughout much of the year. It has yet to be determined whether Pd positive samples represented viable fungal spores, but our results preliminarily suggest there may be potential for bats to spread Pd at rocky landscape features, which are biologically important as roost sites across North America. Additional research needs to be conducted to determine the role that talus slopes and perhaps other rocky outcrops play in the spread of WNS. This question is especially relevant for understanding how WNS may spread in western North America, where bats tend to overwinter in rocky landscape features instead of caves and mines.

Xavier Caceres

Discipline: Engineering

Authors:

#1 Xavier Caceres

Abstract Name: Exploring Whole-Body Center of Mass Dynamics During Narrow Beam Walking to Guide Hip Exoskeleton Control

Mediolateral (ML) balance is crucial for stable walking but is harder to control, especially in tight spaces where body movement is limited. Improving ML stability with wearable devices can help prevent falls and make walking easier for both patients and healthy people. To evaluate how a wearable device can improve ML balance, we tested our hip exoskeleton, which provides assistance in the frontal plane during a narrow beam walking task. Normally, the body uses step width, arm, ankle, and hip movements to keep balance and control the center of mass (CoM), but to focus on the hip's role and the exoskeleton's effect, participants walked heel-to-toe with arms crossed and knees straight, limiting other movements and increasing reliance on ML control and the exoskeleton, which aims to reduce whole body CoM motion. The flexible controller lets participants override the exoskeleton and use their own balance reactions, so the body's movement is a mix of both, which helps improve overall balance during the task. It is hypothesized that smoother whole body CoM velocity in the sagittal plane and less CoM deviation in the frontal plane help improve performance on the narrow beam, so we analyzed CoM motion in both planes to understand its effect on successful distance traveled during the task. Therefore, in this study, we analyze the kinematics of the CoM in both sagittal and frontal planes to investigate the correlation between CoM behavior and walking performance outcomes.

John Cahill

Discipline: Biology

Authors:

#1 Abid Anwar

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Abstract Name: Targeting the lncRNA THBS1-AS1 Attenuates Biliary Fibrosis in PSC Models

Primary sclerosing cholangitis (PSC) is a biliary disorder characterized by progressive inflammation and fibrosis of the bile ducts, driven in part by the release of a profibrotic secretome. Our previous data revealed long non-coding RNAs (lncRNAs), including THBS1-AS1 regulate the expression of profibrotic genes through their interaction with epigenetic regulators within cholangiocytes. We hypothesize that inhibiting THBS1-AS1 would be a therapeutic strategy to mitigate inflammation and fibrosis in PSC. Antisense

oligonucleotide (ASO)–mediated knockdown of THBS1-AS1 was performed in vivo using the Mdr2-/- mouse model of chronic biliary fibrosis. Gene expression analysis was performed on liver tissue using RT-qPCR analysis. Fibrosis was evaluated by histological staining, and serum biochemistry was used to assess liver injury. In vivo ASO administration in Mdr2-/- mice led to decreased expression of multiple fibrogenic genes. RT-qPCR analysis confirmed significant reductions in THBS1-AS1 (~58%, $p < 0.01$), FN1 (~41%, $p < 0.01$), Serpine1 (~61%, $p < 0.05$), CTGF (~66%, $p < 0.001$), and Colla1 (~53%, $p < 0.05$). ASO treatment also led to an improvement in liver disease as assessed by serum biochemistry, ALT ($p < 0.01$), AST ($p < 0.01$), ALP ($p < 0.05$). Sirius red staining also showed reduced fibrosis with ASO treatment compared to controls ($p < 0.0001$). THBS1-AS1 regulates profibrogenic signaling in cholangiocytes. ASO-based RNA therapeutics silencing THBS1-AS1 blunt the fibrogenic gene expression and improve liver injury in the Mdr2-/- mouse model. These results in murine cholangiopathy models illustrate the translational promise of targeting lncRNAs and help set the stage for future clinical trials.

Nora Cai

Discipline: History

Authors:

Abstract Name: Discipline and Protest: A History of the Freedom of Expression and Dissent Policy at Dartmouth College

The purpose of this project is to investigate the historical relationship between Dartmouth College's Freedom of Expression and Dissent (FED) policy and its campus dissent from the 1960s to 1980s. While recent scholarship has investigated how universities have entered a new, unprecedented era of authoritarian crackdown, this project nuances this era by revealing the slow, planned evolution of institutional policy that laid its groundwork. The analytical framework of policy history enriches existing understandings of university violence by interrogating the legal infrastructures that have materially and discursively enabled it. Further, this project offers a uniquely place-based study of Dartmouth College, an institution with a deep yet concealed complicity in racial segregation, the Vietnam War, and South African apartheid. I historicize how Dartmouth "prizes, defends, and upholds" the freedom of expression and dissent, though the "right to this freedom is not unfettered," through the College's Special Collections Library, the student newspaper, oral histories of student activists, archives of The Chronicle of Higher Education; and secondary sources regarding student movements and the politics of higher education during the late twentieth century. I find that Dartmouth's FED policy was first developed to regulate protests against pro-segregationist visiting speaker George Wallace in 1967, then reactively revised and expanded throughout the next two decades of antiwar and anti-apartheid protest. Through analyzing the historical causes, revisions, and applications of the FED policy, I argue that the FED policy was developed not to protect free expression and dissent, but to prevent such expression from disrupting the college administration's desired social order. While the FED policy offers Dartmouth the symbolic credibility of prizing free expression, its concomitant restrictions on permissible activity dampen such dissent's impactfulness.

Zhixin Cai

Discipline: Environmental Science and Sustainability

Authors:

#1 Zhixin Cai

Abstract Name: Construction of a custom insect classifier through BirdNET to create a synthetic acoustic

community

Agricultural fields across the world are experiencing massive biodiversity loss due to conventional agricultural practices. The use of chemical fertilizers and pesticides are negatively influencing insect populations. There has been a recent push towards regenerative agriculture in order to reduce the consequences of repeated use of these practices on farms. However, one of the main problems at hand that researchers face is the lack of automated technology to detect vocalizing insect presence. Recent developments involving artificial intelligence models in bioacoustic detection have proved to be effective with birds (BirdNET). We hypothesize the convolutional neural network model utilized by BirdNET can be translated to insect species. Previous work on BirdNET has shown that it was marginally successful at recognizing a sample of insect species. Here, we aim to improve accuracy metrics for acoustic insect identification. To do this, we will test three common vocalizing species found in regenerative agricultural fields; *Allonemobius allardi*, *Eunemobius carolinus* and *Scudderella curvicauda*. We predict that the expanded training model will recognize insect calls that overlap in acoustic space over other vocalizing species such as birds. The end goal is to create an insect classifier that is ground-truthed using a synthetic acoustic community for rapid assessment of insect species in agricultural fields.

Willoughby Caine

Discipline: Mathematics

Authors:

#1 Ishwari Kunwar

Abstract Name: A Formulation of the Union-Closed Sets Conjecture Using the Hamming Metric

A family of sets is union-closed if the union of any two sets in the family is also contained in the family. The Union-Closed Sets Conjecture, also known as Frankl's Conjecture, posits that for any finite union-closed family of sets containing at least one nonempty set, there exists an element which belongs to at least half of the sets in the family. Although deceptively simple in its statement, the Conjecture has defied a definitive proof, despite extensive study through various approaches and equivalent formulations, which have thus far yielded only partial results. We approach the Conjecture from yet another angle, introducing a new formulation of the conjecture based on the Hamming distance (metric) between sets, which is defined as the number of elements in one or the other, but not both (the size of their symmetric difference). Using this framework, we derive multiple equivalent formulations of the conjecture and provide a complete characterization of the set of all elements that satisfy the conjecture. Furthermore, we demonstrate that our approach enhances the averaging method, a widely used approach that has led to numerous partial results. Finally, we obtain a criterion that relaxes the requirement of the averaging method for verifying the validity of the conjecture. Our findings suggest that the Hamming metric provides a powerful perspective on the Union-Closed Sets Conjecture. The connection between structural properties of union-closed families to Hamming distances offers promising avenues for further exploration, bringing a more algebraic outlook to this combinatorics problem. Future research will focus on extending this framework to continue improving existing partial results and analyze larger families of sets, identifying additional equivalences, and hopefully progressing toward a complete proof of the Conjecture.

Annik Caldwell

Discipline: Visual Arts

Authors:

Abstract Name: My Grandfathers' Hometowns

My Grandfathers are both from small towns in the south, and funnily enough, both of them are still there. I decided to interview both of them, asking them to tell me about their childhoods and favorite memories. My dad's dad, who is from a small town in rural Alabama along Lake Martin told me about his large family, from his older sisters to his cousins. He told me about his love of sports and how he played basketball on a scholarship in college. He told me about the time he set a couple of acres of forest on fire by accident while playing with his cousins. He told me about how he met my grandmother while teaching at a university and that he decided to move back to his hometown to raise my dad and aunt. My mom's dad was from another small town, but this time in North Carolina. He told me about his father's shop and all the characters in his hometown. He told me about his experience at military school, where he went to manage his dyslexia. He did leave his hometown for a job in Maryland, where he raised my mom and aunt, but after giving my aunt the house thirty years later, he and my grandma moved back to North Carolina. Both my Grandfathers are still in their hometowns today, where they both expressed nothing but love for where they live. Illustrating their stories through this zine has also been very rewarding, as I have been able to record and share their stories in a beautiful way. I am extremely grateful for having the opportunity to interview my grandfathers and learn more about their stories and childhood as they mean so much to me.

Dina Xu Callaway

Discipline: Computer Science

Authors:

#1 Dina Xu Callaway

Abstract Name: Staged Multi-Modality Information Fusion to Improve the Diagnosis of Alzheimer's Disease

Alzheimer's disease (AD) is a progressive neurodegenerative disorder that requires early and accurate diagnosis for effective intervention. This study develops a machine learning framework to enhance AD staging by integrating multi-modal data—including clinical, magnetic resonance imaging (MRI), and positron emission tomography (PET) features—to classify patients as Cognitively Normal (CN), Mild Cognitive Impairment (MCI), or Alzheimer's Disease (AD). The research utilizes Alzheimer's Disease Neuroimaging Initiative (ADNI) dataset, Australian Imaging, Biomarkers and Lifestyle (AIBL), and OASIS-3, importing patients' clinical data along with their MRI and PET scans. Image features were extracted from both modalities using eight brain templates processed through SPM12 and CAT12 pipelines, generating and combining imaging features per patient. To ensure dataset consistency only subjects with both MRI and PET scans and numerical clinical data were included, while non-numerical variables were removed or converted to numerical values. A neural network classifier was trained on this integrated dataset to improve classification accuracy across disease stages. This research contributes a staged, graph-based diagnostic framework that begins with the least expensive clinical assessments and progressively incorporates more advanced and costly modalities based on uncertainty quantification, thereby optimizing diagnostic accuracy while reducing medical costs. Future work will validate the model for real life clinical applicability.

Barrett Callejo

Discipline: Biochemistry

Authors:

Abstract Name: Computationally Predicting Important Amino Acids in Ferritin Nanocage Structure

Ferritin is a naturally occurring protein that many different organisms have which oxidizes iron in the body to be stored for later use. Its structure has become an area of interest in the nanomedicine community due to its ability to hold the precipitated ferric oxide due to the 24-mer hollow spherical shape. Researchers in the nanomedical field are trying to harness this ability of the protein to possibly be a use for chemotherapies in cancer treatment. Computational modeling in biochemistry has become prominent in the scientific field and has been found to be useful in studying structures of proteins. In this research it is being used to help predict the important amino acids for ferritin's structure. The program PDBePISA was used to determine the energetic change in the structure between the native strand and the mutations made around the 3-fold interface, made computationally via ChimeraX. Using the predictions, those mutations were made in lab through site-directed mutagenesis. After purification, the mutated proteins were run through gels to determine their molecular weights. Then multiple iron incorporation assays were run to determine the functionality of the mutations. It was found that mutations made at the 3-fold axis, specifically phenylalanine-117, affects the structure of the 24-mer. The mutated protein was broken down into the monomer or dimer as the molecular weights found after running gels was 17.07kDa compared to the wild type, 24-mer of 148.161 kDa. Although, the structure did not form correctly, the protein was still able to oxidize iron and at a faster than the wild type. From these results, it was found that the mutation at the 3-fold interface, F117, breaks down the structure of the protein, but its functionality of oxidizing iron is faster, although it cannot store the precipitate, because the structure fell apart.

Emily Callison

Discipline: Biology

Authors:

Abstract Name: Investigating the Role of HIF-1 Induced Glycolytic Shift in Modulating Macrophage Anticryptococcal Activity

Cryptococcosis is a severe systemic fungal infection caused by *Cryptococcus neoformans* (Cn), a facultative intracellular pathogen that disproportionately impacts immunocompromised populations. Within the lungs, Cn encounters alveolar macrophages (AMs), innate phagocytes that ingest and eliminate the pathogen. Although AMs typically rely on mitochondrial respiration under resting conditions, Cn infection induces a metabolic shift towards glycolysis and activates hypoxia-inducible factor 1 (HIF-1), a central regulator of glycolytic gene expression, allowing the pathogen to avoid destruction and disseminate from the lung, resulting in life-threatening fungal meningitis. Recent findings from our lab demonstrate that stabilizing HIF-1 α with DMOG increases glycolytic gene expression, while inhibition with echinomycin partially reverses this effect. These observations suggest that Cn may exploit HIF-1-dependent metabolic remodeling to promote its intracellular persistence. Therefore, we hypothesize that inhibiting HIF-1 activity with echinomycin will reduce the intracellular replication of Cn. However, an optimal, non-toxic dose of echinomycin has not been defined, and its impact on antifungal defense has not been evaluated. Addressing these gaps is the central focus of this study. We first established an effective dose of echinomycin using J774 macrophage-like cells treated with DMOG, a HIF-1 α stabilizer. Quantitative real-time PCR (qRT-PCR) of canonical HIF-1 target genes was used to identify concentrations that suppressed HIF-1 activity while maintaining cell viability. These optimized conditions were then applied to fetal liver-derived alveolar-like macrophages (FLAMs), a physiologically relevant model that recapitulates key metabolic and transcriptional features of primary AMs. To directly assess the impact of blocking the HIF-1 activity on antifungal defense, live-cell imaging will be used to measure intracellular replication of Cn. We anticipate that blocking HIF-1-mediated glycolysis with an optimal echinomycin dose will reduce intracellular Cn replication and alter macrophage antifungal activity. These findings will advance our understanding of pathogen-driven metabolic remodeling and may identify new therapeutic strategies for combating cryptococcosis.

Leah Callovini

Discipline:

Authors:

#1 Leah Callovini

#2 Melinda Willett Struyk

#3 Jennifer Batchelder

#4 Adriana Cimetta

Abstract Name: Adapting Public Health Implementation Science Frameworks to Inform the Evidence-Based Adaptations of a Longitudinal Undergraduate Research Education and Training Program: A Case Study

Undergraduate research training programs have been highlighted as formative high-impact practices (HIPs) that complement classroom learning. Research in higher education interventions demonstrates that undergraduate research training programs are a key component shaping students' critical thinking, technical writing, and project management; these skills are critical to hone if a student aspires to enroll in a research-intensive postgraduate degree program, especially in STEM and health sciences fields. In a rapidly changing higher-education environment, especially over the past six years, colleges have struggled to produce evidence as quickly as staff and faculty have had to adapt. This has made it difficult to understand and respond to unexpected challenges affecting students' participation in high-impact practices (HIPs). In health sciences intervention research, researchers and interventionists have to quickly adapt the intervention based on preliminary data if intervention uptake is low or the intervention is prolonging or exacerbating a health issue. We present a case study of the ASEMS STARS program: a 16-month, undergraduate research training and preparation for advanced degrees. We will examine the novel ways in which researchers and programmers applied public health implementation science frameworks to a higher education intervention. Utilizing a mixed-methods approach, data on how the students' and mentors' acceptability of the intervention changed over time as the intervention itself evolved. We will also demonstrate longitudinal patterns in post-graduation outcomes and their associations with the shifts in the intervention programming. Finally, we will offer best practices and lessons learned for adapting implementation science to higher education HIPs in order to more efficiently respond to changing training and preparation needs of undergraduate participants.

Angela Camacho Sixto

Discipline: Engineering

Authors:

#1 Angela Camacho Sixto

#2 Pratanu Ghosh

Abstract Name: Advancing Sustainable Construction: Evaluating Portland-Limestone Cement Using a Non-Destructive Maturity Approach

The objective of this study is to evaluate the performance of Portland–Limestone Cement (PLC) containing 15% limestone powder using a robust, non-destructive maturity method. Traditionally applied to Ordinary Portland Cement (OPC) and mixtures incorporating fly ash, slag, and silica fume, the maturity method relates concrete temperature and time to in-place strength development. As a non-destructive technique, it offers advantages such as continuous monitoring of strength gain, reduced reliance on destructive sampling, lower testing costs, and improved construction efficiency through real-time strength prediction. With PLC gaining prominence as a more sustainable alternative to OPC, this research seeks to validate its performance while identifying opportunities to enhance its strength characteristics. The study will examine fifteen binary and ternary concrete mixtures containing newly acquired PLC combined with various supplementary cementitious materials (SCMs). The goal is to determine optimized mixture designs that support both mechanical performance and environmental benefits. Approximately eight mixtures will be tested per academic term, with about sixteen cylinders produced for each mixture. These specimens will be exposed to three controlled curing temperature conditions to assess the influence of thermal environments on strength development. Maturity meters will continuously record temperature histories, enabling the computation of temperature–time factors and equivalent-age functions for predicting compressive strength over a 28-day period. In parallel, two cylinders from each mixture will undergo destructive compressive strength testing at 1, 3, 7, 14, and 28 days to establish strength benchmarks. The primary goal is to compare experimentally measured compressive strengths with maturity-based predictions using a calibrated maturity curve. Because literature on PLC—particularly regarding temperature-dependent behavior—is limited, this research aims to advance knowledge of PLC’s strength development under varying curing conditions. Ultimately, the study seeks to validate the maturity method as a reliable, non-destructive approach for predicting the performance of PLC concrete in practical construction settings.

Anthony Camaraza Diaz

Discipline: Engineering

Authors:

#1 Perony Da Silva Nogueira

#2 Lidia Kos

#3 Joshua Hutcheson

Abstract Name: Role of Levodopa in Murine Aortic Valve Elastogenesis

The aortic valve (AoV) endures billions of cycles of opening and closing over a lifetime, a mechanical challenge met by its specialized extracellular matrix (ECM), primarily composed of elastin (Eln) and collagen. These structural components are produced and maintained by valvular interstitial cells (VICs), a heterogeneous cell population that includes melanocytic cells similar to those that develop pigment in skin. Although the diversity of VICs is well recognized, the contribution of melanocytes to AoV development and pathology remains unclear. Recent studies from our group demonstrated that hypopigmented mice exhibit

reduced and disorganized elastic fibers in the AoV leaflets compared to the pigmented groups, suggesting a link between pigmentation and elastogenesis. Interestingly, previous studies have shown that treatment of albino mice with levodopa (L-DOPA), a precursor of melanin and a known neuromodulator, can restore visual function without altering pigmentation patterning. Building on this, we hypothesized that L-DOPA may influence elastin formation independently of its effects on pigmentation. To better understand the role of L-DOPA in elastogenesis, we treated pregnant albino mice with L-DOPA dissolved in water ad libitum and examined elastic fiber organization in the AoV leaflets of 3 days post-natal (P3) mice. Our preliminary data indicate that L-DOPA treatment rescues the elastin phenotype in postnatal day 3 (P3) albino mice, as evidenced by immunofluorescence analysis. Ongoing studies aim to elucidate the molecular mechanisms by which L-DOPA influences elastogenesis. These findings offer new insights into ECM regulation within the aortic valve leaflets and highlight the potential of repurposing clinically approved pharmacological agents to modulate elastin synthesis as a novel therapeutic strategy.

Paige Cameron

Discipline: Sociology

Authors:

#1 Paige Cameron

Abstract Name: Harnessing Community Voices: Empowering Richmond's Carver District Against Gentrification

Purpose: Gentrification and displacement are reshaping the cultural landscape of Richmond, Virginia, particularly in the Carver District, a historically significant neighborhood with a diverse identity. This poster highlights the pressing need for inclusive urban planning that empowers residents, particularly students, to advocate for their community and preserve its heritage. The central research question guiding this investigation is: "How can community engagement strategies effectively empower residents, particularly students, to influence urban planning decisions and mitigate the impacts of gentrification in Richmond's Carver District?" **Methods:** To address this question, the study employs qualitative methods, including community meetings with residents and students. These meetings serve as key platforms for gathering insights on local challenges and priorities. Students are encouraged to participate actively, voicing their perspectives on issues that matter most to them and their peers. This involvement not only enriches discussions but also fosters a sense of agency and responsibility, empowering them to advocate effectively for their neighborhoods. **Results:** Preliminary findings indicate that rising housing costs and community transformation have led to frustration among residents, with many facing eviction or relocation. Student engagement in these meetings has enhanced their understanding of civic responsibility and sparked interest in community advocacy. Their contributions highlight the specific needs of younger residents, reflecting a collective desire for planning processes that consider perspectives from all age groups. **Conclusions:** The Carver District exemplifies the vital role of community engagement in urban planning. By prioritizing the voices of residents—including students—we can go beyond rigid frameworks like Blueprint Urbanism, which often overlook specific community contexts. This research emphasizes the necessity of empowering students and community members as key stakeholders in shaping their environments, ultimately fostering advocacy for equitable urban development and cultural preservation.

Erin Camp

Discipline: Biology

Authors:

#1 Emily Howard
#2 Olga Pahom

Abstract Name: Analyzing Steroid Abundance in the Lyuberetskiy Wastewater Treatment Complex

The water running into wastewater treatment plants (WWTPs) is full of microorganisms such as bacteria and viruses. This water can also contain steroid estrogens like estrone, estradiol, and estriol. Previous research has shown that prolonged exposure to natural estrogen in water has adverse effects on humans and animals such as interfering with their sexual development, normal homeostasis, and behavior. The goal of the current research is to investigate and compare the amount of steroid estrogens removed by two independent wastewater treatments at the Lyuberetskiy WWTP complex in Moscow. Current technologies for removing steroid hormones from wastewater are very complex and costly, and because of this they are not implemented in WWTPs. The two treatments at the Lyuberetskiy complex have not been evaluated on their ability to remove steroids from wastewater, only their ability to remove antibiotic resistant genes (ARGs). For this research the raw metagenome sequences of the influent water, the two activated sludge samples, and the two effluent waters from the WWTP complex were acquired to look for homologous genes that might correlate to the presence of steroid estrogens. A gene catalog was created for protein-level homologs of estrogen-degrading genes, and those genes were then detected and quantified using bioinformatic analysis in R Studio. The findings of this research will shed some light onto the amount of steroid contamination removal in the Lyuberetskiy wastewater by the two different treatments.

Alexander Campbell

Discipline: Criminology/Criminal Justice

Authors:
#1 Nancy Morris

Abstract Name: From Social Media to Campus Streets: The Impact of Online Police Misconduct on Student Perceived Legitimacy of Campus Police

Since 2020, the visibility of police misconduct on social media has increased dramatically. While these specific instances have led to national conversations about law enforcement, little continues to be known specifically about how this online presence shapes college students' perceptions of their campus police specifically. In this study, we explore how viewing internet-based, and specifically social media content, depicting police misconduct influences university students' views of campus police. By examining perceived legitimacy of campus police in a university setting, it allows researchers to examine an environment where police serve distinct roles and interact with their constituency in a unique way. This study was conducted at a large urban public university using an online survey that included close-ended and open-ended questions. Using qualitative student data, we identify major themes related to the impact of viewing police misconduct on students' perceptions of campus police. Preliminary findings indicate that exposure to police misconduct via online content eroded students' trust in campus police, heightened awareness of racial bias, and increased skepticism of the justice system. Further, student narratives emphasized a weakened willingness to cooperate with campus police. We discuss how these qualitative results compliment or differ with existing quantitative results on student perceptions of campus policing and highlight the need for campus police departments to engage in transparent communication, community-based trust building, and equity-centered policy development.

Jordyn Campbell

Discipline: Biology

Authors:

#1 Jodi Goldberg

Abstract Name: Flavor with a Function: Targeting Colon Cancer with Cinnamon Extract

Cancer remains one of the leading causes of death worldwide, with colon cancer ranking as the third most prevalent form. Traditional treatments such as chemotherapy and radiation often come with significant side effects due to their inability to selectively target cancer cells, leading to widespread interest in natural alternatives. Cinnamon, a widely available and inexpensive household spice, has been shown in previous studies to have anti-inflammatory, antioxidant, and growth-inhibiting properties. In addition, previous studies have shown cinnamon to inhibit colon cancer cell proliferation. By analyzing dose-dependent responses, this research aimed to assess whether aqueous cinnamon extract has negative effects on the metabolic activity of the DLD-1 human colon cancer cell line, and explore its potential as a natural treatment. The effect of aqueous cinnamon extract on DLD-1 cells has not been tested previously. A stock solution of the extract was prepared by boiling cinnamon in water for 30 minutes, followed by centrifugation to spin down and pellet the components of cinnamon that did not go into solution, and filtering the remaining liquid to make it sterile. A total of five experiments were performed using the same treatment concentrations and each experiment showed a dose-dependent decline in the metabolic activity of DLD-1 cells in the presence of cinnamon. This study further demonstrates that cinnamon possesses anti-tumor properties, and should be assessed further as a potential treatment option in addition to more traditional cancer therapies.

Nicholas Camperos

Discipline: Computer Science

Authors:

Abstract Name: Design and Implementation of CTRE: An Infrastructure-as-Code Framework for Cyberwarfare Training Ranges at the United States Air Force Academy

The United States Air Force Academy (USAFA) provides a unique cyber education curriculum that goes beyond a traditional cybersecurity program. The institution's goal of including an operational cyberwarfare focus into its education relies on special training environments called cyber ranges, simulated platforms that provide a medium for learning and practicing technical skills that students will use as cyberwarfare operators. Existing methods for deploying cyber ranges at USAFA are manual, inconsistent, and unreliable, creating a limitation on the institution's ability to effectively provide a range ecosystem for local use. This research project aims to fix this limitation by developing the Cyber Training Range Ecosystem (CTRE), a standardized framework that leverages Infrastructure as Code (IaC) for the rapid, reliable, and reusable deployment of cyber ranges. This study combines industry standards for virtualization with the unique needs of USAFA as a military training program to identify optimal design aspects for a scalable and effective range ecosystem. These design aspects materialized into the CTRE proof-of-concept, utilizing Proxmox, Terraform, Ansible, and Docker technologies to automate the deployment of high-fidelity ranges including realistic network representations and target configurations. The use of CTRE drastically improves deployment speed, reducing deployment time for the proof-of-concept range from over a dozen hours to approximately 13 minutes. Building upon the foundations of CTRE, USAFA will continue to rely on IaC to provide an effective range ecosystem, ensuring that the next generation of warfighters are prepared to succeed in the cyber domain.

Sophia Canderozzi

Discipline: Business

Authors:

#1 Sophia Canderozzi

Abstract Name: Using Generative Artificial Intelligence as an Assistant in Hospital Emergency Rooms

The central research question of this project is to determine the extent to which Generative Artificial Intelligence (GenAI) can act as an assistant within hospital emergency rooms (ERs) to help reduce treatment errors and hasten accurate diagnosis. Other research has looked at the state of AI within medical settings for tasks such as note taking, recommended treatment paths, and solving overcrowding problems; however, this research focuses on listening to and interpreting patient/doctor or patient/nurse conversations in ER situations in real time with the goal of immediately suggesting diagnoses, treatments, and/or further tests that the medical professionals might have missed, i.e. to assist doctors and nurses in decision-making. A prototype will include voice technology combined with GenAI reasoning based on prior case studies that focus on details of a patient's story or medical status, e.g. something as simple as ChatGPT in listening mode integrated with a database holding a patient's medical records. The research methodology includes (i) a review and evaluation of similar prototypes or products in the medical field, (ii) a study of typical ER patient/examiner scenarios, (iii) a review of the Health Insurance Portability and Accountability Act on patient rights, and (iv) consultations with several professional ER workers for feedback. The testing of the prototype includes a series of simple scenarios and unusual scenarios to determine the degree to which GenAI assistance is perceived and appreciated by both ER workers and patients. The conclusions of the research will inform ER workers, patients, and other medical stakeholders with respect to the effectiveness, trust, accuracy, and pros/cons of GenAI-based assistance in hospital ERs.

Carl Canlas

Discipline:

Authors:

Von Knorr

Abstract Name: Database Security Auditing

Databases are central to how organizations manage and protect sensitive information, including student records, financial data, and operational systems. As threats to data security continue to grow, it's essential to understand how vulnerabilities can be identified and addressed before they are exploited. This research introduces a student-led initiative focused on auditing database systems to evaluate their security posture. The goal is to create a practical framework that students can use to assess access controls, encryption methods, user permissions, and logging practices. Through hands-on experience, students will learn how to conduct security audits, interpret system logs, and identify potential risks in both simulated and real database environments. The research project also emphasizes the importance of ethical data handling and compliance with privacy regulations such as FERPA and GDPR. By working directly with sandbox systems and student-developed databases, participants will generate meaningful data that can be used to improve institutional practices and support future funding proposals. This not only strengthens technical skills in cybersecurity and database management but also encourages civic responsibility and awareness of data privacy. Attendees will gain insight into how engaged learning in the field of database information systems can lead to impactful contributions within and beyond the university.

Adam Canler

Discipline: Psychology

Authors:

#1 Adam Canler

Abstract Name: Risk-Taking Under Scarcity The Mindset Factor

Poverty has been consistently linked to cognitive strain and reduced executive functioning, often conceptualized through the Conservation of Resources Theory (Hobfoll, 1998), which posits that resource-related stress arises from both actual and threatened losses. Empirical studies demonstrate that financial stress impairs working memory (Mani et al., 2013; Dang et al., 2016), limits mental bandwidth (Nugroho et al., 2023), and mediates the relationship between poverty and cognitive performance (Mullainathan & Shafir, 2013). These deficits can influence decision-making tendencies such as risk, loss, and ambiguity aversion (Haushofer & Fehr, 2014), potentially shaping behavioral outcomes in individuals from lower socioeconomic status (SES) backgrounds. The present study proposes to examine the potential mediating role of growth mindset, the belief that traits and abilities can be developed, on the relationship between SES and cognitive measures of risk-taking and inhibitory control. Previous research suggests that a growth mindset can improve cognitive performance and adaptability across populations (Plaks & Chasten, 2013; Hu et al., 2025), yet its interaction with resource-related stress and economic decision-making remains unexplored. This cross-sectional, correlational study will recruit a college student sample. Participants will complete demographic and SES measures (subjective SES scale; Adler 2000, parental education, government assistance indicators), growth mindset measures (ITEB-Q; Schleider & Weisz, 2016; Growth Mindset Scale; Sigmundsson & Haga, 2024; Implicit Theory Scale; Dweck, 1999), and cognitive decision-making tasks, including the Balloon Analog Risk Task and the Go/No Go Task. The independent variable will be growth mindset, and the dependent variable will be behavioral indicators of risk-taking and inhibition performance. Findings are expected to clarify whether a growth mindset moderates cognitive and decision-making biases often associated with low SES, offering insight into psychological resilience among populations facing resource scarcity.

Samuel Cann

Discipline: Psychology

Authors:

#1 Simone Belli

Tomas Sandoval

Abstract Name: Lost in Translation: A Grounded Theory Exploration of Cross-Cultural Pain Communication and Epistemic Injustice among Spanish-Speaking Patients

Pain remains the leading cause of healthcare visits, yet it is an inherently subjective experience profoundly influenced by language, gesture, and culture. In cross-cultural settings, the "language of pain" is frequently misinterpreted, resulting in poorer health outcomes for linguistic minorities. Using Constructivist Grounded Theory, this study explores pain communication among 30 Spanish-speaking individuals living with chronic pain, divided evenly between residents of Spain and the United States. Analysis reveals four themes regarding the negotiation of suffering. First, linguistic reductionism occurs when culturally bound terms to describe pain, like "pupa," are used as a psychological tool by adults to "automatically diminish the perception of pain" in the listener. In clinical settings, cultural nuances of pain are stripped of meaning to fit rigid clinical metrics. Second, patients navigate the performativity of pain as they balance the need to perform symptoms for validation against cultural pressures for social harmony. Third, a gender paradox emerged particularly within the Spanish cohort, where men reported adhering to scripts of stoic endurance, or *aguantar*, to maintain

respect and social dignity. This highlights the conflict between cultural modesty and the clinical necessity of advocacy. Finally, participants described epistemic injustice fueled by clinical fatalism, a dynamic where providers dismissed pain as a natural consequence of aging based on cultural assumptions. These findings illustrate that the "pain gap" is not merely linguistic but structural. Addressing these disparities requires the healthcare field to move beyond translation services toward equitable practices that validate culturally distinct narratives of pain.

Olivia Cannizzaro

Discipline: Chemistry

Authors:

#1 Dwight Williams

Abstract Name: Synthetic Route Optimization of Herdmanine-K and Analogues for PPAR γ Agonistic Activity

Type 2 diabetes is listed among the top 10 leading causes of death worldwide. Activation of the peroxisome proliferator activated receptor (PPAR) with synthetic agonist has shown much promise in the treatment of type 2 diabetes. Current FDA approved PPAR agonists known as TZD's, while effective, are associated with severe cardiovascular risks. Thus, the identification of novel PPAR ligands with reduced side effects is needed. The natural product Herdmanine-K was recently demonstrated to possess a binding affinity to PPAR comparable to the FDA approved TZD, Rosiglitazone, but its functional activity has not been determined. This poster outlines our work to optimize a synthetic route allowing access to Herdmanine-K and non-natural analogues. The Optimized route afforded Herdmanine-K in 27% over 4 steps. Yields of non natural-analogues using this route varied from 7 to 48%. Current efforts seek to execute an SAR study on the synthesized compounds at PPAR.

Madison Cannon

Discipline: Psychology

Authors:

#1 Elizabeth Dalton

Abstract Name: The Effects of Distal and Proximal Acute Stressors on False Memory Creation

Past research indicates that stress has an impact on memory encoding and retrieval processes. The magnitude, timing, controllability, and duration of a stressor all impact differing aspects of the information processing model. The magnitude of a stressor can create a stage of fight-or-flight that resembles shock and can obstruct memory creation as a whole. One may observe that the impairment of memory by a stressor theoretically relates to the necessary situation needed in order to create a false memory. A participant's emotional state, physiology, and proximity to misinformation have been cited as influential in the creation of false memories. The study of false memories gained prominence in 1995, when Roediger and McDermott revitalized Deese's memory task, now known as the DRM paradigm. This task attempts to instill false memories through the usage of critical lures, words that are related to the gist of a list of words but not originally presented. This study will attempt to discern whether proximal versus distal stressors have more of an effect, if any, on false memory creation through the usage of the DRM paradigm and psychosocial measures of lab-induced, proximal stress. A DRM-task, Perceived Stress Scale, and Acute Stress Disorder Scale will be administered in a lab setting to 100 undergraduate students to measure distal and proximal stressors before and after

completion of a false memory task paired with a psychosocial stressor. A positive correlation between increased situational and personal stress and false memory is expected to be shown in data, as well as a difference in proximal and distal stressors on the amount of false memories created.

Elise Cantu

Discipline: Physics and Astronomy

Authors:

#1 Eduardo Flores

#2 Shabnaz Kahlandar

Ian Marano

Osvan Vivar-Garcia

Abstract Name: The Galactic Neutrino Atom: The Success of the Classical Gas Model and Rejection of Quantum Modeling

The elucidation of the nature of dark matter represents one of the most significant challenges in modern cosmology, particularly in reconciling the success of the Λ CDM model on large scales with the structural anomalies observed on galactic scales. While massive sterile neutrinos offer a compelling candidate within Standard Model extensions, their dynamical behavior in galactic halos remains a subject of debate. This work presents a rigorous numerical analysis of Milky Way rotation curve data to evaluate the validity of two distinct theoretical frameworks: a Classical Fluid model in hydrostatic equilibrium and a Macroscopic Quantum Bound State (the “Neutrino Atom”). Contrary to recent proposals suggesting a need for quantum degeneracy or coherent field solutions, we demonstrate that the Classical Gas model successfully reproduces the galactic rotation curve. Our analysis reveals that the neutrino halo behaves as a self-gravitating isothermal fluid. Furthermore, we address potential thermodynamic concerns by showing that the negative effective energy states derived from this model are physically necessary to maintain a stable, gravitationally bound system over cosmological timescales. Conversely, we reject the quantum modeling approach. We demonstrate that the “Neutrino Atom” model, treating the halo as a macroscopic quantum bound state, fails to naturally reproduce the observed Keplerian decline and is fundamentally limited by the short interaction range of the weak force ($\sim 10\text{--}18\text{ m}$), which is insufficient to support galactic structures. Consequently, we argue that the galactic halo is best described not as a macroscopic quantum object, but as a classical fluid of massive neutrinos.

Teresa Cao

Discipline: Communications

Authors:

#1 Shanetta Pendleton

Abstract Name: Sorry, Not Sorry: Exploring Communication Patterns and Perceived Authenticity of Influencer Apologies on Social Media

This project poses the following overarching question to investigate the emerging apology aesthetic on social media: How do digital platforms shape the way influencers use image repair strategies? As public apologies increasingly unfold in algorithmic, highly mediated environments, a recognizable set of visual and rhetorical conventions has developed—often marked by subdued lighting, minimal editing, direct-to-camera delivery, and emotionally coded, self-reflective language (Mitchell and Choi, 2022). Although widely circulated in

digital culture, these aesthetic patterns remain understudied in communication research, and influencer crises remain undertheorized in the scholarly literature. To address this gap, the study utilizes a mixed-methods design. The first phase will employ a content analysis of high-engagement influencer apology videos posted on TikTok and YouTube between 2016 and 2025. The content will be analyzed inductively and deductively using a coding scheme that identifies recurring stylistic and narrative features associated with the apology aesthetic and academic literature on crisis communication and image repair theory. In phase two, a focus group will be used to collect qualitative data exploring how users perceive sincerity, emotional labor, responsibility-taking, and reputational motives in digital apologies. This research draws on insights from image repair theory and attribution and framing in mediated communication to examine how influencer apologies navigate the complex intersections of sincere self-expression, reputational management, and audience perception. By analyzing structural, stylistic, and relational cues in these videos, the study synthesizes previous research into a guiding Authenticity and Strategic Impression Management (ASIM) framework, offering a novel lens to understand how social media influencers balance authentic personal identity with strategic brand performance. It demonstrates that the apology aesthetic is not merely a stylistic trend but a culturally meaningful script through which trust, responsibility, and public identity are negotiated in contemporary online environments.

Bella Capaldo

Discipline: Engineering

Authors:

#1 Rachel Smith

Abstract Name: Improving Seizure Prediction through Analysis of Interictal and Preictal Intracranial EEG

Epilepsy is a brain disorder characterized by abnormal brain activity that causes recurrent, unprovoked seizures that can disrupt daily life and potentially lead to life-threatening harm. One way to manage epilepsy is with preemptive intervention, administering medicine or neuromodulation therapies to prevent the onset of a seizure. Because seizures are variable and sudden, it can be difficult to predict and prepare for an oncoming seizure. To optimize this preemptive intervention, seizure prediction can be performed via analysis of neural data and activity patterns. Seizure prediction is often done by analyzing electroencephalography (EEG) data, a recording of the brain's electrical activity, to capture features and patterns occurring directly before seizure, the preictal period. Then, these patterns can be used as indicators for upcoming seizures. However, identifying these patterns can be challenging as EEG data varies significantly across individuals, brain regions, and seizure types. We aim to improve identification of these significant features using intracranial electroencephalography (iEEG) data and MATLAB to compare defined interictal (non-seizure) and preictal phases in a cohort of three epilepsy patients recorded at UAB Hospital. The iEEG data were filtered, preprocessed and assessed with a linelength spike detector, which computed spike rates at each electrode in both the interictal and preictal periods. We found that the interictal to preictal spike rate increased, indicating increased spiking activity as the seizure approached. We also found that contacts with a higher spike rate change were strongly correlated with the seizure onset zone and this correlation was stronger in specific frequency bands which were individualized to each patient. These findings suggest focusing seizure prediction analysis methods on contacts surrounding the epileptogenic zone and in specific frequency bands could improve seizure prediction efficiency by narrowing the data scope and creating a more personalized prediction process.

Abraham Carbajal

Discipline: Nursing and Public Health

Authors:

Abstract Name: Emotional Labor and Academic Pressure in Pre-Nursing Programs: An Autoethnographic Study

Pre-nursing programs are known for their rigorous academic demands. It is framed as a necessary “proving ground” for those who wish to enter the nursing profession, yet the emotional toll involved in preparing for nursing school is often overlooked. Through an autoethnographic approach, this study examines the emotional and academic strain involved in preparing for competitive nursing programs. I reflect on my own experiences of navigating heavy coursework, long study hours, and continual pressure to excel, while also engaging with other pre-nursing students to grasp a better understanding of these experiences beyond my own challenges. Drawing from the literature on stress and resilience, I consider how institutional expectations shape feelings of burnout, self-doubt, and inadequacy, even among highly motivated students. This study argues that the emotional labor required before entering nursing school plays a crucial role in forming professional identity, highlighting a need for pre-nursing environments to recognize and better support the well-being of their students.

Fabian Cardenas

Discipline: Biology

Authors:

#1 Lois Armendariz

#2 Alicia Chan

#3 Natasha Kirienko

Abstract Name: Understanding the Regulation of the Mitochondrial ESRE Pathway by Lipid Metabolism

The mitochondria is the organelle found in eukaryotic cells responsible for energy production and regulating apoptosis, or cell death. Research has shown that mitochondrial dysfunction leads to many pathologies like cancer, neurodegeneration, cardiovascular disease, and lessened immunity. Understanding the mechanisms driving mitochondrial homeostasis is imperative for the maintenance of cellular and organismal health. Preliminary data using model nematode *Caenorhabditis elegans* has shown that many lipid metabolism genes are upregulated following activation of the evolutionarily conserved mitochondrial surveillance Ethanol and Stress Response Element pathway (ESRE). ESRE can be activated by mitochondrial damage resulting from reactive oxygen species (ROS), acute iron removal, and liquid-based *Pseudomonas aeruginosa* pathogenesis (LK-Pa). Because ESRE is evolutionarily conserved, the decrease in mortality in *C. elegans* following ESRE activation has implications for cancer and Alzheimer's remediation in humans, if the ESRE pathway can be artificially probed into being activated without causing mitochondrial damage. After previous gene ontology performed identified a large number of lipid metabolism genes upregulated upon ESRE activation, a primary screen on 22 of these genes identified 5 hits (*acdh-1*, *acdh-9*, *ddo-2*, *mmaa-1*, *Y71F9B.9*) as required for ESRE activation and host defense in LK-Pa. We tested the hypothesis that these genes are required for ESRE activation in a ROS dependent manner by measuring ROS levels in RNA interference (RNAi) knockdowns of these genes. *C. elegans* strain *glp-4* was reared on transformed *E. coli* to knock down the genes of interest, then treated with combinations of ROS generating compound CCCP, ROS absorbing compound DMSO, and ROS dependent fluorescent compound DCFDA. After the worms were imaged over 8 hours, ROS levels were quantified via worm fluorescence. However, we did not observe significant changes in ROS levels, indicating that these hits activate ESRE via other means (e.g., signal transduction).

Discipline: Biology

Authors:

#1 Fabian Cardenas

#2 SeyedehAndia Moeini

SeyedehAndia Moeini

Abstract Name: Using spectrophotometry to quantify bacteriolysis efficiency in phage

An increasing global concern is the rise of “superbugs”, or antibiotic resistant bacteria (ARB), which cause the deaths of 10 million people every year. Bacterial pathogens that develop immunity upon repeated exposure to antibiotic treatment make exploration of new bacteriolysis vectors such as phage therapy an imperative. Phage therapy is the treatment of ARB with modified or engineered bacteriophages to eliminate bacterial infection while leaving human hosts and their microbiomes unharmed. Bacteriophages are the most abundant biological entities on Earth, with nearly every environmental biological sample containing a range of both lytic and lysogenic phages. Partnering with a local lab, we collect environmental samples from avian feces, bat feces, and pond water that we test for the presence of bacteriolytic phages. Once our bacteriophages are identified as viable candidates for phage therapy, they are sent to our partner lab for further analysis and testing. Previous research used spot assays to identify 8 hits, tested against *Staphylococcus aureus*, *Klebsiella pneumoniae*, and *Escherichia coli*. Previous research has shown that spectrophotometry allows for quantification of cell growth and lysis following the introduction of bacteriophages. We aim to further increase our knowledge of previously identified and new samples by developing a protocol to evaluate their bacteriolytic efficiency. We did this by measuring OD600 over time in cultures of *E. coli* strain DH5 α with different multiplicities of infection (MOI) of bacteriophage samples to first identify an MOI range that would result in consistent four-hour lysis curves. Following this, all the hits were tested and had their percent inhibition of cell growth compared against positive control bacteriophage sample ψ 6925. Past this, we plan on having their genome sequenced to identify and compare bacteriolytic efficiency correlated genes, exposing new targets for phage engineering.

Isaac Cardwell

Discipline: Biology

Authors:

#1 Bisho Lawaju

#2 Kathy Lawrence

Abstract Name: A Soil-Based qPCR Assay for Rapid Detection of *Rotylenchulus Reniformis*

The reniform nematode (*Rotylenchulus reniformis*) is a major plant-parasitic nematode limiting cotton production across the southern United States. Conventional detection requires labor-intensive extraction and microscopic identification, which can delay diagnosis and requires specialized expertise. This project aims to develop a quantitative real-time PCR (qPCR) assay for rapid and sensitive detection of reniform nematodes directly from soil. Five primer sets targeting *R. reniformis* were first evaluated in silico and then tested using conventional PCR with DNA extracted from single handpicked nematodes obtained from a greenhouse-maintained stock population on Phy 340 W3FE cotton. DNA extractions were performed using an in-house lysis buffer. Among the primer sets, Ren240F/Ren240R produced the strongest and most consistent amplification and was selected for SYBR Green-based qPCR assay development. Specificity testing was conducted using DNA from reniform nematodes and from 12 non-target nematode species representing eight genera. Ren240F/Ren240R exclusively amplified reniform nematode DNA, showing no cross-reactivity with

other nematodes commonly found in Alabama soils. Sensitivity and amplification efficiency were assessed using serial half-dilutions of DNA extracted from ten reniform nematodes. The resulting standard curve ($y = -3.2491x + 20.365$; $R^2 = 0.9994$) demonstrated a strong linear relationship between Cq values and log-transformed DNA dilutions. The slope corresponds to an amplification efficiency of approximately 103%, and the high R^2 value confirms excellent reproducibility across dilutions. The assay detected as little as 1/4096 of the DNA from ten nematodes, equivalent to approximately 0.002 of a single nematode, indicating high analytical sensitivity. The next phase of this research will evaluate assay performance using soil DNA inoculated with known nematode densities, followed by validation with field samples. Once optimized, this qPCR-based diagnostic tool has the potential to streamline reniform nematode detection, reduce dependence on specialized taxonomic expertise, and improve precision management strategies in cotton production systems.

Camden Carlile

Discipline: History

Authors:

#1 Camden Carlile

Abstract Name: Paper Soldiers: The Role of the Parliamentary Recruiting Committee and Scottish War Savings Committee in World War I

British propaganda during World War I mobilized Scottish identity through two distinct but interconnected approaches that reveal broader tensions within "Britishness." This paper examines propaganda posters produced by the Parliamentary Recruiting Committee (PRC) and the Scottish War Savings Committee (SWSC) between 1914 and 1918 to analyze how these organizations deployed Scottish cultural symbols for British war objectives. The PRC, operating from London, frequently misunderstood or awkwardly appropriated Scottish identity, relying on stereotypes like kilts and accents and depicting Scottish soldiers defending distinctly English landscapes. Their geographic and cultural appeals evolved from emphasizing shared territory to incorporating symbols like the Union Jack and English saints, yet they often failed to authentically integrate Scottish distinctiveness. In contrast, the SWSC, based in Edinburgh after 1916, demonstrated internal co-optation by transforming Scotland's historical heroes, Robert the Bruce and William Wallace, into advocates for British war bonds. By analyzing these poster collections at the Imperial War Museum, chronologically and comparatively, this paper argues that the most effective subsumption of Scottish identity into a shared British identity came from both external stereotyping and internal collaboration. The PRC's limitations exposed the fragility of top-down imperial identity construction, while the SWSC revealed how Scottish agents themselves operationalized their own cultural memory for British purposes. This research contributes to existing scholarship on World War I propaganda by directly examining visual materials largely overlooked by historians and by providing the first historical analysis of the previously unexamined Scottish War Savings Committee.

Valentina Caro

Discipline: Film/Photography Studies

Authors:

#1 Valentina Caro

Abstract Name: Feeding the Mind: How College Shapes our Relationship with Food

Feeding the Mind: How College Shapes Our Relationship with Food Submission by Valentina CaroAbstract
For many college students, there are significant challenges to maintain consistent and healthy eating behaviors amidst balancing academic demands, work schedules, financial constraints, and overall stress. The purpose of this project is to review these everyday barriers and demonstrate how they impact the choices students make, regarding nutrition and total well-being. Applying current research on college eating behaviors and student wellness, I created a short video-podcast intended to translate these findings into a format that is accessible, engaging, and easy for students to relate to. This video-podcast covers common factors shaping eating habits. This includes time constraints on preparing a meal, reliance on convenient foods, irregular schedules, and the difficulty of finding culturally familiar foods for international students. Through the use of visual and conversational elements, the project presents academic research in an easily digestible format for a generalized student population. The multimodal format will allow for easier explanations of key concepts through a guided discussion to help viewers understand not only what these issues are, but why they matter. The project aims to raise awareness of the everyday struggles students face with food and to discuss the support that they may need. Rather than prescriptive advice, the video-podcast focuses on understanding and connection, revealing the role of structural factors-not personal failure-in shaping student eating behaviors. This is a submission on the use of digital media for communicating health-related research in an informative, yet accessible manner. The audience will get an insight into the complexity of student nutrition and ways in which multimodal communication strategies make research more understandable and relevant to larger audiences.

Kharyn Carrasco

Discipline: Anthropology and Archaeology

Authors:

#1 Kharyn Carrasco

Abstract Name: Why Did Ancestral Statue (moai) Construction End on Rapa Nui?

Why Did Ancestral Statue (moai) Construction End on Rapa Nui?Kharyn Carrasco, School of World Studies, Virginia Commonwealth UniversityThe massive anthropomorphic stylized statues (moai)erected on Rapa Nui (Easter Island) religious platforms (ahu)represents one of the most notable cultural achievements in Polynesia. This project poses a central question: When did large-scale moai construction end, and what environmental, societal, or colonial pressures best explain the timing of decline and cessation? Past archaeological work has shown that Rapa Nui experienced rapid deforestation, environmental degradation, a drought-prone climate, and nutrient-poor soils while also undergoing significant social and demographic shifts following European colonization. The chronology of moai construction remains unclear but the timing is central to understanding why construction ceased. The purpose of this study is to re-analyze existing obsidian hydration dates from the platforms and rampsof religious structures (ahu) to refine the construction chronology. The dates from each ahu are used to generate summed probabilities distributions (SPD) of peaks and troughs in ahu construction between AD 1200 and AD 1850. SPD plots graphically illustrate the phases of construction over this time range. By comparing the chronological patterns generated by SPD plots with the island environmental and colonial history, the study will attempt to identify if the cessation of ahu construction aligns with ecological stress, agricultural decline, or post-contact population decrease due to the introduction of diseases.

Emma Carrier

Discipline: Biology

Authors:

#1 Abigail Miller
#2 Lynne Beaty
#3 Samuel Anthony

Abstract Name: Tracking Invasive Mystery Snail Movement and Growth at Presque Isle State Park

Chinese mystery snails (*Cipangopaludina chinensis*) are an aquatic invasive species introduced to Lake Erie. Identified by its operculum, spherical shell, and large size, these snails jeopardize local biodiversity by disrupting nutrient cycling, altering the food web, and outcompeting native species. However, little is known about their movement, growth, and dispersal patterns. Leveraging an ongoing transect-based mark-recapture study at Presque Isle State Park, snails were captured, marked with a unique identification code, measured, and returned to their original location. Sampling occurred for three one-week sampling periods in July and August 2025. Of the transects with recaptured snails, 8 of 14 showed a 100% recapture rate, indicating limited snail movement (<5-10 meters). The most movement occurred in Thompson Bay, with 50-67% of snails moving between transects. One snail moved from Leo's Landing to Graveyard Pond between 2024 and 2025. Average snail size also showed significant variation between locations. Snails at Thompson Bay ($46.8\text{mm} \pm 4.25\text{mm}$) were significantly larger than those in Graveyard ($42.5\text{mm} \pm 3.60\text{mm}$) and Lily Pond ($41.0\text{mm} \pm 1.26\text{mm}$), and snails at Feather Platform ($47.2\text{mm} \pm 3.60\text{mm}$) were significantly larger than those in Lily Pond. Due to the limited number of recaptures, robust statistical comparisons of growth between locations could not be performed. These findings suggest that, in general, Chinese mystery snails exhibit minimal movement. However, variation in movement and size across locations suggests that small-scale environmental factors, such as sediment type or vegetation, may influence the life history of Chinese mystery snails. These factors could be further investigated to develop more effective removal strategies, mitigate spread, and predict snail dispersal, thereby facilitating effective management.

Danielle Carrol

Discipline: Computer Science

Authors:
#1 Steven Fernandes

Abstract Name: Developing a Non-Western Culture Aware AI Application

Most artificial intelligence models are trained predominantly on Western datasets, resulting in responses that often miss cultural nuances, misinterpret context, or provide inappropriate recommendations for non-Western users. Also, the language models are trained on English-heavy web data, resulting in weaker performance for many non-Western languages and cultures. Multilingual benchmarks show strong English scores but clear drops in other languages, indicating a systemic imbalance rather than isolated bugs. Research in massively multilingual MT shows these gaps can shrink when models and data prioritize low-resource languages. Recent research acknowledges cultural bias in AI systems. However, most solutions focus on post-hoc bias detection. They are not focused on incorporating cultural knowledge when building the AI application. Our goal is to build an open-source production application that centers non-Western languages by developing a Retrieval-Augmented Generation (RAG) based web application that would be made freely available for everyone. RAG systems have demonstrated effectiveness in domain-specific applications. However, less work has been done on building RAG applications trained on non-Western cultural data.

Mary Carson

VA - Virginia Commonwealth University

Discipline: Environmental Science and Sustainability

Authors:

#1 Dan Albrecht-Mallinger

Abstract Name: Does habitat occupancy correlate with prey availability for a declining raptor? Insights from a novel acoustics and road-survey monitoring method

The American Kestrel (*Falco sparverius*), a threatened bird of prey, is found throughout North America. Kestrels are a generalist species which are able to exploit different prey types, including small birds, small mammals, insects, reptiles, and amphibians. In turn, this allows kestrels to occupy several different habitat types, although they are typically associated with open-country habitats. However, this species is experiencing idiosyncratic declines across its range, with one of the potential causes being loss of quality habitat. Thus, a study was conducted in Richmond and Highland County, Virginia during summer 2025 to assess kestrel habitat occupancy and prey abundance, which is correlated with habitat quality. Our team conducted road surveys to assess kestrel habitat occupancy and utilized acoustic monitoring to determine the abundance of singing prey types (i.e. songbirds, orthopterans) across the two ecoregions. A total of 25 kestrels were detected, all of which were found in the agricultural pastures of Highland County. Additionally, acoustic monitoring detected 85 songbird species and 18 orthopteran species between the two ecoregions. These data were used to explore the relationships between habitat type, singing prey abundance, and kestrel occupancy across the two ecoregions, providing insight into habitat selection and territory quality for this declining species in Virginia.

Owen Carter

Discipline: Biology

Authors:

#1 Lynne Beaty

#2 Samuel Nutile

Abstract Name: How Round Goby Affect Native Fish Communities in Pennsylvania Tributaries to Lake Erie

Lake Erie and its tributaries are home to an abundance of native species that maintain aquatic ecosystem health. Invasive species can cause irreversible ecological damage to these same aquatic communities, with the round goby (*Neogobius melanostomus*) being a prevalent example in the Great Lake region, especially in Lake Erie. Beyond the presence of round goby in the main lake, little is currently known about their effect on connecting tributary systems and the delicate ecosystems they contain. Analysis of four major Pennsylvania tributaries to Lake Erie (Raccoon Creek, Elk Creek, Walnut Creek, and Cascade Creek) has revealed the effect round gobies have on native fish species in a tributary setting. Indexes of Biotic Integrity and redundancy analysis tests show trends that the presence of round goby negatively affects native fish community assemblages, but not at a statistically significant level as of now. This is shown through native species of similar ecological niche and diet to the round goby being outcompeted and displaced in turn. This negative influence is more profound with higher round goby densities in certain sampling sites. This baseline survey of Lake Erie tributaries presents novel data, underscoring the potential significant ecological threat round goby could pose to tributary ecosystems in the near future.

Jaylyn Carter

Discipline: Nursing and Public Health

Authors:
#1 Michelle Fortier
#2 Dawn Bounds

Abstract Name: The Hidden Gap: Exploring Barriers in the Oncology Transition for Black Childhood Cancer Survivors

Black childhood cancer survivors face persistent inequities as they transition from pediatric oncology to adult-centered care, a period already recognized as one of the most vulnerable points in the survivorship journey. Despite major advances in survivorship care, Black survivors continue to experience higher rates of treatment-related complications, lower follow-up adherence, and greater barriers to long-term support. Emerging evidence suggests that family perceptions, structural racism, medical mistrust, and limited culturally responsive communication significantly influence the quality and success of this transition. The purpose of this project is to examine the family-identified barriers, psychosocial challenges, and systemic factors affecting Black childhood cancer survivors as they move from pediatric to adult oncology care. This research was developed during an 8-week Summer Research Fellowship at the University of California-Irvine under the mentorship of Dr. Michelle Fortier and Dr. Dawn Bounds. Using a qualitative, equity-centered lens, peer-reviewed literature was reviewed, coded, and synthesized to identify themes related to mistrust, fragmented communication, loss of the pediatric support system, disparities in health literacy, and underrepresentation in survivorship planning. Evidence tables were constructed to map existing knowledge, identify gaps, and inform future research questions. Preliminary findings show that Black families frequently report feeling underprepared for transition discussions, uncertain about expectations in adult oncology settings, and disconnected from providers due to cultural and relational discontinuity. System-level obstacles, including insurance challenges, inconsistent follow-up coordination, and implicit bias, further compound these issues. These findings highlight an urgent need for culturally tailored transition models that support family engagement, strengthen trust, and improve continuity of care. By centering the experiences of Black childhood cancer survivors and their families, this work contributes to a deeper understanding of the disparities embedded within oncology transitions and offers direction for interventions that promote equity and long-term survivorship success.

Jayden Carter

Discipline: Engineering

Authors:

Abstract Name: Tracking Chlamydomonas Cell Motility towards Development of a Hybrid Drug Delivery System

Drug delivery systems play a crucial role in patient care by ensuring that therapeutic compounds reach specific target areas within the body. Chlamydomonas cells have emerged as a promising candidate for use as biological drug-delivery vessels due to their natural motility and responsiveness to environmental cues. These unicellular algae possess two flagella that enable them to propel through fluid environments with measurable strength and speed. Understanding the mechanics of their movement is essential for developing engineered cells capable of navigating toward tumor sites. Tracking the motility of untreated Chlamydomonas cells provides baseline information about their natural behavior, which can later be compared to drug-loaded or light-guided cells to assess how modifications influence their movement and targeting efficiency. The goal of this study is to create a baseline for how Chlamydomonas cells move by culturing cells, capturing images of cells, using tracking algorithms to collect data on the velocity and direction of the cell, and produce a readable and comparable data visual for future research.

Aniya Carter

Discipline: Psychology

Authors:

#1 Ashley Fernandez

#2 Amaria Ford

#3 Quincy Beck

#4 Chelsea Derlan Williams

Abstract Name: A Narrative Review of Outcomes Involving Ethnic-Racial Identity in Early Childhood

Ethnic-racial identity (ERI), which involves awareness, affiliation, attitudes, behaviors, and knowledge about one's ethnicity/race(s), is a vital factor in children's development, as it may determine how they navigate through various life experiences (Williams et al., 2020). Research has shown that ERI is a protective factor against negative experiences that may be present in individuals' lives, however, limited work has examined these processes among young children. A recent review focused on how parents talk about race during early childhood (i.e., ethnic-racial socialization; Hall et al., 2025), but few recent reviews have been conducted on ERI during this developmental period. Thus, the goal of the current review was to explore literature examining the impacts of ERI development on outcomes, specifically in early childhood. Inclusion criteria for the search was that articles had to include a sample of children in early childhood (i.e., 2 to 7 years of age) and at least one component of ERI. The search yielded limited articles on this topic, but across the articles results indicated that the components of ERI that have been studied have positive effects for children. For example, children with greater ERI private regard (i.e., how one feels about their race and identity) demonstrated higher levels of self-esteem and perceived social support (Tyrell, 2019), and ERI centrality (i.e., the importance of one's race is to their self-image), predicted better mental health (Tyrell, 2019). Other work found that ERI positive attitudes, negative attitudes, and centrality predicted children's improved social functioning (Williams et al., 2022). ERI has also had protective effects against behavior issues (Marcelo, 2019). Overall, findings can be useful for educating parents and caregivers about the importance of having open racial conversations with their children and encouraging ERI development in early childhood.

Grace Carver

Discipline: Economics

Authors:

#1 Dr. Yan Li

Abstract Name: Dietary Patterns and Adolescent Well-Being in Rural North Carolina

Research on the relationship between dietary patterns and well-being has expanded rapidly in recent years. This study contributes to previous work by examining how diet relates to well-being among rural middle school students in North Carolina, with an average age of 12. Two indicators are used to measure youth well-being at an individual level: self-reported academic performance and perceived stress levels. Students' diets are categorized as healthy, unhealthy, or neutral, and we construct a health index to capture differences across these dietary patterns. Our analysis draws on cross-sectional data from the Motivating Adolescents with Technology to Choose Health (MATCH) program, a school-based wellness initiative implemented during the 2022–2023 academic year in rural North Carolina. Using a mixed-effects model, we assess the association between diet and well-being in this rural adolescent population. Results show that both healthy and unhealthy diets are significantly associated with adolescent well-being, though the magnitude of these associations varies. We also examine potential mediating pathways and find that sleep and body weight mediate the relationship between diet and well-being. Finally, we explore whether participation in MATCH moderates the

effects of dietary patterns. Although the findings suggest that school-based wellness programs may help buffer the negative influence of a poor diet, the moderating effect is not statistically significant. By focusing on a rural youth population and evaluating a real-world intervention, this study addresses an important gap in the literature. It provides actionable insights for policies that promote adolescent well-being and academic success in underserved communities.

Nic Carwile

Discipline: Biology

Authors:

#1 Natalie Truby

#2 Annalise Hassan

#3 Liaa Ferede

#4 Peter Hamilton

Abstract Name: Exploring The Role Of Zfp189-Mediated Transcription On Microglial Activity In The Prefrontal Cortex

Rationale: Microglia are brain phagocytic cells that are increasingly recognized as cellular mediators of brain and behavioral adaptations. Previous research identified ZFP189 as a transcription factor (TF) linked to stress resilience, with its overexpression in the prefrontal cortex (PFC) protecting against social deficits. Delivering synthetic TF variants to PFC, our lab demonstrated that altering ZFP189 transcriptional control impacts immune gene expression, dendritic spine morphology, and social behavior. This study aims to investigate how ZFP189-driven transcription within PFC pyramidal neurons influences microglial activity and synaptic pruning. This work may provide insight into the molecular mechanisms underlying neuroplasticity and social behaviors. Objectives: We hypothesize ZFP189-mediated transcriptional control within the PFC regulates neuronally expressed markers, which can be detected by microglia to facilitate spine pruning at manipulated neurons. Methods: Male and female C57BL/6J mice (8-10 wks old) from JAX Labs were used. Stereotaxic surgery was employed to virally deliver synthetic transcription factor variants to the PFC. Three days following surgery, mice were perfused and brains were removed and postfixed in 4% paraformaldehyde. Following postfix, whole brains were cryoprotected, flash frozen, and 20µm slices of the PFC were obtained for each brain. Tissues underwent immunohistochemistry to stain for IBA-1, a microglia-specific ionized calcium binding adaptor protein, and GFP; co-expressed with our synthetic transcription factors. Tissues were mounted and imaged using a Keyence BZ-X810 microscope. Microglia were analyzed both proximal and distal to transduced pyramidal neurons using ImageJ software for Sholl analysis. Results: Preliminary results from Sholl analysis suggest differences in microglial morphology based on both ZFP189 TF variant and animal sex. Continuing analysis of data using Sholl and statistical analysis using one-way ANOVA or area under the curve may provide a deeper insight into the activity of microglia in relation to ZFP189 transcriptional modulation in the PFC.

Tiffany Casaje

Discipline: Engineering

Authors:

#1 Mehrad Kamalzare

#2 Hans Ferrel Tolksdorf

#3 Donald P. Coduto

#4 Tiffany Mae Casaje

Abstract Name: Efficacy of Presaturation for Controlling the Effects of Expansive Soil Below Slab-On-Grade in Southern California

Expansive soils containing clay minerals are highly prevalent worldwide across diverse geological and climatic environments. The presence of these clay minerals gives rise to the physical properties of expansive soils, which undergo expansion when wet and shrinkage when dry. These volume changes can be highly problematic for lightly loaded foundations, such as concrete slab-on-grade systems. In California, the effects of expansive soils can be further exacerbated by prolonged drought followed by excessive wetting from irrigation or intense rainfall. Mitigation of expansive soils requires low-cost treatment methods due to the relatively low construction cost of slab-on-grade foundations. One cost-effective technique used to reduce swelling is presaturation, which involves wetting expansive soils to induce heave prior to construction. However, the practice of presaturation in California has evolved largely from empirical evidence of successful site applications, and therefore lacks a rational, standardized methodology that extends beyond local practice. This study aims to evaluate the efficacy of presaturation beneath slab-on-grade foundations in two parts. The first part evaluated professional opinions on presaturation to gather a consensus on the California state of practice through local interviews and a statewide online questionnaire. The surveys identified key topics such as identification of expansive soils, presaturation recommendations, literary resources, construction techniques, measurement and verification, and cases of success and/or failures. California professionals were in agreement that presaturation offers a successful treatment of expansive soils, while a minority disagreed. The second part of the study tested a hypothesis for a rational approach to presaturation based on degree of saturation, expansion pressure, and the wetting process. Data from other studies were evaluated to determine the increase in in-situ moisture content and depth of saturation required to minimize volume change. This information supported the design of a step-by-step procedure for determining the effectiveness of presaturation for slab-on-grade.

Edu Casanova Prada

Discipline: Business

Authors:

Abstract Name: Public Infrastructure and Sustainable Development: Evidence from the Padma Bridge in Bangladesh

Public infrastructure plays a central role in shaping development outcomes, especially in emerging economies where improvements in mobility can transform economic and social conditions. This study examines the Padma Bridge in Bangladesh through the Sustainable Livelihoods Framework (SLF), which evaluates change across five forms of capital: human, social, natural, financial, and physical. In this context, the bridge represents a major expansion of physical capital with the potential to influence livelihoods across the region. The analysis uses two World Bank datasets from 2013 and 2022 to compare conditions before and after the bridge's construction. A difference-in-differences approach will help identify how the project may have affected trade activity, regional investment, mobility patterns, and access to essential services, isolating changes that coincide with the bridge rather than broader national trends. The goal is to offer a grounded, case-based understanding of how a large infrastructure project can affect multiple livelihood dimensions and to provide evidence that supports more informed planning in developing economies.

Azul Naomi Casas Aranda

Discipline: Biology

Authors:

#1 Julio H Rangel
#2 Siddhartha Das
#3 Brian Grajeda

Abstract Name: Glucosylceramide Transferase and Cyst Wall Biogenesis in *Giardia lamblia*

Giardia lamblia is a waterborne protozoan that survives outside the host by forming environmentally resistant cysts that are essential for transmission of Giardiasis. Encystation is a tightly regulated differentiation process characterized by diverse molecular dynamics in gene expression, including changes driven by glucosylceramide transferase (GlcT1), an enzyme central to lipid metabolism. Giardial GlcT1 (gGlcT1) contains two catalytic domains, i.e. Ceramide glucosyltransferase (CGlcT) and ceramide galactosyltransferase (CGalT) that mediate the synthesis of glucosylceramide (GlcCer) and galactosylceramide (GalCer), respectively. This study investigates the role of gGlcT1 in *Giardia* encystation by examining its potential regulatory influence on five key interacting partners involved in encystation and chromatin-related processes: *cwp1*, *cwp2*, *cwp3*, *myb2*, and *hcmp*—a high-cysteine-rich membrane protein implicated in chromatin remodeling. We studied the expression of *cwp* genes and monitored cyst development following gGlcT1 silencing, targeted mutation, or enzymatic inhibition to assess how lipid metabolic pathways contribute to the encystation program. Disrupting gGlcT1 activity led to a verified reduction in CWP synthesis and resulted in defective cyst formation. These defects included irregular cyst wall morphology, decreased wall thickness, and compromised structural integrity, indicating that proper glycosphingolipid metabolism is essential for cyst wall biogenesis. While *cwp1–3*, *myb2*, and *hcmp* were included as interacting partners of interest, only CWP expression changes were experimentally confirmed in this study. The involvement of the additional genes remains a focus for future investigation. Overall, the findings identify gGlcT1 as a critical regulator of *G. lamblia* encystation, linking lipid metabolic processes to the structural pathways that drive cyst formation. This study provides new insights into protozoan differentiation and environmental survival while highlighting lipid metabolism as a potential therapeutic focus.

Ridgeway Case

Discipline: Biochemistry

Authors:

#1 Kari Nejak-Bowen
#2 Matthew Carson
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#4 Jack Drda
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#6 Joseph Locker
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Abstract Name: The β -catenin/Liver X Receptor Axis Regulates Cholesterol Metabolism and Inflammation in Murine Cholestasis

Introduction: Primary sclerosing cholangitis (PSC) can result in retention of toxic bile acids (BA) within hepatocytes leading to cell death, inflammation, and fibrosis. Lithocholic acid (LCA) is a BA associated with adverse clinical outcomes in PSC; however, studies focusing on therapeutic interventions that target this toxic

BA are lacking. We hypothesize that β -catenin, which has been shown to regulate BA homeostasis, may reduce LCA-induced cholestasis. Methods and Results: Liver-specific β -catenin knockout mice (KO) and wild-type littermates were fed 0.6% LCA supplemented diet for 7 days. KO had a remarkable reduction in bile infarcts and hepatobiliary injury, as shown by histology and serum biochemistry. In the absence of β -catenin, xenobiotic metabolic pathways including pregnane X receptor (PXR) were activated, resulting in decreased serum hydrophobicity in KO. Additionally, loss of β -catenin increased HNF4 α occupancy of the oxysterol-activated liver X receptor (LXR) promoter in KO, resulting in the upregulation of downstream targets that regulate cholesterol metabolism and transport in hepatocytes. Conversely, LXR activation also repressed expression of inflammatory genes, such as IL-33 and ST2, which in turn decreased recruitment of disease-exacerbating type 2 innate lymphoid cells (ILC2). Conclusions: PXR- and LXR-mediated processes such as regulation of BA composition and cholesterol metabolism are enhanced by loss of β -catenin during LCA-induced cholestasis. Additionally, inhibiting β -catenin suppresses the inflammatory response by downregulating the LXR/IL-33/ST2/ILC2 axis. Taken together, these data demonstrate a newly-identified β -catenin-dependent mechanism for attenuating hepatic injury in patients with cholestasis.

Tomas Casella

Discipline: Engineering

Authors:
Christopher Cueva

Abstract Name: Evaluation of a Modular Raspberry Pi–Based Weather Station for Real-Time Environmental Monitoring

Pollution driven by industrial activity and urbanization poses a significant and often unnoticed threat to public health through the gradual accumulation of pollutants. Miami Dade College's Wolfson Campus is currently located at the center of a major construction zone, where constant development increases the likelihood of hidden environmental impacts. As a result, individuals in the area may experience negative health effects over time without realizing that everyday exposure is contributing to these issues. These conditions highlight the need for active environmental monitoring and greater awareness of how urban pollution affects surrounding communities. This study investigates the feasibility of using a modular Raspberry Pi platform to conduct real-time environmental monitoring and to evaluate whether such a system can serve as a low-cost complement to commercial weather stations. The research will evaluate the utilization of several compatible sensors, including temperature, humidity, pressure, and particulate matter sensors, controlled through customized Python code. The Raspberry Pi–based monitoring system will be strategically deployed at different locations around the Wolfson Campus for environmental relevance, collecting data across multiple time intervals. Sensor readings will be compared with publicly available environmental databases to assess the effectiveness of real-time monitoring and remote data access using open-source software tools. Ultimately, this study will help identify which sensor configurations offer the most reliable performance and provide insight into the practical trade-offs between affordability, accuracy, and long-term stability. The results of this research will be discussed in relation to the system's practicality for campus-based environmental monitoring and its potential use as a low-cost tool in broader urban settings.

Jamie Cashour

Discipline: Biology

Authors:

Abstract Name: The Impact of Polyamine Depletion on Macrophage Polarization and Phagocytic Ability

Ovarian cancer remains difficult to treat, in part due to the immunosuppressive tumor microenvironment that impairs the immune system's ability to eliminate cancer cells. Macrophages within this environment often adopt an M2-like phenotype, characterized by reduced pro-inflammatory activity and altered phagocytic function allowing for tumor escape. Phagocytosis, the process by which macrophages engulf and eliminate cellular debris, pathogens, or tumor cells is a key mechanism of immune surveillance that can be compromised in the tumor setting. Previous work from our group has shown that polyamines, essential molecules involved in cell growth and immune regulation, are elevated in the tumor microenvironment and their depletion leads to an increase in M1 macrophage markers and a decrease in M2 macrophage markers in the ascites fluid of a murine ovarian cancer model. Current experiments are evaluating if this is a polarization switch or a change in immune recruitment in vivo. In this study, we investigated if polyamines are capable of influencing macrophage behavior in vivo, including their phagocytic ability. To investigate how polyamine depletion affects macrophage phagocytosis, THP-1-derived macrophages and mouse RAW264.7 macrophages were treated with polyamine depleting drugs, DFMO and ivospemin, and then challenged with FITC-positive IgG beads and analyzed by flow cytometry. Polyamine depletion increased the phagocytic capacity of both cell lines and supports the broader hypothesis that polyamine depletion supports an M1-like phenotype. Ongoing experiments are evaluating changes in M1/M2 related genes in these cell lines following polyamine depletion. My results provide insight into the potential of polyamine depletion to restore or enhance macrophage phagocytic function in the context of ovarian cancer and other difficult to treat cancers.

Delphine Casper

Discipline: Biology

Authors:

#1 Margaux Balduck

#2 Adam Burgener

#3 Kristina Broliden

Abstract Name: Functional and Microbial Analysis of *Candida albicans* Colonization in Women from Stockholm, Sweden

Candida albicans is a common yeast species found in the human gastrointestinal and genitourinary tracts. Under certain conditions, it may become pathogenic, leading to long-term complications and heightened vulnerability to other infections. Chief among these are vulvovaginal candidiasis (VVC) and recurrent vulvovaginal candidiasis (RVVC). These infections affect millions worldwide, causing chronic pain, stigma and lost productivity. An estimated 75% of women globally will experience VVC in their lifetime, and 5-8% will experience RVVC, defined as three or more episodes within a year. Treatment is lengthy and often unsuccessful, as guidelines dictate more than six months of antifungal therapy, yet over half relapse. To better understand the mechanisms by which *Candida albicans* disrupts mucosal homeostasis and predisposes individuals to secondary infections, we looked at immunohistological analysis of vaginal biopsies from a cohort of Swedish women and profiled epithelial junction proteins and immune cell infiltration to compare two treatments: fluconazole, the gold standard oral azole, and chlorhexidine, an emerging novel compound used in antiseptics. We hypothesize that *C. albicans* may alter mucosal integrity and immune responses, and these treatments may reduce *C. albicans* presence, leading to an overall healthier vaginal microbiome and recovery of mucosal integrity and immune balance. Using metagenomic and shotgun sequencing, we aim to identify functional and microbial pathways and determine which specific species perform these functions. By integrating host and microbial datasets, we seek to reveal key molecular signatures associated with treatment response and mucosal health. This will allow us to identify how antifungal treatments modulate host-microbe interactions and guide the development of more effective, targeted therapies for VVC and RVVC.

Katie Cassady

Discipline: History

Authors:

#1 Katie Cassady

Abstract Name: TRANSATLANTIC MARRIAGES IN THE GILDED AGE: CONSUELO VANDERBILT'S TRANSFORMATION FROM DEBUTANTE TO DUCHESS

Between 1865 and the onset of World War I, wealthy American women increasingly married titled European men, creating a stereotype of the glittering American heiress marrying into British high society. These marriages played a critical role for both parties: the newly moneyed elite asserted its claim to social status, and depleted European nobility regained the funds so essential to their longevity. By 1915, 454 American heiresses had married into the European aristocracy. In one famous example, Consuelo Vanderbilt was forcibly wed to the ninth Duke of Marlborough. As the Vanderbilt family labored to assimilate themselves into old-money New York society, the opportunity to tie their family name to English nobility could catapult the ambitious clan to the social ladder's apex. Alva Vanderbilt invited Charles Richard John Spencer-Churchill, the ninth Duke of Marlborough, to visit her summer home in Newport, Rhode Island. There, he met her daughter Consuelo, his unwilling bride-to-be who was already happily engaged to the man she truly loved, Winthrop Rutherford. Consuelo, through her mother's insistence, married the Duke at St. Thomas' church in New York City. She was immediately relocated to the Blenheim Palace in England, a historic home in desperate need of repairs that Alva's millions were to supply. Their unhappy marriage ended with divorce in 1920. Consuelo's tragic story mirrors that of dozens of others: a young American heiress becoming a bargaining chip between a wealthy American family and a struggling European aristocrat.

George Cassens

Discipline: Psychology

Authors:

#1 Zachary Wood

#2 Neha John-Henderson

Chloe Abraham

Abstract Name: Civil Engagement and Health in American Indians: Frequency of Different Factors in Relation to Civic Engagement.

This presentation explores the relationship between Native Americans and civic engagement. Native Americans are notoriously underresearched in regard to mental health and preventative measures. Civic engagement has been shown to have a positive bidirectional relationship with mental health and shows a potential focus area for the indigenous community. Creating relationships and forming a community is an important step to further build the indigenous culture. Thus, survey responses of the barriers, motivations, and the impact on well-being of Native people when they engage in civic engagement were collected and explored to develop new interventions or support for indigenous people and to improve the rate at which civic engagement is performed. Participants were surveyed on the challenges or barriers to civic engagement, and we discuss why time constraints were the most prevalent response. Additionally, we look at the motivations for civic engagement and discuss why family and community were indicated most frequently. Native people face many modern-day challenges, and a multi-faceted response is critical. Civic engagement is one avenue that appears beneficial and is an important component in the conversation about improving mental and physical health in indigenous people.

Katelynn Castagnola

Discipline: Biology

Authors:

#1 Caleb Mast

#2 Maggie Milhorne

#3 Ersilia Mirabelli

Abstract Name: Histological Assessment of Neuropathic Pain in Murine Nervous Tissue

Neuropathic pain is a symptom that occurs often in people with diabetes, multiple sclerosis, and HIV/AIDS. It is difficult to treat however, since the pain results from damage to the central nervous system. Gliosis and demyelination are the two most prominently seen changes to central nervous tissue. Current models of neuropathic pain in mice make studying difficult, since the methods are very invasive and require extensive training; ligation of the sciatic nerve and the T4 and T5 spinal nerves are the most common procedures in modern medicine. However, it has been shown that formalin can potentially induce chronic pain (pain lasting over two weeks from one injury) in mice, as it has been successfully induced in rats. Therefore, our experimental goal was to establish a formalin-induced model of neuropathic pain in mice for an easier and quicker alternative to the standard surgical methods. To do this, mice were injected with 5% formalin subcutaneously into the dorsal side of the hind paw and observed for a two-week period with mechanical and thermal tests. After 14 days, the mice were euthanized. Brains and lumbar spinal cords were collected, and tissue was prepared for histological processing to be cut with a cryostat. The slides created were stained with Hematoxylin & Eosin and were observed for any visible changes in the tissue between the control mice and injected mice. Gliosis and demyelination were observed in only the experimental mice, indicating that neuropathic pain was present due to the formalin injection. The results of this study open new means to research neuropathic pain without invasive surgeries. This will allow more research to be easily done to aid patients who suffer and have little to no treatment available. With this research, it is possible to get closer to the cure for chronic pain.

Sara Castillo

Discipline: Chemistry

Authors:

#1 Sara Castillo

#2 Maria Silva

#3 Shiru Lin

#4 Chong Wang

Abstract Name: Platinum-Decorated Carbon Nitride as a Mott-Schottky Photocatalyst for Efficient CO_x-free Hydrogen Production from Methanol

As the global demand for sustainable and efficient energy sources increases, hydrogen has emerged as a promising energy carrier due to its high energy density and clean conversion in fuel cells, producing only water as a byproduct. However, challenges in hydrogen storage and transportation hinder its widespread adoption. Methanol represents a practical hydrogen carrier because it can be readily integrated into existing fuel infrastructures. The efficient release of hydrogen from methanol relies on an active and stable methanol dehydrogenation catalyst. Molten-salt carbon nitride (MCN) has shown potential as a photocatalyst, yet its

limited interaction with methanol molecules constrains its catalytic performance. To enhance these interactions and improve photocatalytic activity, in this work, a Pt₁₃ cluster is incorporated into MCN to generate a Pt₁₃@MCN Mott-Schottky photocatalyst. We use Density Functional Theory (DFT) in VASP to optimize the structures of MCN, Pt₁₃, and methanol-based molecules including CH₃OH and CH₂O, along with composite systems including Pt₁₃@MCN-CH₃OH and Pt₁₃@MCN-CH₂O. We examine how charge distribution changes before and after adsorption to better understand the catalytic mechanism. Through computational comparison of Pt₁₃@MCN and pure MCN, this work offers a theoretical understanding of how Pt incorporation on MCN influences adsorption, charge transfer, and the reaction energy in methanol dehydrogenation.

Olivia Castle

Discipline: History

Authors:

#1 Eric Huneke

Abstract Name: The Fight For Sex Ed: Battles Over Sexual Morality During the HIV/AIDS Epidemic

As one of the paramount health crises of the century, the HIV/AIDS epidemic in the United States provoked a multitude of conflicting responses from government officials and activist citizens alike. This produced rapidly increasing tensions between sexual abstinence education pushed by the Religious Right and the urgent need for HIV prevention education. Dialogue surrounding sex education throughout the 1980s shows the extreme diversity in ideas about what should be taught, how, and by whom. This research examines how and the extent to which debates sparked between key groups and figures transformed sex education during the HIV/AIDS crisis. As standards of sex education are still under scrutiny today, this research is impactful because it gives the basis for understanding why comprehensive programs face opposition and stigma. Methods include mixed-media research conducted through the lens of historical analysis, utilizing primary and secondary sources such as newspaper articles, advertisements, and peer-reviewed journals. The debates over safe sex led to community activist efforts and new conversations over condom usage, inextricably intertwining the pivotal ways in which key players and groups set the parameters of promoting sex education. I argue that through these means, the various discourses between scientists, activists, and the government created a paradox that often contradicted not only the “opposition,” but notions within their own groups.

Terra Castresana

Discipline: Architecture, Construction Management, and Interior Design

Authors:

#1 Terra Castresana

Abstract Name: Reintegrating the River: Sope Creek Mill as the Site for Reviving the Connection to the Chattahoochee River

What environmental feature does San Antonio, Chicago, and Atlanta have in common? Despite their radically different urban cultures, these cities are all built around rivers! As anthropologists have shown, rivers are foundational to the creation of human settlement, and many cities design their urban fabric to interact with their respective rivers. Despite the scale of the Chattahoochee River, a visitor of Atlanta might not see the river as it is covered with highways and other infrastructures. Since the inception of colonial Atlanta as a

railroad town in the nineteenth century, the urban design deviated from having the rivers be central to the city's evolution, as scholarship shows. There was still an existing relationship with its rivers when waterways played essential roles in the economy as power sources for industrial mills. Once the economic use of mills declined, the relationship with rivers also fizzled out. This broken ecological relationship can be seen through the rise and fall of mills as a once-important part of Atlantean landscape. One such mill was Marietta Paper Mill on the Chattahoochee River that was once a booming economic source that lays abandoned today. These ruins symbolize the current relationship that the people of Atlanta have with rivers. This research design project brings into light the fraught relationship between Atlanta and its rivers. How can architectural interventions transform Sope Creek Paper Mill ruins to reconnect the broken ecological relationship between the Chattahoochee River and people into the urban fabric of Atlanta? This design research explores adaptive reuse of the Sope Creek Paper Mill as a technique to revive the connection between people and the Chattahoochee River. By reprogramming the Sope Creek Paper Mill and restoring the space, people who are not just hikers would interact with the space and establish their connection to the Chattahoochee River.

Briana Castro-Balbi

Discipline: Political Science

Authors:

#1 Ramazan Kilinc

#2 Dacey Ngo

#3 Kyle Hicks

#4 Lucas Mohr

Gabrielle Da Silva

Abstract Name: Shifting Grounds: The Influence of Political Environments on Refugee Resettlement Policies in Germany and the United States (1975-2025)

This research project investigates the evolving impact of political environments on refugee resettlement policies in Germany and the United States (U.S.) over the past five decades. By tracing policy developments from the mid-1970s to the present, the study examines how domestic political dynamics—such as party ideologies, public opinion, and institutional structures—have shaped national responses to global refugee movements. The comparison of the two countries' approaches offers insights into how liberal democracies balance humanitarian obligations with political constraints. The study explores the Germany's post-World War II refugee reception policies, the influences of European Union directives, and political ramifications of the 2015 refugee crisis. It examines the influence of shifting coalitions, rising populism, and debates over national identity on asylum procedures, integration programs, and border enforcement. The research also focuses on the interplay between U.S.' federal and state-level policies, roles of presidential administrations, and impact of security concerns—particularly post-9/11—on refugee admissions and resettlement infrastructure. It also considers the influence of advocacy networks and religious organizations in shaping outcomes. The project draws on archival research, legislative records, policy documents, and interviews with policymakers and practitioners. It incorporates quantitative data on refugee admissions and qualitative analysis of political discourse to assess how narratives around refugees have evolved. The study identifies key inflection points—such as the end of the Cold War—that prompted significant policy shifts and public debate. The research contributes to deeper understandings of political environments mediating the implementations of refugee resettlement policies. It argues that while both Germany and the U.S. have institutional commitments to refugee protection, their policy trajectories are shaped by domestic political pressures and strategic interests. The findings have implications for current debates on refugee governance, democratic accountability, and the resilience of humanitarian norms in an era of rising nationalism and geopolitical uncertainty.

Roman Caulk

Discipline: Economics

Authors:

#1 Roman Caulk

Abstract Name: Free Enterprise under Two Regimes: Tribal vs Commercial Casino Regulations

This project explores how different rules and regulations shape the performance of casinos in the United States by comparing tribal casinos (built on reservations) with commercial casinos. Both kinds of casinos compete for the same customers, but they often face different tax rates, regulatory requirements, and agreements with government agencies. These differences provide a useful setting to ask a central question in free enterprise: when the rules of the game change, does the market behave differently? To answer this, I plan to collect data on casino revenue, employment, and size (such as number of slot machines and table games) for tribal and commercial casinos that operate in the same or similar regions. I will then compare how well these casinos perform after accounting for local factors such as population, income, and tourism. If casinos operating under lighter tax or regulatory burdens consistently earn more per casino or per game, this would support the argument that less restrictive rules encourage investment, expansion, and competition. On the other hand, if performance is similar across regimes, it may suggest that market forces and consumer demand matter more than regulation in this industry. The goal of this project is to provide evidence that can inform discussions about the proper role of government in markets like gaming, and to offer a concrete case study of how different institutional frameworks can affect businesses, workers, and consumers.

Shannon Cawley

Discipline:

Authors:

#1 Cinthia Pacheco

#2 Shan Cawley

#3 Rachel Midkiff

#4 Rachel King

Abstract Name: Discussing Barriers for Undergraduate Students to Participate in Research Experiences

The Office of Undergraduate Research (UgR) at West Virginia University (WVU) connects undergraduates with research opportunities. Every semester, hundreds of students express their interest in these opportunities through a widely publicized Interest Form (IF). However, only a fraction of these students proceed with the process of being matched with a faculty research mentor and participating in a structured research experience. Research experiences are known to positively impact students' persistence in college and the advancement of their careers. Therefore, we aim to identify and address potential barriers that prevent undergraduate students from following through with the process of getting involved in research. We collected data from IFs over four consecutive semesters to identify specific stages in which students stop the enrollment process in the UgR program. Additionally, we wanted to identify specific groups of students by major who were more likely to discontinue the process to develop targeted recruitment strategies for these groups.

Brittany Cazares Luna

Discipline: Nursing and Public Health

Authors:
#1 Dina Garcia

Abstract Name: Perceived Unfair Treatment and Access to Dental Care Among Latin* Adults in Rural Southwest Virginia

Latin* people face significant oral health disparities across the life course as evidenced in higher oral disease rates and lower dental utilization rates than their counterparts. While the majority of studies have focused on the role of acculturation in driving these oral health disparities, less attention has been placed on the role of structural drivers such as discrimination. To address this gap, this study determined the distribution of perceived unfair treatment towards the self and observed towards others due to ethnicity, across dental care utilization status among Latin* adults residing in rural Southwest Virginia. Adults were invited to participate in an online survey administered via REDCap in either English or Spanish, consisting of 80 questions. This substudy focused on questions related to sociodemographics, dental care utilization, and unfair treatment, to self or towards others, attributable to ethnicity. Data analysis was limited to descriptive statistics generated for sociodemographic characteristics overall and perceived unfair treatment by dental care utilization status. Ninety-one Latin* adults enrolled in the study, of which the majority were female (70.3%%), over the age of 30 (63.7%), with more than a high school level of education (42.9%). Almost three-quarters of participants reported not having dental insurance (71.4%) and only 40.7% reported having utilized dental care in the past year. The majority of participants reported having experienced unfair treatment towards the self (73.6%) or observed towards others (73.5%). Among those that reported not attending dental care in the past year, 79.4% experienced unfair treatment and 75.9% witnessed unfair treatment towards others. Findings reveal a large proportion of Latin* individuals in rural Southwest Virginia have experienced unfair treatment towards the self or observed towards others due to ethnicity. Further research should explore how psychosocial stressors influence access to dental care and oral health status for minoritized ethnoracial groups.

Edwin Cazun-Lima

Discipline: Engineering

Authors:
#1 Laleh Golshahi
#2 Mohammad Hejazi

Abstract Name: Analyzing The Regional Depository of Nasal Spray Medication in Adults vs. Children

Nasal sprays are a common form of medication that are prescribed to patients of all ages, children included. While general nasal sprays are considered effective, they lack specific dosage amounts specified for adults and for children. Apart from that, the nasal structure of adults differs from children. There have been studies done to explore the regional deposition of locally acting nasal sprays in adult nasal geometries. Other studies have revealed that medications administered intranasally to children are not as effective. The question that is left unanswered is whether the effectiveness of nasal sprays differs between adults and children, who have different nasal structures. Anatomically realistic in vitro nasal models of adults and children, three children and three adult, were used to analyze how different spray models perform in delivering their intended product through the nasal passage into five areas of interest. Three distinct nasal spray products were used on the in vitro nasal models under repetitive controlled experiments that carefully measured the angle at which the nasal spray is applied and the depth of insertion of the nasal spray. The experiments aim to shed light on specifically how much of the drug is delivered during a single spray into each of the five areas of interest. Doing so will reveal key information on the difference in drug delivery between the nasal models of children and those of adults as well as highlight other factors that tend to have an effect on the regional deposition of the drug through the nasal geometries.

Carisa Ceasor

Discipline: History

Authors:

Abstract Name: Archiving Black Madness: Race and Psychiatry in the Asylum Era

American psychiatry has a long history of racializing its subjects. From Samuel Cartwright's coining of drapetomania, Negritude and Dysarthria aethiopica, to the overdiagnosis of schizophrenia in Black communities exacerbated during the civil rights movement, psychological sciences have cultivated Black distrust. While contemporary research has established disproportionately poor treatment of Black patients across several metrics, we lack a complete historical perspective on the development of these racializing systems. This project explores the varied archival access to asylum histories in the United States, and how archival silences impact the history of Black mental health. I employ a mixed-methods approach to address this gap. First, locating and mapping Black-serving asylums to illustrate the ways they worked in larger hospital systems rather than as individual institutions as previous research suggests, and to quantify the impact of the asylum era on Black populations. Secondly, I will survey contemporary archival stakeholders (including researchers, descendants, former patients and archivists themselves) on what archival access issues they've encountered, and what policy changes they would like to implement. Lastly I will engage in a case study of the Texas State Hospital system, leveraging local resources to document the experience of performing historical research on Black patients. In doing so, I hope to create a macro history of the Black patients in the asylum era, contextualizing previous research and offering the foundation for further work into the development of racial-psychological rhetorics.

Jenna Cecil

CA - University of California - San Diego

Discipline: Biology

Authors:

#1 Miles Wilkinson

#2 Kun Tan

#3 Beate Illek

Abstract Name: miRNA Inhibition as a Universal Therapeutic Strategy for Treating Cystic Fibrosis

Cystic Fibrosis (CF) is a devastating genetic disease that affects over 100,000 people worldwide. The disease is caused by mutations in the CFTR gene, which encodes a chloride channel important for normal pulmonary function. Recent treatments benefit approximately 90% of CF patients but leave 10% without options, and even treated patients experience persistent symptoms. Thus, a need for novel therapeutic approaches for treating people with CF. To address this challenge, we are developing a CF therapy that revolves around microRNAs (miRNAs). These small regulatory molecules suppress gene expression by binding to specific mRNAs and eliciting their destabilization and inhibiting their ability to translate their protein product. Past studies have suggested that the CFTR gene transcribes an mRNA that is targeted by several miRNAs. We hypothesized that selective inhibition of these CFTR-targeting miRNAs would increase CFTR protein expression and hence provide a therapeutic strategy for all individuals with CF regardless of the nature of the mutation(s) in their CFTR gene. This approach is feasible because miRNA-binding sites typically occur outside of the mutation-prone coding region of genes, making it a broadly applicable approach. Using algorithms for computational prediction, we identified several candidate miRNAs with high probability of targeting CFTR. Using chemically-synthesized, sequence-specific miRNA inhibitors (anti-miRs) coupled

with a CFTR reporter assay in human bronchial epithelial cell lines, we found that seven of the anti-miRs we tested significantly increased CFTR expression (by >3-fold). Further investigation revealed that some of the CFTR-regulatory miRNAs work predominantly by destabilizing CFTR messenger RNA while others suppress CFTR protein translation. We are currently examining whether a combination of anti-miRs elicits stronger CFTR upregulation than single anti-miRs. Our results show that miRNA-suppression therapy is a promising, potentially universally-applicable approach that could benefit a wide spectrum of CF patients, including those for whom treatment options are currently unavailable.

Aaron Cecil

Discipline: Engineering

Authors:

#1 Yuhao Xu

Abstract Name: Design and Fabrication of a High-Pressure Chamber for the Combustion of Synthetic Aviation Fuel Droplets

Synthetic aviation fuels (SAFs), such as farnesane (C₁₅H₃₂), offer reduced life-cycle emissions; however, their fundamental combustion behavior at elevated pressures has yet to be explored. Farnesane has significance because it can be used in diesel engines and as a certified component in jet fuel blends. This study reports the design and commissioning of a high-pressure combustion chamber (HPCC) for generating and igniting farnesane droplets and diagnosing their combustion. This apparatus will enable quantification of flame structure, burning rate, and soot formation under controlled atmospheres up to 40 atm. The study aims to examine how burning rate, flame distance from the droplet, and soot behavior change with pressure and gas composition to inform models and the practical use of SAFs. Measuring how a single droplet burns provides the key parameters used to predict spray and engine behavior, guiding the design of cleaner injectors and combustors. The HPCC is a pressure-rated chamber with optical windows for imaging diagnostics, allowing for control of pressure and gas composition. Uniform droplets are suspended on a fine fiber and ignited by a retractable heated wire to allow for robust experimentation with minimal disturbance. High-speed imaging is performed in both the color spectrum for flame observations and in backlit black and white imaging for soot formation diagnostics. Overall, this setup enables the analysis of droplet sizing, flame shape, and soot characteristics over time. This work reports the apparatus, test procedure, and preliminary results on how pressure affects burn rate, flame, and sooting dynamics. Higher pressure is expected to increase the burning rate and the intensity of soot formation. Trends are interpreted using classical droplet combustion theory and thermophysical properties of the fuel. Overall, the HPCC provides an optically accessible platform for high-pressure SAF combustion studies and reference data to improve models and guide lower-emission injector/combustor design.

Justin Cecilio

Discipline: Biology

Authors:

Abstract Name: From Scat to Sustainability - Analyzing the Effects of River Otter Scat on Soil Properties

The North American river otters (*Lontra canadensis*) are an important environmental indicator species as they can accurately reflect the overall ecosystem's health. In addition to their role as bioindicators, river otters can positively influence soil enrichment through scat deposits. Understanding this relationship is important for

evaluating and analyzing the health at Big Break Regional Park, and other biologically diverse sites with varying levels of river otter activity. This study examined the impact of river otter scat on soil quality by comparing nutrient levels in soil collection from areas with visible river otter scat, and from control areas with a lack of river otter activity. The research question guiding this study was: How does river otter scat affect soil quality at Big Break Regional Park? Soil samples were collected from four total sites, two with confirmed river otter presence and two environmentally matched control sites. Soil was sampled at a depth of 0-10 cm, and scat samples were collected using contamination-free methods (e.g. gloves, plastic bags, and trowels). All soil samples were brought to the lab, where they were tested for nitrogen (N), phosphorus (P), potassium (K), and pH using soil nutrient testing kits. The nutrient levels from both sites were compared using visual and statistical graphs and charts. Results showed a statistically significant difference in nitrogen concentrations between the scat and non-scat sites. Soil from scat sites exhibited a nitrogen deficiency level of 1.75, whereas soils from non-scat sites showed a depletion level of 0. These findings show that river otters can contribute nitrogen level to soil, ultimately enhancing soil fertility. This study highlights the ecological importance of river otters as contributors to nutrient enrichment and soil health. The addition of organic nitrogen from the river otters is seen to support plant growth and promote biodiversity.

Rashelle Ceja

Discipline: Biology

Authors:

#1 Jungwon Min

#2 Mara Mather

Abstract Name: Association Between Water Exchange Rate Across the Blood-Brain Barrier and Blood Pressure in Older Adults

It is well known that high blood pressure is a risk factor for Alzheimer's Disease (AD) and dementia. Recently, it was found that the function of the blood-brain barrier is compromised in early AD and other dementias. As adults age, the blood-brain barrier begins to dysregulate, which has contributed to neurodegenerative and cerebrovascular diseases. However, it is not clear in the literature whether the decline of the blood-brain barrier is associated with high blood pressure. The goal of this study is to assess the integrity of the blood-brain barrier in healthy older adults using non-invasive neuroimaging methods and to investigate its associations with blood pressure and its variability. We use diffusion-prepared pseudo-continuous arterial spin labeling (dp-pcASL) to measure water exchange rate across the blood-brain barrier. This new technique quantifies the water diffusion across the capillaries in the brain and has shown that decreased water exchange rate is associated with declined cognitive ability in older adults. With the current study, we hypothesize that increases in blood pressure are associated with decreases in the water exchange rate across the blood-brain barrier. Based on the dataset that is being actively compiled, we collected dp-pcASL data from 29 older adults (ages from 60 to 80). We ran partial correlation analyses between blood pressure measures and water exchange rates when controlling for age. We observed that elevated mean arterial pressure in the supine posture was associated with reduced water exchange rate. The findings of this study can contribute to the current understanding of the pathways through which high blood pressure affects neurodegenerative diseases or symptoms.

Tanya Celestial

Discipline: Mathematics

Authors:

#1 Tanya Celestial
#2 Veronica Aruta

Abstract Name: Architectural Appraisal of 3D-Printed Building Models: The Ingestion of Calculus for Design Optimization Using Surface Area and Volume Analysis

In recent years, 3D printing has become an exciting tool for creating building designs that are efficient and creative. This research explores how calculus, especially concepts like surface area, volume, and moment of inertia, can improve the design and structure of 3D-printed architectural models. Using CAD software and 3D printing technology, the study will analyze how mathematical principles help optimize material use, balance, and stability in building designs. The project also aims to show how hands-on tools, such as 3D-printed models, can make complex math concepts easier to understand and more practical. Overall, this study emphasizes the strong connection between mathematics, 3D printing, and architecture, showing how calculus bridges abstract theory and real-world design innovation.

Jasmyn Cepeda

Discipline: Education

Authors:

#1 Antonia Charles-Strowbridge
Bracey Gross

Abstract Name: Artificial Intelligence Meets Special Education: Harnessing GenAI to Improve Communication with Autistic Students

This research presents the MVP design and development process of TillyTime © 2025, an innovative GenAI-powered communication prototype aimed at supporting non-verbal and semi-verbal autistic students. Utilizing a Design Science Research Methodology (DSRM), the researchers addressed the pressing need for personalized, intuitive communication tools in special education settings, specifically for autistic students. The TillyTime prototype was designed using features to facilitate expressive language through customizable visuals, emotion recognition, and context-based interactions. The MVP prototype frontend was developed using Thunkable. Later, GenAI and a 3D interface will be integrated, employing Firebase for backend user authentication and data management. Key user interface components of the present prototype include a splash screen, a login screen, and tab navigators featuring "Feelings," "Needs," "Accommodations," "Websites," and "Settings." TillyTime holds promise as a scalable and inclusive educational tool that leverages GenAI to transform communication support for autistic learners.

Haleigh Cephus

Discipline: Social Work and Human Services

Authors:

Abstract Name: Beyond the Athlete: How Racialized Expectations Influence the Mental Health of Black Female Athletes

Black female collegiate athletes navigate a unique intersection of racialized and gendered expectations that profoundly affect their mental health. Central to this study is the question: How do racialized narratives about

Black women impact the mental health experiences of Black female collegiate athletes? This inquiry explores how stereotypes, particularly the “strong Black woman” trope, contribute to stress, anxiety, and isolation, while also examining the coping strategies athletes employ including reliance on support systems, self advocacy, and acts of resistance. Guided by phenomenology, this qualitative study centers the lived experiences of current and former Black female collegiate athletes across diverse institutions. Data collection included a demographic questionnaire and one time semi structured Zoom interviews lasting 25 to 55 minutes with participants self identifying as Black women aged 18 or older who competed in collegiate athletics within the United States. This study employed a thematic analysis to examine how racialized narratives affect the mental health of Black female athletes. Data were drawn from seven semi structured interview transcripts conducted via Zoom. An a priori codebook guided the analysis, and AI assisted tools supported organization and pattern recognition while interpretive framing remained grounded in qualitative expertise. Grounded in Beauboeuf Lafontant’s critique of the “strong Black woman” schema and Bailey’s concept of misogynoir, this study situates Black women’s mental health within overlapping systems of oppression. Prior research, including Abrams and Lewis, emphasizes how these narratives pressure women to suppress vulnerability and discourage help seeking. Findings reveal that stereotypes such as sexualization and the “angry” label function as chronic stressors, contributing to exhaustion and guardedness. Yet community, sisterhood, and faith emerged as sources of resilience. Results inform recommendations for culturally responsive support in athletics and education, guiding institutions to foster inclusion and advance scholarship on race, gender, sport, and mental health.

Stanlie Cerda-Cruz

Discipline: Engineering

Authors:

#1 Sergey Drakunov

Abstract Name: Electric Ducted Fan MAV Implementation Using Fused Deposition Manufacturing and Post-Processing Methods

The increased accessibility of Fused Deposition Manufacturing (FDM), also known as 3D printing, has enabled labs to research novel propulsion methods for Micro Aerial Vehicles (MAVs), also known as drones. Common alternatives to conventional open rotors, such as toroidal propellers and Electric Ducted Fans (EDFs), can minimize the vortices that contribute to significant noise pollution, an environmental concern, and cause efficiency loss in propulsion, a problem for hobbyists or research groups. EDFs can minimize wing-tip vortices by placing a wall, but unlike toroidal propellers, they can also reduce wake contraction and induce the Coanda effect, thereby increasing the system's efficiency. All of these issues can be mitigated with EDFs, but remain largely unexplored in the literature for MAVs due to the difficulty of implementation and the production of appropriate blades. With the rapid expansion of MAV use, labs, students, and hobbyists can benefit financially from manufacturing EDFs, both fans and ducts, in-house rather than purchasing MAVs fully assembled with standard propellers. This study aims to assess the efficiency gains, wake noise reduction, feasibility, and practicality of producing FDM-manufactured EDF for MAVs made in-house, while also investigating novel post-processing smoothing techniques to enhance the airflow parameters of plastic components produced via FDM, as the surface quality of 3D-printed plastics, such as Polycarbonate (PC), a plastic commonly used in regular drone fans, can be improved with acetone vapor smoothing. Ultimately, this work aims to provide a low-cost, accessible pathway to developing quieter, more efficient MAV platforms, thereby supporting students, autonomous control research, and mitigating environmental concerns associated with drone noise.

Molly Cernich

Discipline: Biology

Authors:

#1 Molly Cernich

#2 Brett Berke

Abstract Name: The Role of Glial Cyp1 in Drosophila Larval Crawling Behavior

Drosophila larvae crawl through peristaltic waves of bodywall contractions that propel the animal forward or backward. Periodically, larvae pause, swing their head, and change their crawling direction in a behavior called a search. The Cyp1 gene encodes a putative chaperone that folds proteins. Mutations affecting Cyp1 increase searching behavior and backward crawling during larval locomotion. Glia are CNS cells that assist in neural circuit formation during development and modulate neural circuit function in mature animals. These phenotypes were also present when Cyp1 was knocked down in all glia. I aim to determine whether glial Cyp1 is required during neural circuit formation in the embryo or circuit function in mature larvae. To reduce Cyp1 expression in glia, I used RNA interference (RNAi) controlled by the GeneSwitch bipartite expression system. RNAi is produced only in the presence of RU486, and GeneSwitch enables the RNAi to be expressed exclusively in glia. By administering RU486 during embryogenesis or in third instar larvae, Cyp1 RNAi should be expressed either during circuit development or during circuit function. Larvae crawled on agar plates for 2 minutes, and their behavior was analyzed using impressions in the agarose and from video recordings. Cyp1 RNAi expression using the GeneSwitch system replicated the phenotypes observed with traditional GAL4-UAS knockdown, and RU486 feeding did not alter crawling behavior. Uninduced controls with no RU486 also showed increased backward crawling and searching, which was unexpected and likely due to background genetic effects. The glial-specific driver line that expresses Cyp1 RNAi in glia under RU486 control was located within MSP-300, a gene essential for neuromuscular function. Therefore, current work focuses on using a new inducible glial driver strain to determine whether it affects crawling on its own. If it does not, work with the Cyp1 RNAi in embryos or mature larvae will be presented.

Inessah Cernohous

WI - University of Wisconsin-Eau Claire

Discipline: Nursing and Public Health

Authors:

#1 Frances Hawes

#2 Shuangshuang Wang

#3 Di Shao

Abstract Name: Beyond Personal Attitudes: The Critical Role of Subjective Norms in Shaping Medical Students' Willingness to Work With Older Adults

As the older adult population ages, there is a growing gap in appropriately trained healthcare professionals willing and competent to work with older adults. This study is part of a larger cross-cultural project examining healthcare students' perspectives on aging across multiple countries, including the United States. Ageism, the prejudice or discrimination based on age, has been identified as a significant factor impeding healthcare students' intention to work with older adults. Using the Theory of Planned Behavior (TPB), this research investigates how attitudes, subjective norms, and perceived behavioral control (PBC) impact career aspirations for those in China. A total of 1,081 undergraduate health sciences students at a large medical university in China were surveyed using the Working with Older Adults Scale (WOAS) and the Ageism Attitude Scale (AAS). A subsequent qualitative survey was conducted with 50 participants to better understand students' rationales. Attitude ($B=0.17$, $p<.001$), subjective norm ($B=0.73$, $p<.001$), and PBC ($B=0.12$, $p<.001$) all emerged as significant predictors, but the primary driver of students' intention to work with older adults was subjective norms, suggesting students' beliefs on what others expect of them have a

greater influence than their own beliefs or sense of capability. These results underscore the need to incorporate social interventions in education to reshape perceptions of geriatrics. Rather than focusing only on improving knowledge and attitudes, curricula should engage geriatricians as role models, highlight the social value of the field, and reframe careers in geriatrics to better attract students.

Melanie Ceylan

Discipline: Biochemistry

Authors:

#1 Gabrielle Wagner

#2 Ross Mahler

Abstract Name: Determining the function of gene YPR013C in *Saccharomyces cerevisiae*.

The *Saccharomyces cerevisiae* genome contains approximately 6000 open reading frames; nearly 1,300 of these are unknown and are categorized as Genes of Unknown Function (GUFs). The gene YPR013C is a non-essential gene that likely contains a tandem C2H2 zinc finger motif. The C2H2 zinc fingers are among the most abundant and conserved proteins in eukaryotic organisms, and most function as transcription factors that bind DNA in a sequence-specific manner. Deletion of YPR013C leads to misregulation of several genes, further supporting this hypothesis. To confirm that YPR013C is a transcription factor, we wanted to determine subcellular localization of the protein. To do this, we used a strain in which YPR013C was tagged with the GFP protein. In addition, we used cellular fractionation to isolate the nucleus from other organelles and used Western blot analysis to confirm that YPR013C localized to the nucleus. These assays indicate that YPR013C is distributed throughout the nucleus, supported by the co-localization of GFP-tagged YPR013C with DAPI staining. The localization of YPR013C strengthens the hypothesis that the gene product participates in gene-regulatory processes. Additionally, we were interested in determining novel functions of the gene product. To that end, we exposed strain in which YPR013C has been deleted to a variety of genotoxic stressors by performing a spotting assay. Interestingly, we find that deletion of the gene leads to sensitivity to the antifungal drug rapamycin, indicating a potential role in cell cycle progression. We tested this hypothesis by doing a bud index assay. We find that deletion of YPR013C leads to a delay in the G1/S transition, further supporting a role in cell cycle progression. Taken together, these data indicate a potential role of YPR013C as a transcription factor as well as a role in cell cycle progression.

Moises Chacon

Discipline: Physics and Astronomy

Authors:

#1 Moises Chacon

Abstract Name: Fusion Ignition: A Net Energy Gain in Nuclear Reaction

Nuclear fusion offers a pathway toward a clean and nearly limitless source of energy by combining light atomic nuclei under highly specific, high-temperature and high-density conditions. This paper examines the physics required to achieve fusion ignition, where the energy produced by the reaction exceeds the total energy invested in initiating and confining the plasma ($Q \geq 1$). Central to this analysis are the Lawson criterion and the triple product ($nT\tau$), which define the minimum plasma density, temperature, and confinement time needed for ignition. The study compares deuterium–tritium (D–T) fusion, which currently has the most favorable reaction cross-section, with proton–proton fusion, whose low cross-section poses

significant confinement and temperature challenges. A major reference point is the December 2022 ignition event at the Lawrence Livermore National Ignition Facility (NIF), where a laser-driven inertial confinement experiment produced more fusion energy than the laser energy delivered to the target. This milestone highlights both the potential and the limitations of inertial confinement fusion, particularly the need for precise symmetry, high compression ratios, and minimal energy losses during implosion. The paper also discusses magnetic confinement approaches, with emphasis on the International Thermonuclear Experimental Reactor (ITER), which aims to sustain high-temperature plasmas long enough to demonstrate continuous net energy gain. Loss mechanisms such as bremsstrahlung radiation, conductive heat loss, and particle escape are evaluated to understand how they restrict achievable temperatures and confinement times. Overall, the paper aims to clarify the physical limits of net-positive fusion energy and assess the viability of developing stable, self-sustaining fusion reactions across different confinement methods.

Rohit Chadalavada

Discipline: Engineering

Authors:

#1 Rohit Chadalavada

#2 Adhvait Khansaheb

Adhvait Khansaheb

Abstract Name: Characterizing the effects of rotor diameter on thrust for a small-scale dual rotor helicopter

In recent years, there has been a growing interest in improving the efficiency for drones and helicopters that have been increasingly used in both recreational and military applications, from forest fire evaluation to surveillance. We hypothesize that, for a dual rotor helicopter, thrust is impacted by various parameters, such as distance between rotors, camber, thickness, and rotor diameters. In order to test this, thrust stands are required. Commercial thrust stands suffer from limitations like price and design complexity. For this experiment, a simple thrust stand was designed and developed at SJSU to combat these problems. A dual rotor helicopter (SREJNGL-31.5"×3.5"×9.4") was mounted on an S-Type 20kg Load Cell attached to a HX711 load amplifier. A tachometer was used for measuring rotational speed. A calibration curve was obtained by using known weights and measuring the load cell response. Previous investigations have shown that thrust was maximized at 4.0 cm separation and with an airfoil with 18% thickness and 4% camber (NACA 4418). To determine the effects of rotor diameter on thrust production, current work involves altering the diameter of the top rotor, holding the bottom rotor diameter constant, and vice versa. For this purpose, new blades were designed and 3D printed. For this investigation NACA 4418 blade was selected (4%-camber/18%-thickness). The length of the rotor blade (NACA 4418) was selected to vary the rotor diameter from 35 cm to 39 cm. The separation between the rotors was kept at 4.0 cm, a separation distance that provided maximum thrust in our previous study. Preliminary results are being obtained. In addition, attempts are being made to visualize the vortex interaction between the two rotors by using a laser sheet, high speed camera, and a fog machine. Complete results will be presented at the conference.

Ethan Chafin

Discipline: Biology

Authors:

#1 Ethan Chafin

Abstract Name: Identifying Early Hormonal and Physical Markers of Klinefelter Syndrome to Improve

Diagnostic Accuracy in Primary Care

This study investigates two questions: Which early hormonal and physical markers can reliably support diagnosis and prediction of Klinefelter Syndrome (47, XXY)? How can these indicators be used to ensure timely diagnosis in primary care? Klinefelter Syndrome is one of the most common chromosomal disorders in males, yet 70–75% of affected individuals remain undiagnosed during childhood and adolescence. Research consistently identifies hallmark symptoms: elevated LH and FSH, low testosterone, and reduced inhibin B, along with tall stature, delayed or absent puberty, and small testicular volume. Despite strong documentation, these findings are not being translated into a practical screening process for family medicine physicians, who are often the first to observe developmental concerns. As a result, many patients experience delayed treatment, limited fertility planning, and preventable psychological and metabolic complications. This project will synthesize endocrine and developmental findings into an accessible early screening approach tailored to primary care. Methods include a targeted review of cohort studies, endocrine profiles, clinical guidelines, and available datasets. Hormonal and physical markers will be categorized by age of onset, frequency, and predictive reliability. The study will then assess whether consistent symptom patterns can support the creation of a screening checklist that triggers early karyotype testing when clinical concern is present. The expected outcome is a concise set of high-yield markers—such as elevated FSH and LH, low testosterone, delayed puberty, and small testes—that consistently warrant further evaluation. The ultimate goal is to promote earlier diagnosis, guide timely hormone therapy, support fertility counseling, and reduce associated physical and mental health risks. By translating existing scientific evidence into a clear, practical tool, this study aims to strengthen early identification of Klinefelter Syndrome within primary care settings.

Varun Challa

Discipline: Biology

Authors:

#1 Santosh Prajapati

#2 Hariom Yadav

Abstract Name: The Skin Microbiome as a Modulator of Wrinkle Formation: Mechanisms Linking Microbial Shifts to Aging Skin

Skin aging leads to visible structural changes such as wrinkle formation, yet the biological factors driving this process remain partially understood. The purpose of this project is to clarify how the skin microbiome contributes to wrinkle development and to evaluate whether microbial interventions may slow or reverse these changes. Aging skin undergoes well-documented shifts in hydration, barrier integrity, and extracellular matrix stability, but emerging research indicates that parallel shifts occur within the skin's microbial community. These microbial alterations may influence inflammation, oxidative stress, and collagen degradation, positioning the microbiome as a potential regulator of skin aging. To address this question, I conducted a comprehensive review of peer-reviewed studies indexed in PubMed, focusing on literature describing topics such as age-associated microbial changes, matrix metalloproteinase activity, barrier dysfunction, and the effects of probiotics and postbiotics on skin structure. As part of the project, I developed three original graphical abstracts to illustrate key mechanisms linking microbial imbalance to extracellular matrix deterioration and to visualize clinical findings on microbiome-based interventions. The review revealed consistent evidence that aging is accompanied by a shift toward more pro-inflammatory microbial communities, which amplifies oxidative stress and accelerates collagen breakdown. In contrast, several probiotic and postbiotic treatments—such as strains of *Lactobacillus plantarum* HY7714 and *Bifidobacterium breve*—have been shown to improve elasticity, hydration, and wrinkle depth in clinical studies. These findings support the conclusion that targeted modulation of the skin microbiome may offer a viable strategy for reducing wrinkle formation. This project contributes to current dermatologic research by integrating microbiome science with established aging mechanisms and by identifying promising avenues for future clinical exploration of microbiome-based skincare therapies.

Dylan Chamberlin

Discipline: Computer Science

Authors:

Abstract Name: Assessing Convolutional Neural Network Performance on Balanced and Imbalanced Image Datasets

Convolutional Neural Networks (CNNs) have driven major advances in AI-based image classification across applications such as autonomous vehicle perception, medical diagnostics, and planetary science. Despite these successes, real-world datasets are often imbalanced, and large disparities in class representation can lead to biased learning, reduced generalization, and poor performance on minority categories. This research examines how four widely used CNN architectures including DenseNet, InceptionResNetV2, MobileNetV2, and ResNet152V2 perform when trained on balanced and imbalanced image datasets. The goal is to understand how class distribution influences accuracy, precision, recall, and F1 scores. Particular attention is given to DenseNet, whose densely connected structure promotes feature reuse and efficient gradient flow, which raises the question of whether these advantages remain when the data contain significant class imbalance. Multiple image datasets of varying complexity and domain, including medical diagnosis, planetary surface imagery, and general object recognition, were evaluated using five-fold cross-validation and statistical analysis to compare model performance under different imbalance conditions. By examining the extent to which dataset imbalance affects classification outcomes, this study aims to inform model selection and training strategies for researchers and practitioners who rely on AI-based technologies in situations where obtaining balanced datasets is difficult or impossible. The findings aim to clarify whether some deep learning architectures show greater resilience to real-world data imbalance and how model performance can be improved under such constraints.

Kennedi Chambers

Discipline: Biology

Authors:

Abstract Name: The Holistic Study of the Neurological Effects of Breast Augmentation Surgeries on Breast Cancer Patients and Non-Carriers within the United States

With the advancement of neuroscience, body modification surgery, and mass spectroscopy, we intend to analyze the neurological and psychological benefits of breast augmentation surgery (BAS) on two groups, individuals in remission from breast cancer and non-carriers. Both groups of women experience varying levels of Body Dysmorphia, and we hypothesize that BAS is an alternative way to treat an individual's mental health as an alternative to pharmaceutical medication. Monitoring the dopamine levels produced in the Ventral Tegmental Area (VTA) by the Substantia Nigra, received by neurons in the prefrontal cortex, we can deduce if the groups are responding positively to the treatment. Using DaTscan, fMRI, and EEG, we can monitor the brain's functionality. Additionally, with the guidance of initial mental health screenings, the individuals will be given a survey before and after receiving the treatment to observe an increase (or lack thereof) in dopamine levels in the brain. This experiment will take approximately two years to evaluate the individuals, conduct the test, for recovery time and lifestyle adjustments. We expect to see an increase in the well-being of both populations.

Cinnia Chan

Discipline: Physics and Astronomy

Authors:

#1 McKenzie Wagner

#2 Wade Tuggle

#3 Lifeng Dong

Abstract Name: Evaluating Minnesota Hardwoods as Biochar Precursors for Supercapacitors

Supercapacitors are increasingly used as energy storage devices because they can deliver high power. Unlike batteries, supercapacitors are able to uptake electric charge and dispel them in a short amount of time. They are particularly important in applications such as electric vehicles, buses, and light rail systems, where they take advantage of their large energy uptake and quick energy discharges. One promising material for supercapacitor electrodes is biochar, a carbon-rich product derived from plant biomass. When the biochar is activated to increase its porosity, the biochar exhibits high surface area and good electrical conductivity, making it well-suited for energy storage applications. In this study, the biochar is prepared using self-activation, a process in which calcium oxalate (CaOx) naturally present in biomass decomposes upon heating to form pores in the carbon structure. To explore locally available resources, there were five different Minnesota hardwoods selected that contained varying amounts of CaOx. In the production of supercapacitors, the biochar is first produced and self-activated using a top-lit updraft gasifier, next mixed with a PVDF/NMP solution to be rolled out on copper and aluminium foils, then put in a vacuum oven to remove impurities, and subsequently fabricated into coin-cell supercapacitors. After the supercapacitors are produced, the coins are put in a LAND battery testing for capacitance, or the measure of how much charge a capacitor is able to hold. Among the tested samples, black walnut showed the highest capacitance, reaching 19.51 F g^{-1} at 0.1 mA . These findings suggest that locally sourced biomass, particularly black walnut, holds strong potential for sustainable supercapacitor electrode materials.

Manya Chandra

Discipline: Biochemistry

Authors:

#1 Manya Chandra

Abstract Name: Enzyme Activity in Crowded Colloidal Media

Tissue engineering aims to support the formation and healing of tissues that lack self-healing capabilities or to enhance their regeneration speed (Lin et al., 2019). Biomaterials can help bridge the gap between external treatment and the body's natural healing mechanisms, restoring native tissue function (Lin et al., 2019). Within this context, microgels are being utilized in a variety of bioengineering applications. The ability to control their size (from tens of nanometers to hundreds of microns), their colloidal stability, and their high solvent content make them ideal building blocks for engineered biomaterials (Bachman et al., 2015). Furthermore, microgels can be made stimuli-sensitive, allowing for the creation of materials that respond rapidly to their local environment, such as changes in temperature, pH, ionic strength, and protein binding (Clarke et al., 2013). The Lyon Lab has pioneered the fabrication of poly(N-isopropyl acrylamide)-based microgels for bioengineering applications. In the work presented here, highly crowded microgel assemblies called microgel pastes were investigated to determine how factors such as microgel concentration and pH

affect enzymatic reactivity within the paste. Given the high degree of macromolecular crowding associated with microgel pastes, we sought to understand whether that crowding would impact macromolecular activity. To determine enzyme activity within the pastes, colorimetric reactions were used to directly visualize the conversion of substrate to product in a model horseradish peroxidase enzyme assay. Our results show that enzyme activity is largely unperturbed by microgel crowding, and that substrate diffusion within the paste represents the rate limiting steps in enzyme activity. These results illustrate the promise of using crowded synthetic tissue scaffolds in biotechnology applications, where macromolecular activity must be maintained to produce biologically relevant outcomes.

Shiny Chandravel

Discipline: Political Science

Authors:

Abstract Name: The United States of America's Constitutional Aristocracy

Since the birth of the United States of America, the resentment of elites has driven the desire for democracy for its citizens. Promptly after the revolution, the Anti-Federalists and Federalists engaged in discourse concerning the possibility of an aristocratic reign under the U.S. Constitution. While Anti-Federalists adamantly argued that the document was an aristocratic ploy, many of America's Founders, particularly Thomas Jefferson, argued that the unique characteristics of this new nation would mark a successful democracy with elected "natural" aristocrats, men of high caliber, character, and intellect. Jefferson predicted the merit-based aristocracy would emerge from accessible public education and flexible social mobility. John Adams disagreed with Jefferson, writing that it would be impossible to raise up a truly merit-based aristocracy without creating an artificial one, corrupted with family ties, accumulated generational wealth, and individuals with unearned influence and power. This study evaluates these predictions' accuracy of a possible aristocracy through the analysis of historical documents as well as current economic patterns, public education, and public opinion. This study determines that Jefferson inaccurately characterized the United States of America's ability to be the exception of developing a corrupted aristocracy due to the inequality of public education and the inability for citizens to climb the social ladder. This study examines the effects of this artificial aristocracy on the relationship between the "common man" and intellectual elites, and the following fractured sense of truth and reality. The study determines that the distrust and resentment built towards these elites have created a culture of anti-intellectualism and rejection of political bodies, thus fostering the current hyper-populism culture of politics today.

Shiny Chandravel

Discipline: Biology

Authors:

#1 Kimberly Jefferson

#2 Gilbert Glago

Maya Kamat

Abstract Name: Effect of Extracellular ATP on Growth and Toxin Expression in *Sneathia vaginalis*

Sneathia vaginalis (*S. vaginalis*) is a component of the human vaginal microbiome that is significantly associated with preterm birth. The lab had discovered, previously, that *S. vaginalis* triggers vaginal epithelial cells to release ATP through a mechanism that is dependent upon its pore-forming toxin, the cytopathogenic

toxin A (CptA). Extracellular ATP, or eATP, is a “damage-associated molecular pattern”, or DAMP, that induces an inflammatory response in the human host, and it has been shown to alter growth and the transcriptome in *E. coli*, suggesting that bacteria may also recognize it as a signal. We hypothesized that eATP would likewise affect growth of *S. vaginalis*, as well as affect the expression of CptA. We ran quantitatively assessed the growth of *S. vaginalis* with and without the addition of ATP. Because ATP is rapidly hydrolyzed by secreted enzymes, we kept the assay relatively brief and assessed *S. vaginalis* growth at three different time points: 1 hour, 2 hours, and 3 hours. Growth was quantified by counting colony forming units (CFU). We found no difference in the growth of *S. vaginalis* in the presence of eATP vs no eATP. This suggests that eATP release by the vaginal epithelial cells does not provide an advantage to the growth of *S. vaginalis*. We also investigated the effect of eATP on the expression of CptA in *S. vaginalis* by western blot and found evidence that eATP suppresses CptA expression. We will further examine this finding by measuring expression of the *cptA* gene by realtime RT-PCR. These results suggest that eATP, released from epithelial cells by the CptA toxin, may function in a negative feedback manner to downregulate CptA expression by the bacteria. Thus, ATP could play a role in the cytotoxicity of *S. vaginalis*.

Frederick Chang

Discipline: Biology

Authors:

#1 Isabella Muratore

Abstract Name: Collective Building Behavior Revealed: Internal Densities in Army Ant Bivouacs

Army ants (genus *Eciton*) live a nomadic lifestyle – moving on a daily basis and hunting food to feed their colonies. In order to support this lifestyle, these ants form temporary shelters, known as bivouacs, from the living bodies of workers and can also build other structures such as bridges to help support movement as they travel. This lifestyle requires an efficient construction process and the ability to modify collective architecture in an organized manner to adapt to various environments. To examine this process, live *Eciton* bivouacs were scanned using a custom computed tomography scanner at regular time intervals during the construction process. Three-dimensional scans were split into horizontal slices. These slices were then analyzed for density in concentric ring-shaped selections from the outside to the inside, highlighting the development of hollow internal pockets in larger and more mature bivouacs. Studying bivouacs – particularly their development over time – provides an opportunity to gain insights on how ants choose to distribute themselves in a structure to accomplish their goals while also maintaining the flexibility to adapt. Such construction rules have potential applications in city planning, social network analysis, swarm drones, and supply chain logistics.

Annabelle Chang

Discipline: Health and Human Development

Authors:

#1 Annabelle Chang

Abstract Name: Low-Dose Atropine as a Therapeutic Intervention for Myopia Progression

The prevalence of myopia (nearsightedness) is growing at an increasingly alarming rate throughout the world. In 2010, the presence of myopia in the world's population was measured to be 27% yet is predicted to reach 52% by 2050. There is currently a variety of interventions in place to help slow the progression of myopia, with one of the most common being low dose atropine (0.01-0.05%) which acts upon the muscarinic

receptors in the back of the eye to slow the elongation of the eyeball, thus slowing myopia progression. The objective of this experiment is to examine the effectiveness of low dose atropine on slowing myopia progression in children by monitoring refractive error and axial length. It was hypothesized that low dose atropine will produce a measurable decrease in spherical equivalent change and axial elongation in pediatric patients over at least one year of treatment. This systematic literature review consisted of thirteen studies selected based on relevance to pediatric atropine treatment for myopia, while exclusion criteria included eliminating research that was outdated, not directly pertinent, or duplicates. Data extracted from included studies were placed in a cross-study analysis to compare outcomes and treatment methods. Analysis of the included studies reveal that low dose atropine effectively reduced myopia progression over at least one year of treatment. Results show variation in correlation of the effectiveness of higher concentrations and greater reductions where some studies suggest that there is a positive dose response and rebound effects occasionally observed at higher dosages. These findings support low dose atropine as an effective intervention to slow pediatric myopia progression and provide the foundation necessary for upcoming clinical trials. Further research is needed to solidify the effectiveness in atropine, as it has the potential to slow the increase of this ocular disease.

Si Chanterelle

Discipline: Visual Arts

Authors:

Abstract Name: End Animal Captivity: The Impact of Captivity on Orcas

This project investigates the ethical implications of animal captivity, with a focus on orcas, and presents its findings through a research-informed visual poster titled End Animal Captivity. The poster spotlights the consequences of keeping wild animals in confinement for entertainment, display, or financial gain. Drawing on research in animal welfare and studies conducted regarding captive orcas, the piece highlights how captivity places wild animals at serious risk for psychological harm, physical harm, and the loss of natural behaviors. The poster foregrounds orcas as a case study, referencing documented effects such as reproductive exploitation, reduced lifespan, and self-harming behaviors. By pairing these findings with a visual representation of the cruelty inherent to these conditions, the piece aims to create an accessible and personal entry point into a larger ethical issue. Many people view captivity as harmless entertainment, and some even assume animals are better off in human care. These attitudes can reinforce speciesism and limit public engagement on behalf of confined animals. The familiar symbolism of a fish in a plastic bag facilitates emotional connection with the audience by referencing a practice that is recognized as inhumane. Silhouettes of onlookers, incorporated chains, metal bars in the background, and a reserved color palette work together to convey the emotional weight of the situation. The integration of data and visualized statistics supports the argument that captivity is largely harmful. Research findings, such as orca mortality rates being approximately 2.5 times higher in captivity and the largest existing tank equating to only 0.0001% of the distance an orca would naturally traverse in a single day, highlight the profound deprivation inherent in captive environments. While orcas serve as a focal example, they represent just one of many species suffering under captive systems, emphasizing the urgent need to rethink how humans interact with wildlife.

Isabel Chapman

Discipline: Philosophy, Ethics, and Religious Studies

Authors:

Abstract Name: Mimetic Reactionary Thought: Propaganda in the Digital Age and a New Epistemology of Fragmented Incoherence

Although the media landscape has changed dramatically since the era of “keep calm and carry on” slogans, Nazi agitprop, and Red Scare McCarthy trials, the public conception of propaganda has remained largely the same: propaganda is overt, ideological agitation through false information, disseminated by the state. In the 1980s, Noam Chomsky and Edward S. Herman sought to analyze and outline how propaganda operated through “news filters” in the new media environment they found themselves in – i.e., one characterized by the dominance of television, concentrated ownership in massive media conglomerates, and a globalized world now driven by the profit motive. In *Manufacturing Consent*, they concluded that this profit motive and embedded capitalist logic in the media system were the primary directors of propaganda and the modern determinants of ideological production. In essence, propaganda became baked into the media we consume, covertly shaping public consciousness and discourse through sitcoms, flashy advertisements, and “objective” news from the mouths of well-manicured television personalities. While the Herman-Chomsky thesis detailed the media environment that propaganda operated within, Neal Postman theorized on the epistemological landscape created by such media, which in turn ripened the conditions for ideological reproduction. Through the injection of triviality and the mixing of decontextualized information with entertainment, our television-culture created a new epistemology characterized by fragmented thought and discourse. This essay explores how the propaganda model and Postman’s media-metaphor framework have evolved with the emergence of the internet and social media, where the meme – Richard Dawkins’ “unit of cultural transmission” – is the dominant medium of communication. The new epistemology of this digital era, which I have termed “mimetic reactionary thought,” has constructed the conditions for the widespread prevalence of disinformation and conspiratorial thinking, ideological incoherence, and cultural shift to the far-right that we are now experiencing.

Simone Chapman

Discipline: Engineering

Authors:

#1 Navita Sunil

Abstract Name: Fate of A Surrogate Organic Contaminant of Phenol under Conventional and Emerging Ultraviolet (UV) Irradiation in the Presence of Inorganic Nitrogen Species during Semiconductor Wastewater Treatment Processes

Introduction: Semiconductors are integral parts of biomanufacturing from specialized medical equipment to wearable devices and monitors. Semiconductor manufacturing involves many processes that use water. The wastewater from these processes contains pollutants such as nitrate, nitrite, phenolic compounds, heavy metals, and acids. These substances pose an ecological and public health risk if not treated properly. Ultraviolet (UV) based Advanced Oxidation Processes (AOPs) have been implemented in wastewater reclamation processes. However, it has not been tested in semiconductor wastewater. This project focuses on evaluating the photochemical fate of a surrogate wastewater contaminant of phenol under UV irradiation using both conventional (254 nm) and emerging (222 nm) UV light technologies in the presence of nitrate and nitrite at different pH values. Materials and Methods: Samples of the Nitrate solution were placed under the 222 nm UV light or the 254 nm UV light for 30 minutes, taking samples at 0, 5, 10, 20, and 30 minutes. This process was repeated for a solution of pH 7 and pH 11. Samples of phenol with nitrate were also placed under the two UV lamps at pH 7 and pH 11 respectively, but the 222 nm light sample was exposed for 10 minutes, while the solution under the 254 nm light was run for 60 minutes. Results: In the results, Phenol underwent more efficient degradation at pH 7, particularly under 222 nm UV light and when nitrate was present in the solution, phenol degradation was further enhanced. This highlights that phenol removal at neutral pH can be accelerated through reactive nitrogen species (RNS) formed from nitrate photolysis, rather than relying solely on direct UV absorption by phenol. These results demonstrate the potential of far-UVC

(222 nm) treatment for targeting phenolic pollutants through both direct and indirect pathways, making it a strong candidate for advanced semiconductor wastewater treatment systems.

rannon Chapman

Discipline: Economics

Authors:

Abstract Name: The Enduring Power of Racial Covenants: Links between Income and Racial Demographics of Today

During the time period of 1930 to 1948 racial covenants were used to maintain residential segregation. A racial covenant is a neighborhood-level agreement that includes a racial clause that restricts non-caucasian people from owning or living on the property unless they work on the property. Questions have been raised on how this practice has affected current socioeconomic factors. This analysis looks at the impact of these racial covenants on income and racial demographics within Weber County, Ogden more specifically. I run a multiple linear regression, to look at correlations between the density of racial covenants within a block group, the current median income, and percentage of non-white population, to determine if that correlation is statistically significant. Results of this analysis show two separate findings. Related to income, the data reveals a positive correlation between median income and the density of covenanted blocks. Related to non-white racial demographics, we also see a positive correlation between non-white demographic density and density of covenanted blocks. Both results are insignificant. These findings suggest that while there is still minimal diversity within Weber county, racial covenants alone were not the deciding factor of that restricted diversification. Other policies and/or practices of residential segregation may have a bigger impact or complement the impact of racial covenants, these other policies should be taken into account.

Leah Chapman

Discipline: Biology

Authors:

#1 Zachary Stahlschmidt

#2 Zoya Khan

Abstract Name: Stressed and Hungry: How Does Oxidative Stress Alter Nutrient Choices and Investment Decisions?

Many aspects of environmental change—heat waves, droughts, and pollution—induce oxidative stress (OS), which is a physiological stress that can influence survival, reproduction, and dispersal. The costs of OS may be mediated by nutritional decisions, such as resource acquisition (feeding choices) and resource allocation (how ingested nutrients are invested into different tissues). Here, we investigated how OS influences these resource-related decisions in adult female variable field crickets (*Gryllus lineaticeps*). In the first week of adulthood, long-winged females received three injections of either saline (control) or OS-inducing paraquat (PQ, an herbicide that promotes oxidative damage). Throughout the experiment, crickets chose between high-carbohydrate and high-protein diets. The following were then measured: (1) consumption of calories, protein, and carbohydrate, (2) somatic mass gained as an indicator of self-maintenance, (3) ovary mass gained as an indicator of reproductive investment, and (4) functional status of flight muscle as an indicator of investment into dispersal capacity. We tested competing hypotheses regarding resource (food) acquisition that OS increases preference for consumption of (a) proteins to support antioxidant defenses, or (b) carbohydrates to

support energy use (given energetic costs of antioxidant defenses) and/or energy storage (fat). We also tested competing hypotheses regarding resource allocation– specifically, (c) whether resources were invested into current reproduction (ovaries) at an expense to self-maintenance (somatic tissue mass and flight musculature); i.e., ‘terminal reproductive investment’ or (d) vice versa where investment into current reproduction is deprioritized in favor of investment into self-maintenance; i.e., ‘reproductive restraint’. By examining how nutritional choices and OS influence investment strategies, our study helps us understand the mechanisms determining physiological resistance in changing environments.

Natalie Chartrand

Discipline: Chemistry

Authors:

#1 Ana Vande Linde

#2 Tyler McGinnis

Abstract Name: Investigating Para-phenylenediamine Levels in Hair Dyes, Henna, and Tattoo Inks

Para-phenylenediamine (PPD) is a common aromatic compound used in permanent and semi-permanent hair dyes. Crucially, it is also frequently found in henna and occasionally in tattoo inks, despite being unapproved by the FDA for use in these products. The presence of PPD in these widely used products poses a significant public health concern, as it is a potent sensitizer linked to an increased risk of severe allergic reactions and dermatitis. Furthermore, cases of acute hair dye poisoning associated with PPD have led to severe systemic effects, including renal failure, respiratory failure, and rhabdomyolysis. Given these potential risks, the continuous monitoring of PPD concentrations in these consumer products is essential. The objective of this study was to determine the concentration of PPD in commercially available hair dyes, henna, and tattoo inks using High-Performance Liquid Chromatography (HPLC). A total of seven brands of henna, three brands of tattoo ink, and three brands of hair dye were selected for analysis. Preliminary results showed no detectable PPD in the three brands of tattoo ink analyzed. However, PPD was quantifiable in both hair dyes and henna. Notably, the levels of PPD detected in henna were significantly higher than those found in hair dyes. In henna, PPD concentrations ranged from 34.8 ppm to 3180 ppm. In hair dyes the concentrations ranged from 33.7 ppm to 40.1 ppm. While all detected concentrations fall within the maximum allowed concentration specified by the current European Cosmetics Regulation, the extremely high variability and maximum concentration (3180 ppm) observed in henna products warrant further investigation into safety practices and regulatory compliance, particularly considering the unauthorized use of PPD in these products.

Sanah Chatiwala

Discipline: Biology

Authors:

#1 Maria Hanean

#2 Jessica Williams

Abstract Name: Cytokine-Mediated Suppression of Caspase-1 by Astrocytic NLRC5

Astrocytes, a major CNS glial cell with immune-responsive properties, play a vital role in the innate immune response against inherent cell stressors and invading pathogens. A key mechanism underlying this response is the inflammasome complex, which mediates caspase-1 (CASP1) activation and the subsequent release of downstream pro-inflammatory cytokines through gasdermin D (GSDMD)-mediated pore formation.

Transcriptional upregulation of inflammasome sensors, such as NLRPs and NLRCs, within astrocytes can be achieved by agonists of toll-like receptors and cytokines such as interferon (IFN) γ and tumor necrosis factor (TNF) α . It is well known that the cytokines IFN γ and TNF α contribute to neuroinflammation, but their role in astrocytic inflammasome assembly is currently unknown. Bulk RNA sequencing of primary human spinal cord astrocytes indicates a high upregulation of a novel inflammasome sensor, NLRC5, specifically by IFN γ stimulation. We therefore sought to determine the role of NLRC5 within the inflammasome activation pathway in response to IFN γ and TNF α . Inflammasome activity was assessed in vivo using a model of neuroinflammation, experimental autoimmune encephalomyelitis (EAE), through immunohistochemical staining for NLRC5 and activated CASP1, where NLRC5 was identified to be upregulated in acute stages of EAE. In a knockdown model of IFN γ receptor 1 in astrocytes, immunocytochemistry revealed increases in CASP1 activity. However, in an NLRC5 overexpression model, CASP1 activity was reduced, while a siRNA-mediated NLRC5 knockdown reversed these effects. These findings suggest that IFN γ signaling mediates a direct interaction between NLRC5 and CASP1 to suppress inflammasome activation. Overall, the collected data indicate that IFN γ upregulates NLRC5 and other inflammasome components, repressing activation of CASP1, and suggesting an immunomodulatory role for astrocytic NLRC5.

Sreejato Chatterjee

Discipline: Biology

Authors:

#1 Hongbo Liu

#2 Shuangshuang Feng

Abstract Name: Epigenetic Regulation of Brain Aging GWAS Variants within Transposable Element Sequences

Genome-wide association studies (GWAS) have identified many loci associated with brain aging, yet most lie in noncoding regions, complicating functional interpretation because their effects must be inferred through regulatory mechanisms. In the brain, where long-lived cells rely on stable epigenetic regulation to maintain transcriptional homeostasis, transposable elements (TEs) represent a major component of the regulatory DNA landscape and a potential substrate through which noncoding variation may be interpreted. However, it remains unclear whether brain-aging GWAS variants are preferentially localized within specific TE sequences, whether these variants are linked to biological pathways relevant to brain aging, and through which regulatory mechanisms and cell-type-specific chromatin contexts they may act. Here, we applied an integrative genomic framework combining RepeatMasker TE annotations, single-nucleus ATAC-seq chromatin accessibility maps across major brain cell types, ENCODE candidate cis-regulatory elements (cCREs), and partitioned LD Score Regression. We found that GWAS variants frequently overlap transposable element sequences, but this overlap does not indicate global enrichment relative to genomic background. Instead, enrichment is non-random and specific to TE families: SINE elements, especially Alu, show the strongest genomic enrichment, whereas enrichment within cell-type-specific accessible chromatin is driven by other repeat families. Simple repeat elements exhibit consistent enrichment across multiple brain cell types, while TcMar-Tigger DNA transposons show strong, oligodendrocyte-specific enrichment. Brain-aging GWAS variants overlapping TE sequences are preferentially localized within transcription factor-associated cCREs and depleted from promoter-like regions, indicating bias toward transcription factor-mediated regulatory contexts. Functional enrichment analyses revealed limited and context-specific pathway associations. Partitioned heritability analyses showed no independent enrichment of TE annotations after conditioning on baseline functional features, indicating that TE-overlapping GWAS signals are largely explained by shared regulatory architecture. Together, these results support a model in which TE-localized GWAS variants reflect underlying epigenetic regulatory architecture rather than independent TE-specific genetic effects.

Mahika Chatterjee

Discipline: Economics

Authors:

#1 Mahika Chatterjee

#2 Subhadra Ganguli

Abstract Name: Human Development Index (HDI) and Employment Diversification in GCC Economies: A Panel Analysis (1995–2023)

Gulf Cooperation Council (GCC) economies have long relied on hydrocarbon revenues and public-sector employment, creating labor markets characterized by limited sectoral diversity and strong dependence on government jobs. As these states pursue economic transformation agendas—such as Saudi Vision 2030, UAE Centennial 2071, and Oman Vision 2040—employment diversification has become a central policy objective. Simultaneously, GCC countries have invested heavily in improving human development outcomes through expanded education systems, enhanced healthcare access, and rising income levels. This study examines whether improvements in the Human Development Index (HDI) have contributed to employment diversification across GCC economies from 1995 to 2023. Using a balanced panel dataset covering Bahrain, Kuwait, Oman, Qatar, Saudi Arabia, and the United Arab Emirates, this research employs fixed-effects panel regression to analyze the relationship between HDI and shifts in employment composition. HDI, sourced from UNDP, captures long-run improvements in education, health, and income. Preliminary trends suggest that GCC states with higher HDI levels—particularly the UAE, Qatar, and Bahrain—exhibit greater movement toward diversified employment structures, including growth in tourism, finance, logistics, healthcare, and technology sectors. Improvements in educational attainment appear especially influential, supporting the emergence of skill-intensive and private-sector employment. The analysis also indicates that the relationship between HDI and employment diversification strengthens after 2010, coinciding with intensified national development strategies. These findings underscore the importance of human development as a foundation for labor market transformation in resource-dependent economies. Enhancing education quality, supporting lifelong skill development, and promoting workforce health may be critical to accelerating diversification efforts. This study contributes to the understanding of how human development shapes structural economic change in the GCC and highlights policy pathways for achieving sustainable, post-oil employment growth.

Rhea Chatterjee

Discipline: Computer Science

Authors:

Abstract Name: Investigating Preterm Birth and Smoking Patterns using Electronic Health Records

Preterm birth is defined as a baby delivered prior to the 37th week of pregnancy. Preterm is incredibly prevalent and affects around 1 in 10 mothers. Prior literature review, show that low cigarette use is associated with a increased risk of preterm birth. This study, we used logistic regression and random forest models to predict preterm birth among mothers who smoke, using data from the Analytics and Machine-learning for Maternal-health Interventions (AMMI) Datamart project (2019–2024), which includes clinical records from the Wake Forest/Advocate healthcare system. Key variables included race, maternal age, insurance status, smoking behavior, BMI, and hypertension. This study excluded non-singleton births. This study used the AMMI which included birth information on women in North Carolina. The study included 8,152 participants, with 12.7% experiencing preterm birth. Among them, 52% had never smoked, 17% were light smokers, and 15% were former smokers. Both models had a mean AUC of 0.69, indicating fair discriminative ability to

predict preterm birth. With the current dataset, we found that the logistic regression outperformed random forest overall in identifying preterm births. Both models found that higher maternal age and higher systolic blood pressure were associated with an increased risk of preterm birth. Limitations include low explanatory power and potential bias from missing data. Future work should explore data balancing techniques (e.g., SMOTE) and ensemble methods to improve model performance. In the future, this dataset can be used to examine blood tests and see how it may relate to preterm birth.

Arleen Chau

Discipline: Anthropology and Archaeology

Authors:

Abstract Name: Interpreting “Vampire” Burials in Medieval Eastern Europe

Since the early twentieth century, various atypical or deviant graves have been excavated across Eastern Europe, particularly in Poland. These discoveries have prompted much speculation, as the individuals were interred with items such as sickles placed over their necks or abdomens, along with other mortuary artifacts not considered normative compared to those found in typical community burials. Such practices suggest that these individuals were regarded as deviant or pariahs within their social contexts. Consequently, many have been quick to label these as “vampire burials,” interpreting them as measures intended to keep the dead from rising. However, this definition is problematic, as the medieval concept of vampires in Eastern Europe differs greatly from modern interpretations of vampirism. The reasons behind these atypical burials are far more nuanced and require an understanding of the religious and folkloric beliefs surrounding vampirism, as well as how medieval Eastern European societies perceived death and the afterlife. This research aims to explore how deeply folklore and religion permeated medieval Polish society, and how these beliefs shaped the living’s relationship with the dead and the beyond.

Humberto Chavarria

Discipline: Biology

Authors:

#1 Humberto Chavarria

#2 Christopher Pierce

Abstract Name: Plant-Derived Flavonoids as Promising Inhibitors of *Candida albicans* Biofilms

Candida albicans is an opportunistic fungal pathogen capable of causing disease in immunocompromised individuals. During infections, *C. albicans* forms robust biofilms on both biotic and abiotic surfaces, including mucosal tissues and implanted medical devices. Biofilm formation significantly enhances resistance to host immune responses and conventional antifungal therapies, contributing to persistent infections and high relapse rates. As antifungal resistance continues to rise, the discovery of alternative or adjunctive therapies is urgently needed. Flavonoids, a diverse group of plant-derived polyphenolic compounds, have emerged as promising candidates due to their broad biological activities and low toxicity profiles. In this study, we explored the potential of flavonoids as antibiofilm agents by screening a library of structurally distinct flavonoids against *C. albicans* biofilms. To date, we have screen 240 compounds using a 96-well microtiter plate model for biofilm growth and identified 23 flavonoids (initial hits) that inhibit *C. albicans* biofilm formation by more than 50 percent at 20 micromolar (μM) concentration. Of these initial hits, the flavonoids with the greatest inhibitory effect on *C. albicans* biofilms are lycorine and 7-methoxyflavon. Lycroine inhibits

82 percent of biofilm formation at 20 μ m, and 7-methoxyflavon inhibits 78 percent at the same concentration. Current studies are focused on determining the effect of the hit compounds on various stages of biofilm development, including early adhesion and proliferation. Research has shown that certain flavonoids have increased the susceptibility of *Candida* species and other fungal pathogens to the antifungal drug, fluconazole. Thus, future studies will look for synergistic effects between the flavonoids and fluconazole. Overall, this work underscores the promise of plant-derived flavonoids as an innovative strategy to combat *C. albicans* biofilm-associated infections.

Leah Chavez

Discipline: Psychology

Authors:

#1 Leah Chavez

Abstract Name: The Impact of Transfer From 2-Year to 4-Year Campuses

This paper presents findings from an ongoing research study examining the experiences and outcomes of students who transfer from two-year branch campuses to the main campus of a large Hispanic-Serving Research University. Building on earlier stages of this project, the study further investigates how environmental factors such as campus climate, community support, cultural ecologies, and geographic context influence students' decisions to persist toward graduation with a four-year degree. These factors are particularly important at institutions that serve diverse and often first-generation student populations, where the transition from a smaller campus to a larger research environment can introduce new academic and social challenges. Using a mixed-methods approach that incorporates institutional data and student interviews, this study compares graduation, drop-out, and bounce-back rates with qualitative narratives gathered through semi-structured interviews with transfer students, returning students, and main-campus students. The goal is to understand how individual experiences align with, or diverge from, broader institutional trends. The central emphasis is placed on how the transfer process influences students' happiness, confidence, and sense of belonging, and how these emotional and social dimensions shape their decisions to continue or discontinue their academic pathways. Preliminary results suggest that feelings of isolation, unfamiliarity with campus resources, and limited cultural or community connection can negatively affect persistence, while mentorship, peer networks, and culturally responsive support systems significantly improve student outcomes. By analyzing these trends alongside the lived experiences of transfer students, this paper highlights the structural and cultural barriers that shape transfer-student persistence and identifies practical opportunities for institutions to strengthen support systems that promote degree completion.

Laura Chavez

Discipline: Economics

Authors:

Abstract Name: The Effects of Medicaid Expansion on Adult Mortality Rates.

The purpose of this research is to examine the effects of Medicaid on mortality rates across the United States. Specifically, this study investigates whether the Affordable Care Act (ACA) expansion is associated with lower mortality rates in expansion states compared to non-expansion states. Over time, Medicaid has become one of the largest healthcare providers in the nation, helping many low-income families and individuals with disabilities gain access to essential medical services. Understanding the relationship between healthcare

access and population health outcomes is critical for evaluating the effectiveness of public health programs. Mortality serves as a key indicator of population health, as higher mortality rates often reflect poorer health outcomes. In this study, mortality is used as the primary measure to assess the effectiveness of Medicaid and the ACA expansion in improving health outcomes. Previous research supports the positive impact of Medicaid expansions. Romero and Ponomariov (2023) found that expansion states experienced improved healthcare access and preventive behaviors, highlighting the ACA's effectiveness in reducing coverage gaps. Similarly, Miller et al. (2021) suggest that ACA Medicaid expansions substantially reduced mortality rates among beneficiaries. To estimate the causal impact of Medicaid on mortality rates, this study employs a difference-in-differences (DiD) approach using publicly available data from CDC-WONDER and state-level mortality rates, combined with linear regression analysis. Preliminary findings indicate a significant negative relationship between ACA Medicaid expansions and mortality rates among adults with diabetes.

Nickole Chavez

Discipline: Education

Authors:

Abstract Name: Bridging the Confidence Gap: ELL Mentorships and Narrative Exploration of the Mexican-American Student Experience

How should American rural school districts bridge the gap for immigrant student literacy needs for a growing population of second-language learners? How can other authors' personal narratives help inspire Mexican-American youth to further their educational journey? Over the last five years, the college town of Rockbridge County, VA has seen a 40% increase in Spanish-speaking students, leaving local schools and teachers racing to find inclusive, scaffolded ELL (English Language Learner) strategies despite VA Dept of Education's English immersion policies. Rural VA communities lack resources and bi-lingual support staff, affecting student growth in English and Spanish. Because Virginia Standards of Learning (SOLS) restrict alternative literacy instruction, Rockbridge County teachers are often unequipped to bridge language barrier gaps. Without adequate and consistent resources, ELL students lose confidence because they are not reaching the same level as their peers in basic reading skills and content learning. This creative research presentation weaves an autobiographical literacy narrative alongside grounded, qualitative analysis from a semester-long ELL Fieldwork Project mentoring 5th grade, second language learners. During her mentorship, Chavez developed a supportive program for rural bilingual students by designing guided language think-alouds and organizing an Inclusive Reading Bookshelf to validate student confidence, motivation and prior knowledge within regulated classroom routines. This mentorship inspired Chavez to reconsider her own bilingual literacy landscape in a rural Arizona border town. She explores her own emotional themes and experiences of learning as an "outsider," and draws on Mexican-American author Sandra Cisneros's memoir *A House of My Own – Stories of My Life* (2015) and *Ay Tu! Critical Essays on the Life and Work of Sandra Cisneros*. As a bilingual student that grew up in a failing education system, Chavez considers Cisneros's journey as conversation for the obstacles faced by current ELL students.

Judith Chavez Diaz de Leon

Discipline: Engineering

Authors:

Abstract Name: Re-Engineering Student Success: A Habit-Driven System for Career Clarity in STEM and Higher Education Aspiring Students.

Students in the STEM and Healthcare field lack structures, personalized career guidance since there is limited access to mentorship, progress trackers, and planning systems. For this reason students pursuing long term goals such as MD, Engineers, and Lawyers need a platform that can guide them with tools that will focus on breaking down their long term goals into micro-milestones and habits, implement academic and professional planning, providing tracking dashboards, and linkage to mentorship and interest-based resources. Thus, supporting students who yearn for clarity in their career standpoints, to reduce burnout, confusions, and wasted semesters. Importantly, guiding students who are first generation gain access to structured systems of tracking and guidance into their dream careers. This research will be oriented on user research & needs analysis by interviewing College students that are in STEM, pursuing grad school, Pre-med, Pre-law, transfer, honors, and engineering. Conducting surveys on barriers in career planning & skill development and analyzing patterns in motivation and burnout cycles/ causes, positive and negative academic habits, resources for experiences challenges, and access to mentorship/ advising. Secondly this research will review literature that focuses on habit formation models like ABA reinforcement, cognitive science behind learning & goal-setting, theories of career-development, and behavioral psychology and motivation frameworks. Lastly, benchmarking and competitively analyzing existing platforms such as LinkedIn, career pathways websites and apps. Then applying this research into the app, first creating a prototype and system design by defining user journey, creating wireframes, building map of habit to career milestone structure, and building priority list. Secondly, creating a behavioral and Data model design by developing a competency tracking framework, habit reinforcement loops, and milestone algorithms. Finally Testing by running pilots with students and collecting feedback on motivation impact, clarity of their roadmap, and their level of ease of app consistency, measuring effectiveness.

Maeve Chawk

Discipline: Biology

Authors:

#1 Aaron Sathyanesan

Abstract Name: Locomotor motif deficits in Down Syndrome mouse models

This research project explores potential locomotor motif deficits in Down Syndrome mouse models. Within current research conducted in the field of neuroscience of Down Syndrome, there is not much attention given to early behavioral development. The project aims to identify the effect of trisomy on early postnatal locomotor development using AI-enabled tools. We used high-speed video recordings of mouse pups belonging to an established Down syndrome model (Ts65Dn) at different developmental stages including P5-P10 and P30-P60. We recorded video of selected pups from below a transparent box to capture whole body locomotion. We are currently using our preliminary dataset of videos to train a DeepLabCut model. After DeepLabCut pose-estimation we will run kinematic data through an unsupervised learning algorithm - B-SoID - to perform behavioral segmentation of locomotor data. By following these mice across development, this project aims to uncover the evolution of early locomotor motifs in typically developing pups and identify how trisomy alters these developmental trajectories.

Diya Sudheer Chemudugunta

Discipline: Biology

Authors:

#1 Diya Sudheer Chemudugunta

#2 Swetha Mantha

Abstract Name: Impact of Nitrogen and Oxygen Additives in DBD Argon Plasma on E.coli Bacteria Mitigation

Dielectric Barrier Discharge (DBD) plasma is being used to sterilize wounds that can accelerate wound healing. This is due to the presence of oxygen and nitrogen reactive species (RONS) that are generated as the ambient air is entrained in the plasma. This study is investigating the techniques to enhance RONS by adding small amounts of nitrogen and oxygen in the plasma gas. The impacts of additive gases are being monitored by exposing the plasma on E Coli bacterial colonies. In addition, this study investigates the effect of varying experimental conditions (N₂ and O₂ percentage addition, plasma power and argon gas flow rates) on the interactions between plasma and bacteria. Through our research, various doses of nitrogen and oxygen (0.015, 0.03, 0.05, 0.07, 0.1 slpm) are introduced at a fixed argon flow rate (~16 slpm). Argon plasma jets were generated by applying 5-10kV at frequencies between 30-50 kHz. Emission spectroscopy was used to monitor emission lines from various radicals (Nitrogen 2nd positive lines, OH lines, argon lines, oxygen lines). The intensity of these lines provide information on RONS in a qualitative manner. E Coli bacterial colonies were grown in a sequential manner where a serial dilution was conducted to get the samples on ten petri dishes. Five of them were used as the control whereas five of them were exposed to plasma jets at various operating conditions. Petri dishes were kept in an incubator at 37 degrees centigrade for 24 hours to grow bacterial colonies that were counted using a software called Promega Colony Counting. Our preliminary results show that bacterial mitigation strongly depends on the plasma power and the percentage addition of oxygen. Nitrogen addition had marginal impacts. More results are being analyzed that will be presented in the conference.

Yufei Chen

Discipline: Interdisciplinary

Authors:

#1 Yufei Chen

Abstract Name: Barriers to Higher Education in the Carceral State: How the University of Chicago's Involvements with the Stateville Correctional Center Shaped Its Prison Programming, 1920s–1960s

The University of Chicago's collaborations with Stateville Correctional Center reveal the deep interdependence between higher education and the carceral state in the mid-twentieth century, yet scholarship has not yet accounted for how these partnerships generated enduring barriers to educational access in prisons. This project establishes how UChicago's involvement in prison education, scientific research, and rehabilitative initiatives at Stateville from the 1920s to the 1960s decisively shaped both the development and the structural limits of prison programming in Illinois. Drawing on archival collections, institutional correspondence, newspaper accounts, and historical analyses, the research delineates how funding constraints, institutional design, administrative prerogatives, and dependence on individual champions configured the possibilities and failures of early prison education. The findings demonstrate that although university-prison collaborations created programs such as the Stateville Correspondence School and facilitated scientific and pedagogical initiatives, they simultaneously entrenched inequities by situating educational access within systems of surveillance, institutional self-interest, and discretionary gatekeeping. This historical analysis asserts that reckoning with these entanglements is imperative for constructing contemporary university-prison partnerships that do not replicate past harms but instead cultivate durable, equitable, and ethically grounded models of higher education in carceral settings.

Catherine Chen

Discipline: Biology

Authors:

#1 Taehee Kim

#2 Samantha Mossuto

#3 Alice Soragni

Abstract Name: Developing a Co-Culture Liver Organoid Model for High-Throughput Prodrug Screening

Patients with rare tumors have a lower 5-year survival rate (52.6 percent) compared to other cancer patients (70.1 percent). Our lab uses high-throughput drug screening on patient-derived tumor organoids to recommend promising drugs. However, prodrugs remain incompatible with our automated liquid handling protocol. To screen these drugs, they must first be metabolized. This project aims to develop a protocol using 3D bioprinted miniature liver inserts (MLIs), enabling the lab to include prodrugs in patient drug screening. Irinotecan, which converts into SN-38, is the focus. Before testing a co-culture model, we identified a concentration of irinotecan that minimizes cytotoxicity and assessed enzymatic activity in potential hepatocytes. HT1080 cells stood in for patient-derived cells, seeded in mini-rings in 96-well plates. Cell viability was measured via ATP assays, and enzyme activity with CYP3A4 cell-based assays and CES1 ELISAs. Staurosporine and DMSO were used as positive and negative controls. We found 1 and 10 μM irinotecan balances viability and conversion to SN-38. We also compared CYP and CES1 enzymatic activities between commercially available primary hepatocytes and clinical hepatocytes that we isolated from liver samples in our lab. In the future, we will test the co-culture model together. This system will allow patients to benefit from a wider range of drug recommendations, ultimately increasing their chances of receiving effective, personalized therapy.

Dan Chen

Discipline: Physics and Astronomy

Authors:

#1 Daniel Harsono

Abstract Name: JWST Reveals High-Velocity Gas Jets in Baby Stars During Their Formation

In astronomy, one of the central open questions is how stars and planets form. Current theories suggest that planets form in protoplanetary disks around baby stars (protostars), but one unknown is how the materials in the disk conserve angular momentum as they fall toward the protostar. The proposed physical mechanism to conserve angular momentum is the launching of bipolar protostellar jets. Protostellar jets launch hot atomic and molecular gas at more than 100 km/s, which can be detected using the James Webb Space Telescope (JWST) by observing [Fe II] and H₂ emissions. Moreover, as matter is launched from the protostar, the ambient medium becomes excited by shocks and creates emissions that can be detected as well. Using emission line data collected from JWST, we characterize and perform analyses on the outflow of the protostar TMC1A. We found that the jets consisting of hot atomic and molecular gas show a collimated structure, and analysis of the brightness along the jet axis reveal a series of knots consistent with ejection events that occur in episodes. The shocked molecular gas is broader and displays a ring-like structure with brightness asymmetry around the ring. In addition, the redshifted and blueshifted sides of the jet exhibit a significant velocity asymmetry, providing insights into the launching conditions of the jet. Notably, our analysis shows no detectable transverse velocity gradients across the jet axis that would indicate rotation, contrary to theoretical expectations. Together, our findings indicate that mass ejection may not be a steady, rotationally driven process, but instead occurs in bursts and interacts asymmetrically with the surrounding medium. This suggests that the mechanisms responsible for conserving angular momentum during star formation are more

complex than a simple rotating jet, and these results provide new constraints on models for the evolution of young stars.

Jimmy Chen

Discipline:

Authors:

#1 Jimmy Chen

#2 Narineh Zargarian

#3 Chen Cui

#4 Bingling Huang

Abstract Name: A Deep-Learning based Self-supervised Denoising Method for Kinetic Plasma Simulations

Accurate kinetic plasma simulations are important for advancing fusion energy and, electric propulsion. However, the Particle-in-Cell (PIC) method, the dominant approach for fully kinetic modeling, suffers from inherent statistical noise that grows over time with computational cost. Traditional denoising techniques such as Proper Orthogonal Decomposition (POD) and Kernel Density Estimation (KDE) often require problem-specific tuning and may distort the physical quantities. To address this challenge, we develop a Deep Learning (DL) -based denoising framework that blends modern computer-vision (CV) architectures (Noise2Noise) to recover high-fidelity plasma features from noisy PIC simulations. The approach treats PIC outputs as image-like and employs DL to learn structured spatial-temporal patterns underlying plasma dynamics, integrated physical laws and boundary conditions. We use the PIC simulation with varying Nppc (number of particles per cell) to prepare the noisy data and use the noise-free grid-based Vlasov method to prepare the benchmark data. We vary Nppc across a wide range ($N_{ppc} \in \{10^1, 2 \times 10^1, 5 \times 10^1, \dots, 8 \times 10^6, 10^7\}$). Multiple initial-seed realizations are created at each Nppc for training. Outputs are reformulated into space-time tiles to learn spatial-temporal correlations. Our results show for a 1D Landau damping problem, using a trained 2D U-Net Noise2Noise model using two independent, low-fidelity PIC realizations (target Nppc = 1000, reference Nppc = 5000). The network learned the physical signal, making the noisy data show clearer wave structures. Quantitatively, this yielded a global Δ SNR gain of 21.672 dB, a 147x noise power reduction (99.3% removal). By comparison, POD achieved 18.677 dB (a 74x reduction). This suggests a CV-inspired DL method can achieve 2x greater noise power reduction, even with a low-resolution reference and on a problem dominated by one low-frequency signal mode easy for POD. Overall, this research establishes a promising pathway to achieving high-fidelity kinetic plasma modeling without prohibitive computational cost.

Lily Chen

Discipline: Environmental Science and Sustainability

Authors:

#1 Miguel Cabrera

Abstract Name: Temperature and Relative Humidity Effects on Water Absorption and Dissolution of Urea Fertilizer

The critical relative humidity (CRH) of a fertilizer is the ambient humidity at which the fertilizer starts to absorb water from the air. For urea, the CRH varies from 83% at 50°C to 72% at 35°C. Thus, when urea is surface-applied to pastures or no-till fields, it usually absorbs water from the air during late night and early

morning hours. If the period of water absorption is sufficiently long, the whole urea granule will dissolve to form a saturated urea solution, which will further dilute as water absorption continues. Later in the day, when the air temperature increases and the relative humidity decreases, the urea solution may lose water to the atmosphere and therefore its concentration will increase. These changes in urea concentration can affect the rate of urea hydrolysis. This study was conducted to evaluate the rate of water absorption by urea when it is exposed to two relative humidities (88% and 100%) and three temperatures (10, 20, and 30oC). The results showed that the rate of water absorption at a given relative humidity increased as the temperature increased. These results were used to develop a simulation model in Stella Architect to estimate water absorption by granular urea when exposed to changing temperature and relative humidity under field conditions. Model results indicated that complete urea dissolution in a pasture or no-till field may take one to five days depending on environmental conditions.

Kel-Li Chen

Discipline: Psychology

Authors:

#1 Phoebe Lam

Abstract Name: Which Comes First? The Temporal Order of Reward Sensitivity and Inflammation following Childhood Abuse

Childhood abuse is linked with increased cardiovascular disease risk, prompting the question of underlying mechanisms. Theories proposed two key mechanisms: (1) reduced reward sensitivity – experiencing less enjoyment or positive emotion from typically rewarding activities and (2) elevated low-grade inflammation – a prolonged and systemic state of unresolved inflammation. This is because both reward sensitivity and inflammation are sensitive to childhood adversities and predictive of cardiovascular disease. However, whether abuse first impacts reward sensitivity or inflammation is unclear. Moreover, prior studies relied on behavioral tasks, limiting ecological validity and real-world implications. To address these gaps, we analyze longitudinal data from the Midlife in the United States (MIDUS) study (N=780, 3 waves over 18 years) which included self-reported childhood abuse and biomarkers of inflammation. Using self-reported positive events and positive emotions from its 8-day telephone interview data, we ecologically operationalize reward sensitivity as within-person difference in positive emotion experienced on positive event vs. non-event days. We expect that people will generally experience more positive emotion on positive event days, but that there will be individual differences captured by within-person difference scores. Covariates include age, race, gender, socioeconomic status, and adulthood life stress. We will test two competing hypotheses: (a) childhood abuse measured at Time 1 (T1) will predict decreased reward sensitivity at Time 2 (T2), which in turn will predict increased inflammation at Time 3 (T3); (b) abuse at T1 will predict increased inflammation at T2, which in turn will predict decreased reward sensitivity at T3. Through testing indirect effect models, findings will clarify the temporal sequence of childhood abuse's impacts on reward sensitivity and inflammation. Clarifying reward-inflammation's directionality refines theories to a specific mechanistic pathway for how abuse heightens disease risk, can inform interventions, and may challenge the perception that health-compromising behaviors are merely lifestyle choices.

Ryan Chen

Discipline: Engineering

Authors:

#1 Ryan Chen

Abstract Name: Experimental Study on the Effect of Hydraulic Jumps on Bridge Pier Scour

Scour at bridge foundations is the leading cause of bridge failure, necessitating methods for determining scour impacts in various flow scenarios. While foundations are primarily located in rivers with low velocity, high depth subcritical flow, rainfall events can cause changes in flow regime through high intensity rainfall (raising critical depth above current water depth) or obstructions. The transition between gradually varied flow regimes, coupled with contractions at bridge foundations, may introduce hydraulic jumps, leading to scenarios where rapidly varied turbulent flow directly interacts with foundation elements. Previous studies have analyzed pier scour in subcritical and supercritical flow, noting that supercritical flow typically results in lower pier scour; however, studies have not yet determined the impacts of hydraulic jumps on pier scour. From inspection, the effect on scour depth is unclear, as turbulent flow increases erosion and pier scour, while eddy currents reduce scour by returning eroded soil to the pier. This study uses experimental methods to determine the effects of hydraulic jumps on pier scours. Identical piers are placed in a soil bed of fine beach sand at various distances along the channel and subjected to a hydraulic jump within a wave flume. Scour effects at the pier are measured as a ratio of pile diameter at set time intervals, providing implications into the need for further protective measures such as corrugated aprons or buried plates. Investigation of impacts of hydraulic jumps on bridge pier scour depth will assist in determining the effectiveness of protective measures or the effectiveness of modifying pier geometry in mitigating hydraulic jump effects and reducing scour related instability.

Jiuyi Cheng

Discipline: Economics

Authors:

#1 Jiuyi Cheng

Abstract Name: Production Networks and Volatility Transmission in U.S. Industries: Insights from BEA Input–Output Linkages

This research proposes a network-augmented econometric model to investigate how production interdependencies shape volatility propagation across U.S. industries. With tightly connected domestic supply chains, shocks originating in one industry rarely remain isolated. This study addresses the question: How do inter-industry input-output linkages amplify or attenuate volatility transmission across the U.S. economy? Beyond traditional multivariate volatility models such as DCC-GARCH, our approach explicitly incorporates the network structure into conditional volatility modeling using time-series data from the BEA Input-Output accounts. The methodology augments a GJR-GARCH(1,1) specification for sector-level ETF returns with a network spillover term, allowing an industry's conditional variance to depend on a weighted average of its neighbors' lagged volatility. This captures the sector-specific spillover coefficients δ_i that measure the time-varying sensitivity of an industry's volatility to shocks within its supply network. Subsequently, we regress these coefficients on network centrality measures—degree, betweenness, and eigenvector centrality—derived from the weighted adjacent matrix, testing whether an industry's network position systematically determines its role as a volatility transmitter or receiver. Potential research findings are threefold: first, the identification of structurally critical industries whose network positions make them potent amplifiers of financial instability; second, an empirical characterization of how specific centrality features moderate the magnitude of cross-sectoral spillovers; and third, an analysis of how major recessions (2008 Financial Crisis, COVID-19 pandemic) have reconfigured these risk channels. These results aim to characterize systemic risk channels rooted in production, with implications for macroprudential policy, industrial resilience planning, and targeted risk management by highlighting sectors most susceptible to contagious shocks.

Erika Cherpes

Discipline: Physics and Astronomy

Authors:

#1 Erika Cherpes

Abstract Name: A WISE Look at Variability of Maser Galaxies

Current cosmological models for the fate of the universe and its geometry lack constraints that can be found with observations of powerful laser-like microwave emission (maser) from galaxy centers. These so called megamasers are however very rare, with detections in only about 3% of all surveyed galaxies. We explore here ways of efficiently detecting megamasers via a possible connection between this type of emission and accreting matter on supermassive black holes at galaxy centers, known as Active Galactic Nuclei (AGNs). An important feature of AGNs is light variability, which can now be exploited with multi-epoch observations in mid-infrared from the Wide-field Infrared Survey Explorer (WISE). We present here results from our calculations and parameterization of the Structure Function for galaxies with and without maser emission, as a tool to identify and compare the most prominent variability features, and therefore AGN emission, associated with maser activity.

Maxwell Chervenak

Discipline: Engineering

Authors:

#1 Xinyi Wang

Abstract Name: Data-Driven Prediction of Hydrogen Storage Performance in Metal-Organic Frameworks

Fossil fuels are a finite resource that contribute to global warming through carbon emissions and cause ecological harm during extraction. These sustainability challenges have increased interest in hydrogen as a cleaner energy carrier for applications such as transportation and power generation. Its low density, however, poses a major challenge for effective storage. Traditional storage approaches, including compression and liquefaction, require extremely high pressures or very low temperatures and still face safety and efficiency limitations. Metal-Organic Frameworks (MOFs) offer a promising alternative because of their high surface area and tunable structural properties. However, the vast chemical and structural diversity of MOFs makes it impractical to experimentally evaluate every candidate, necessitating computational tools to screen and predict their hydrogen storage performance. To address this challenge, molecular simulations using RASPA are conducted to obtain hydrogen adsorption data for a range of MOFs under different pressure conditions. Two machine learning models: Decision Tree and Extra Trees are implemented to predict storage capacity. Model performance is evaluated using the coefficient of determination (R^2) and mean absolute error (MAE), with hyperparameters optimized to improve accuracy. The trained models are then applied to new datasets to predict hydrogen uptake and to analyze relationships between structural features and storage capacity. Results show that MOFs with high uptakes exhibit large surface areas, high pore volumes, and high void fraction, along with low densities. These findings illustrate the potential of machine learning to guide the design and evaluation of MOFs for improved hydrogen storage and to support the development of next-generation storage materials.

Owen Chesemore

Discipline: English and Literature

Authors:

Abstract Name: Poems as Tour Guides: Uncovering Place During the Late 20th Century through Poetry

Charles Semones established himself as one of the great 20th century Kentucky poets by dedicating his work to capturing and preserving the history of Harrodsburg, Kentucky. His writing serves as an eloquent tour guide to the time and terra firma of central Kentucky. Each line of poetry retraces his footsteps across the rural landscape and reveals the captivating stories contained within its sprawling lakes and fields. He pulls the curtain back to reveal the secrets each home contains. This unique window into the community enables the reader to fully grasp the struggles, values, and shared experiences that bind its inhabitants together. Semones' poetry also explores a wide range of topics, such as grief and loss, religion, and the formative experiences that defined his childhood. While Semones spent most of his life living in a secluded area, he remained in constant conversation with other Kentucky poets. His peers, Robert Penn Warren and Joy Bale Boone, inspired and invigorated Semones through their correspondence. This research will qualitatively examine poetry and the correspondence in the Charles Semones Papers, 1950s-1980s, at the University of Kentucky Special Collections Research Center to explore connections among poets who explored similar themes and supported each other's work. By studying Semones work in conversation with Warren and Boone, this research will provide intricate portraits of the individuals, locations, and literary traditions that defined Central Kentucky during the late 20th century.

Saniya Chethan

Discipline: Health and Human Development

Authors:

#1 Kaitlyn Baker
#2 Dayna Adeso
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Abstract Name: Repurposing Metastatic Breast Cancer Drugs in a Mouse Model of Alzheimer's Disease

Alzheimer's disease (AD) is a progressive neurodegenerative disorder characterized by the buildup of amyloid-beta plaques and neurofibrillary tangles in the brain, leading to memory loss and cognitive decline. A potential contributor to this buildup is the disruption of protein folding mechanisms. In particular, the chaperone protein GRP78 has been found to be highly expressed in AD, possibly causing disruption in damaged protein clearing within the brain. In this ongoing preclinical study, we investigate whether a combinatorial approach of AR12 and neratinib could strengthen protein clearance leading to memory deficit prevention. AR12, an anti-viral/anti-cancer drug, improves autophagy, a natural cellular recycling process, while neratinib, an FDA-approved breast cancer therapeutic, reduces GRP78 levels and targets amyloid precursor proteins for degradation. Beginning at approximately three months of age (i.e., prior to accumulation of amyloid-beta) mixed sex APP/PS1 mice, a transgenic mouse model of AD, received daily injections of AR12 and neratinib or vehicle for five months. All mice were evaluated for memory deficits using novel object recognition and object location learning and memory tasks, prior to experimentation and after chronic treatment. All APP/PS1 mice did not significantly differ from wild-type controls in either task, which precludes interpretation of potential drug-related effects. Nevertheless, the drug combination treatment was well tolerated, with no observed differences in weight gain. Further analysis of brain tissue via

immunohistochemistry will determine whether the chronic combinatorial treatment prevented amyloid-beta plaque accumulation in the APP/PS1 mice. Future studies should consider using other learning and memory assays known to undergo age-related performance deficits in APP/PS1 mice (e.g., Morris water maze). Ultimately this work will establish whether a combination of two repurposed drugs possess the potential for preventing age-related memory deficits or the accumulation of amyloid-beta in the brain using an established mouse model AD.

Aster Cheung

Discipline: Engineering

Authors:

#1 Linh Luong

#2 Anurag Paul Ovi

#3 Seung Yup (Paul) Lee

Abstract Name: Optical Phantom Mimicking Cerebral Blood Flow for Validation of Speckle Contrast Optical Spectroscopy

Monitoring cerebral blood flow (CBF) is essential for understanding and maintaining brain health. Non-invasive optical techniques such as Speckle Contrast Optical Spectroscopy (SCOS) offer a method for assessing CBF. However, evaluating SCOS depth sensitivity is limited by the lack of suitable tissue phantoms. Many existing phantoms use bulk liquids or single-layer solids and model a uniform tissue type. To address this, we propose a multi-layer tissue phantom designed to better reflect optical properties and flow patterns of skin and skull. A two-layer phantom was fabricated using polydimethylsiloxane (PDMS) with embedded silicone tubing at 4 mm and 10 mm below the surface to simulate superficial blood vessels. Titanium dioxide (TiO₂) and India Ink were added to match brain-like scattering and absorption properties. The experimental setup used an 852 nm long-coherence laser (200 mW, coherence length >50 m) and a 2M-pixel, 8-bit CMOS camera at 160 fps with 1920 × 1200 resolution. The detection optics consisted of a two-lens assembly (aspheric and plano-convex) providing ~4× magnification, ensuring a speckle-to-pixel ratio >2. Light was delivered through a 600 μm multimode source fiber, and detection used multimode fiber bundles with 90° molded tips. Source–detector separations (SDS) were varied between 1.0 and 1.5 cm to evaluate depth sensitivity. An intralipid solution circulated through tubing using a syringe pump to produce flow. Speckle contrast (κ) was calculated from recorded videos. A rectangular ROI was selected from each frame, and $1/\kappa^2$ increased as flow rate increased, demonstrating sensitivity to flow. While promising, these results demonstrate feasibility. Validation experiments are in their final stages to refine depth-dependent sensitivity by optimizing source–detector separations and adjusting optical properties. The finalized two-layer phantom will serve as a standardized benchtop platform for calibration, benchmarking, and performance evaluation of optical flow measurement technologies, supporting broader applications in cerebral blood flow measurements.

Aubray Chevannes

Discipline: Psychology

Authors:

#1 Aubray Chevannes

Abstract Name: Mentorship at HBCUs: How Black STEM Mentors Shape Identity, Belonging, and Career Aspirations

Historically Black Colleges and Universities (HBCUs) play a critical role in shaping the academic and career pathways of Black students in science, technology, engineering, and mathematics (STEM). While mentorship is known to strengthen persistence and identity development in STEM, little research has examined how these processes operate specifically within HBCU environments. This qualitative study investigates how Black STEM mentors influence Black undergraduates' STEM identity formation, career aspirations, and coping with race-related challenges. Guided by Social Cognitive Career Theory (SCCT) and the Phenomenological Variant of Ecological Systems Theory (PVEST), this project explores how self-efficacy, outcome expectations, and identity development emerge through mentoring relationships. Participants include eight mentor-mentee dyads across four HBCUs, consisting of graduate student and faculty mentors and junior/senior STEM majors. Data collection involves a prescreening survey and two semi-structured interviews per dyad—an individual interview followed by a joint interview. Transcripts are analyzed using a two-cycle coding process that incorporates a priori codes from SCCT and PVEST as well as inductive codes reflecting students' lived experiences. Hermeneutic phenomenology and counter-storytelling approaches support interpretation and challenge deficit narratives surrounding Black STEM achievement. Preliminary findings suggest that mentorship at HBCUs operates on multiple levels: mentors build students' confidence through modeling and shared identity; expand career expectations by normalizing Black success in STEM; provide culturally informed guidance on navigating academic and professional spaces; and buffer racialized stressors by affirming belonging and identity. This study advances understanding of how HBCU ecosystems uniquely support STEM persistence and offers implications for designing culturally responsive mentorship models across higher education.

Diya Chhabra

Discipline: Biology

Authors:

#1 Austin Witt

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Shree Patel

Abstract Name: The role of Hippo pathway kinases LATS1 and LATS2 in ovarian cancer

High-grade serous ovarian cancer is often diagnosed at an advanced stage and has poor long-term survival, highlighting the need to better understand pathways that restrain tumor cell proliferation. The RB family and the DREAM complex enforce a G0/G1 checkpoint by repressing cell-cycle genes, whereas the Hippo kinases LATS1 and LATS2 inhibit the pro-growth transcriptional co-activator YAP. Clinical data link low LATS1/2 expression in ovarian tumors to poorer overall survival and earlier onset, suggesting that Hippo pathway disruption is clinically relevant. Previous work in our laboratory shows that shRNA-mediated loss of both LATS1 and LATS2 in human ovarian cancer cell lines results in increased proliferation, anchorage-independent growth, migration, and tumor growth in vivo. These changes were mediated in part by reduced activity of DYRK1A protein kinase that promotes the phosphorylation of LIN52 protein, required for DREAM complex assembly, as well as increased nuclear YAP and cyclin D1 upregulation. To validate these findings and gain a mechanistic understanding of these effects, this project aims to establish additional human and mouse ovarian cancer models with simultaneous knockdown of LATS1 and LATS2. Using lentiviral infection, we generated shControl and shLATS1/2 SKOV3 and Kuramochi human cell lines, as well as ID8 mouse ovarian cancer cells. The targeted cell populations were enriched using GFP-based sorting, and knockdown validation was performed by Western blotting. Gene expression changes of the Hippo and DREAM targets were assessed by RT-qPCR, and the DREAM complex assembly and DYRK1A activity were measured by immunoprecipitation and Western blotting. These models are amenable to in vitro and in vivo preclinical studies to determine how the loss of LATS kinases can rewire the Hippo and DREAM pathways and influence the CDK4/6 inhibitor sensitivity in ovarian cancer.

Arshia Chhabria

Discipline: Nursing and Public Health

Authors:

#1 Arshia Chhabria

#2 Aditri Balaji

#3 Mridini Ramachandar

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#5 Tania Pradhan

#6 Gabriela Villalobos

#7 Alex Krist

Aditri Balaji

Abstract Name: Evaluating Recruitment Methods for the NOSES Study: Insights and effectiveness at Student Health

Acute rhinosinusitis (ARS) affects ~15% of adults annually, yet despite most cases being viral, antibiotics are prescribed in nearly 70% of ARS-related encounters. The Nasal Irrigation, Oral Antibiotics, and Subgroup Targeting for Effective Management of Acute Sinusitis trial is a four-arm, double-blind RCT evaluating alternatives to routine antibiotic use. The trial aims to determine how treatment efficacy varies across patient subgroups to inform more personalized ARS management. Across Virginia, recruitment occurs in urgent care, primary care, and student health clinics. Research assistants (RAs) play a central role, introducing the study, screening for eligibility, reviewing procedures, and guiding the informed consent process, including enrollment procedures. Recruitment is generally consistent across sites, though workflows differ. In urgent care and primary care clinics, RAs rely on clinician referral. Clinicians identify patients presenting with sinus symptoms and notify the RA, who then approaches the patient after the clinical assessment. This model limits RA–patient interaction to encounters initiated by clinical staff. At VCU Student Health Services, RAs employ a proactive outreach model, remaining in the waiting area, discreetly approaching patients upon check-in. RAs introduce themselves, share a study flyer, and ask patients if they are interested in learning more. Those interested are escorted to a private room following their visit for the consent discussions. This approach reduces clinician burden, avoids using exam rooms, and enables efficient patient engagement. These strategies have increased enrollment at Student Health. Notably, the Student Health population is younger than the urgent care and primary care populations, highlighting the need to tailor recruitment approaches to different age groups. Overall, these findings emphasize the value of adapting recruitment workflows to clinic settings and patient demographics to maximize engagement and enrollment in clinical trials.

Siekleng Chhuon

Discipline: Computer Science

Authors:

#1 Siekleng Chhuon

Abstract Name: Longitudinal Analysis of TWU/AFA CyberCamp Impact: A Decade of STEM Education Outcomes

This study examines the educational impact of the TWU/AFA CyberCamp by analyzing a decade of pre and post survey data that measure student knowledge, confidence, and skill development in cybersecurity and STEM domains. CyberCamp is a week-long intensive program designed to introduce middle and high school students to core cybersecurity concepts, hands-on technical training, and professional pathways. As cybersecurity threats and workforce needs have expanded significantly over the past ten years, understanding

how early interventions influence student learning and career interest has become increasingly important. The dataset underlying this project includes S-STEM survey responses, cybersecurity knowledge assessments, and demographic information collected annually from participants. These data provide a unique opportunity to investigate how short-term instructional experiences shape student self-efficacy, knowledge gains, and interest in STEM fields over time. The study evaluates changes in participants' cybersecurity knowledge and confidence by comparing matched pre and post responses across four survey instruments. Analysis of data focuses on examining patterns of growth in skill areas such as network security, password management, virtual machines, and online safety. Additionally, this will explore broader STEM constructs including confidence in math and science, 21st-century learning skills, and career readiness perception. Because CyberCamp participants represent a diverse population from multiple school districts, this project also considers how educational background and demographic factors relate to learning outcomes. The findings will contribute to national discussions on cybersecurity workforce development by identifying which instructional components most effectively improve student understanding and engagement. Results will also inform program design for institutions seeking to broaden participation in cybersecurity and strengthen early STEM pipelines. This work supports the broader need for evidence-based approaches to cybersecurity education as organizations and communities face an increasingly complex digital threat landscape.

Yanina Chicas Amaya

Discipline: Psychology

Authors:

#1 Jessica L Greenlee

Abstract Name: Adverse Childhood Experiences, Family Resilience, and Mental Health in Latinx Children

Adverse Childhood Experiences (ACEs) are associated with poor mental and physical health outcomes (Loria & Caughy, 2018; Zetino et al., 2020), but limited research has examined what might help buffer the negative impact of ACEs on mental health in this population. The current study is a secondary data analysis of the 2022-2023 National Survey of Children's Health (NSCH) that aims to examine the relationship between ACEs and mental health in Latinx children (N= 12,333) and to explore whether family resilience buffers this relationship. Most children were third generation or higher (48.5%), 39.1% had a parent born outside the US, and 3.7% of the children were born outside the US. Logistic regression, which included categorical ACE levels (0, 1-2, 4+), family resilience, controlling for nativity, generational status, sex and age, tested the relationship between ACEs, family resilience and mental health. Children with 1 ACE had higher odds of mental health problems versus no ACEs (OR= 1.54, $p < .001$; 2-3 ACEs had higher odds (OR=2.67, $p < .001$); 4+ ACEs had higher odds (OR=5.56, $p < .001$). The ACE x family resilience interaction was significant for 2-3 ACEs ($p = .022$) and marginally significant for 4+ ACEs ($p = .069$), indicating diminished buffering at higher adversity. This pattern remained consistent across nativity ($p = .104$) and generational status ($p = .340$). Latinx children who experience more ACEs face progressively higher risks of mental health problems. Family resilience was protective factor, however, the buffering effect diminished as ACEs increased. Migrant status does not seem to impact this interaction. This suggests that some families of Latinx children may need more support, and more research is needed to understand how family resilience helps kids do better in stressful situations.

Katheryn Chicas-Delcid

Discipline: Dance

Authors:

Abstract Name: Bridging the Gap Abstract - Elizabeth Delcid

My research explores the evolution of choreographic identity through immersive participation in the Bates Dance Festival (BDF), a nationally recognized hub for dance innovation and collaboration. Motivated by a personal inquiry into artistic growth, my project studies how choreographers develop and express meaning through dance, storytelling, and cultural observation. My research explores various choreographic techniques and the influence of rigorous training environments on the development of creative voices, drawing on journalistic, performative, and ethnic methodologies. My research looks at rehearsal procedures, thought-provoking discussions, and contemplative performances through close collaboration with well-known artists like David Dorfman and The Bill T. Jones/Arnie Zane Dance Company. I research how technique, emotion, and interpretation interact. MK Abadoo's mentoring offers a structure for goal-setting, critical evaluation, and ongoing reflection, highlighting the value of self-awareness, flexibility, and involvement in artistic practice. The research highlights the significance of community, vulnerability, and cultural dialogue in choreographic development. It also discusses issues like perfectionism and imposter syndrome, providing insight into how emotional experiences can be turned into artistic creations. Ultimately, my work strengthens the fields of choreography, and arts-based research by emphasizing the potential of movement as an outlet for research, connection, and leadership. As a result of this project, I will be able to share my voice in the dance community, which will direct future work in instruction, performance, and collaborative creation.

Nyasha Chikwinya

Discipline: Education

Authors:

#1 Nyasha Chikwinya

Abstract Name: Bridging the Gap: How Under-Resourced High Schools Compensate for Limited AP Access

Educational inequality in the United States is a problem that still shapes students' access to quality academic opportunities, more precisely at low-resourced high schools. Many lower-resourced schools often have no Advanced Placement courses, which allow students to develop college-level skills, earn early college credit, and strengthen their college or university application. Without access to AP coursework, students in under-resourced schools typically face significant barriers to college readiness and long-term academic success. Some low-income schools have responded by creating alternative programs to keep high-performing high-school students adequately challenged: dual-enrollment or early-college relationships that give students college credits, as well as honors courses with a more rigorous level of academic challenge and CTE pathways with added practical learning to regular academic learning. Many offer similar benefits to AP coursework, these varying in effectiveness for differing reasons that include partnerships, teacher preparation, and funding. The study investigates the ways in which under-resourced schools compensate for a lack of AP courses, as well as assorted impacts of their alternative programs on college readiness. This study aims to inform whether and how these programs successfully bridge the gap in access to academically rigorous or challenging instruction by closely analyzing how the programs function and the range of outcomes they produce. The final goal should be to point out ways to guarantee equal opportunities for college preparation irrespective of students' socioeconomic status and background.

Chloe Child

Discipline: Health and Human Development

Authors:

#1 Chloe Child

#2 Martie Thompson

Abstract Name: Chronic Pain, School Absenteeism, and Suicidal Behaviors in a Nationally Representative Sample of US Adolescents.

Youth suicidality is a critical public health issue, reflected by suicide being the third leading cause of death among 13-18 year olds in 2023. An increasingly studied factor that contributes to worsened mental health in youth populations is chronic pain status. National data suggest that chronic pain among youth is prevalent, having been reported by over 20% of US adolescents. An additional dimension of chronic pain that can contribute to decreased youth mental health is its impact on school absenteeism. The purpose of our study is to add to this body of literature by investigating the mediating role of school absenteeism in the relationship between chronic pain and youth suicidality. We used nationally representative data from Waves 1-2 of the National Longitudinal Study of Adolescent and Adult Health to determine if chronic pain prospectively increased the risk for suicide ideation and attempts, and if school absenteeism partially accounted for this association. Chronic pain was measured at Wave 1 across four separate pain sites including: joint, headache, body aches, and stomach pain. School absenteeism and suicide ideation and attempts were measured at Wave 2. Logistic regression models, controlling for gender and race, indicated that both the presence and extent of chronic pain significantly increased the likelihood of both missing school and suicidality. As hypothesized, the frequency of missing school mediated (accounted for) the increased risk of suicidal behaviors due to chronic pain. Results will suggest future research directions as well as implications for intervening with health care providers, parents, and school personnel to educate them about the potential ramifications of chronic pain among youth.

Kelli Childs

Discipline: Biochemistry

Authors:

#1 Kelli Childs

#2 Nicola Osgood

Abstract Name: Systematic Optimization of Prime Editing to Correct JAK2 V617F

Prime editing is a next-generation CRISPR-Cas9 genome-editing system that enables precise, versatile DNA editing without generating double-stranded breaks or requiring donor DNA templates. While it holds great promise for correcting pathogenic mutations, limited efficiency remains a significant barrier to its therapeutic application. One such therapeutic application is for the correction of a particularly pathogenic mutation in the JAK2 gene. JAK2, or janus kinase 2, is a key protein involved in the JAK/STAT signaling pathway, which controls the cell growth and differentiation of hematopoietic stem cells in the bone marrow. Mutations in this gene are implicated in several myeloproliferative neoplasms (MPNs), a group of blood cancers characterized by uncontrolled cell differentiation. Of these, the V617F mutation, caused by a G·C to T·A transversion in Exon 14, is most common and thus offers a therapeutic opportunity. Due to the nature of the mutation, it can only be corrected using prime editing. Therefore, optimization of a prime editing strategy to correct this mutation would be an invaluable contribution to therapeutic efforts to treat MPNs caused by the JAK2 V617F mutation. Efficiency screens using plasmid transfection and next-generation sequencing analysis are conducted in two mammalian cell lines: HEK293T cells, a commonly used workhorse line, and leukemia-derived K562-s cells that closely mimic the disease environment. By optimizing editing conditions across both model and disease-relevant cell types, this project aims to provide researchers with the foundation to develop therapies that correct the JAK2 V617F mutation using prime editing, while also improving the applicability of prime editing for correcting other pathogenic single-nucleotide variants.

Ananya Chillara

Discipline: Biology

Authors:

#1 Varun Kodali

#2 Nicholas Morales

#3 Edward Wu

#4 Isha Patel

#5 Donatas Kraskauskas

#6 William Del Castillo Reyes

#7 Rakesh Kukreja

#8 Anindita Das

Abstract Name: Dual Inhibition of PDE5 and mTOR Attenuated Chemotherapy and Immunotherapy Induced Cardiotoxicity

Combining HER2 (human epidermal growth factor receptor 2, ErbB2)-targeted immunotherapy with anthracycline-based chemotherapy (Doxorubicin, DOX) improves progression-free survival in HER2-positive breast cancer, but increases the risk of heart failure. We previously showed that Sildenafil (Sild, a phosphodiesterase inhibitor) prevents DOX-induced cardiotoxicity while potentiating antitumor efficacy. As mTOR (mammalian target of rapamycin) signaling is over-activated in multiple cancers, Rapamycin (Rapa) attenuates tumor growth. In this study, we investigated whether novel therapy combining Sild and Rapa could reduce the cardiotoxicity associated with DOX and the HER2 inhibitor. Female C57BL/6J mice were treated with DOX (6 mg/kg/twice/week, i.p. 5 times). After a one-week interval, Afatinib (AFA, a selective ErbB inhibitor, 10 mg/kg, p.o.) was further administered to mice for 2 weeks. Mice were co-treated with Rapa (0.25 mg/kg/twice/week, i.p.) and Sild (0.4 mg/ml in drinking water) throughout the experimental period (12 weeks) and body weight and survival were monitored. After 6 weeks following completion of DOX±AFA treatment, cardiac function was examined by Echocardiography, then hearts were collected to isolate proteins for Western blot analysis. Body weight and survival were decreased following treatment with DOX alone and DOX+AFA, which were improved with co-treatment of Sild+Rapa. Left ventricular ejection fraction (LVEF) was reduced in DOX+AFA-treated mice, while co-treatment of Sild+Rapa restored the cardiac function. Western blot analysis revealed DOX alone and DOX+AFA induced phosphorylation of mTOR and S6 (marker of mTOR complex 1, mTORC1), which were attenuated with the cotreatment of Sild+Rapa in mice hearts. The expression of a proapoptotic marker, Bax was induced in mice hearts after DOX+AFA treatment, which was also repressed by Sild+Rapa co-treatment. Cotreatment with Sild+Rapa may represent a novel strategy to reduce cardiotoxicity associated with chemoimmunotherapy by inhibiting mTOR, specifically mTORC1 activity and proapoptotic protein Bax.

Noorkaran Chima

Discipline: Interdisciplinary

Authors:

Abstract Name: The Role of Law in Addressing Climate Change: Shaping Public Perceptions of Climate Change through Educational Policy in Spain

Spain offers a uniquely compelling context for examining the relationship between legally-mandated climate

education and public perceptions of climate change. The country ranks among the EU's leading nations with high citizen support for climate reform and has enacted comprehensive national climate education laws. Additionally, Spain exhibits remarkably high public climate engagement with 95% of Spaniards supporting urgent climate action. This study investigates Spain's climate education laws, including Law 7/2021 (Climate and Energy Transition Law), LOMLOE educational reforms, and Royal Decree 217/2022, to understand how these legal mandates may relate to Spain's strong public commitment to climate action. The methodology for this research also included a systematic literature review of legal documents, policy analyses, and public perception studies. Interdisciplinary perspectives from law, cognitive science, and community psychology were utilized to examine how climate education laws relate to the public's perceptions on addressing climate change. Findings reveal significant outcomes that demonstrate these policy-perception relationships. Spain shows exceptionally high public awareness with 80% of Spaniards believing they can personally make a difference in the climate crisis (eight points above the EU average). Spain's action-oriented, transversal approach also fosters cross-sector sustainability awareness with 83% of young Spaniards prioritizing the employer's sustainability strategies during job searches. These findings emphasize that legal frameworks often relate to the reinforcement of environmental values in Spain. In fact, 79% of Spaniards under 30 support stricter government behavioral measures in the future. This creates a feedback loop where the climate education laws enhance the public's understanding of climate change's threats, which subsequently generates support for policies and candidates advocating for stricter environmental legislation. By analyzing Spain's distinctive integration of law, education, and civic attitudes, this research highlights the importance of policy-driven climate education as an effective component in addressing the climate crisis.

Surya Chinnappa

Discipline: Linguistics and World Languages

Authors:

#1 Christopher Kennedy

Abstract Name: Investigating Synesthetic Adjectives with Diachronic Word Embeddings

While historical linguistics has enjoyed great success in discovering laws governing many aspects of linguistic change, this has proven difficult for semantic change. In the past decade, diachronic word embeddings have shown promise to ameliorate this. Using diachronic word embeddings, I evaluate the proposal that sensory adjectives ("bright", "loud", etc.) are governed by a systematic and unidirectional law of semantic change in their metaphorical extensions to other sensory modalities, as put forth in Joseph Williams' 1976 paper "Synaesthetic Adjectives: A Possible Law of Semantic Change". Diachronic word embeddings are vector representations of words, with values determined by the frequency with which a given word appears adjacent to context words in a large text corpus, organized by the time period of the sources in which these appearances are found. By analyzing their relative values, prior work has demonstrated a method for identifying interpretable semantic dimensions. Using this method to identify dimensions representing sensory modalities, I track the metaphorical extensions of the sensory adjectives attested in Williams (1976). I use cosine similarity to measure semantic relatedness between each sensory dimension and a given adjective for its embeddings over several time periods from the 1800s to present, and compare the direction of change to Williams (1976)'s hypothesis, which is informed by data from c. 1000 to his time of writing. Diachronic word embeddings afford finer granularity, but also impose a shorter temporal window of analysis, due to the sparsity of corpus data from before 1800. Analysis is still ongoing. Results in line with Williams (1976)'s hypothesis would support his proposal, establishing that his proposed law is ongoing and steady over shorter time periods. Results contradicting Williams (1976)'s hypothesis or inconclusive results would indicate that his proposed law is no longer in effect, or is too noisy to be observed over shorter time periods.

Keertana Chinta

Discipline: Psychology

Authors:

Abstract Name: Adults with Congenital Anosmia: Lifelong Absence of Smell in Relation to Creating Autobiographical Memory and Personality

Congenital anosmia, the lifelong absence of smell, has connections to autobiographical memory and personality development, which allows for examination into the shaping of cognition and the construction of self in adults with congenital anosmia. In normosmic individuals, olfactory cues are closely tied to emotional learning, vivid memory recall, and the retrieval of autobiographical memories through direct connections between primary olfactory regions and limbic structures. Individuals with congenital anosmia lack these sensory-emotional pathways and show distinctive structural and functional brain differences compared to normosmic adults, including reductions in primary olfactory cortex volume and altered connectivity in regions supporting memory and emotion. Evidence indicates reliance on conceptual, semantic strategies during remembering, resulting in autobiographical memories that are less perceptually detailed, less emotionally intense, and more effortful in retrieval compared to cue-driven recall typical in normosmic adults. Most of these discoveries were found from individual studies about imaging methods, odor processing instead of memory and personality outcomes, and neural changes unrelated to the lived cognitive experience. These findings leave the psychological consequences of congenital anosmia underexplored, with gaps in the understanding of how these neural differences translate into lived cognitive experience. Combining behavioral, cognitive, and neurobiological findings may clarify how individuals with congenital anosmia construct autobiographical memories through conceptual and linguistic mechanisms rather than sensory cues, and how these alternative processes shape personality development. Together, these observations highlight how the absence of a sensory modality can influence both memory systems and personality formation, demonstrating the importance of olfaction in shaping emotional development.

Gargi Chitre

Discipline: Interdisciplinary

Authors:

Abstract Name: Exploring the Frequency of Community Service in the School of Health Professions

Community engagement is essential for student development, fostering leadership, social responsibility, and hands-on experience. In the School of Health Professions (SHP), service is embedded in both education and research, enhancing students' ability to address health disparities and contribute to community well-being. This study explores the extent of community service involvement within SHP through surveys and interviews with faculty, student organization, and staff. Participants engage in 30-minute sessions, with a goal of collecting responses from at least 20% of each department and one student organization per department. The survey investigates the prevalence of service activities, affiliated organizations, and whether these efforts align with research and educational goals. Preliminary findings suggest that most groups within SHP actively engage in service, partnering with organizations such as Firehouse Ministries, Live Health Smart, and United Ability. These partnerships focus on healthcare access, disability advocacy, and wellness initiatives. While results indicate a strong commitment to service, data collection is ongoing. Community service is a vital component of SHP's mission, equipping students with essential skills such as cultural competence, interdisciplinary collaboration, and problem-solving. By integrating service into academic training, SHP prepares students to become well-rounded healthcare professionals who are not only clinically competent but also dedicated to improving public health and addressing community needs.

Christine Cho

Discipline: Architecture, Construction Management, and Interior Design

Authors:

Abstract Name: Molded Plywood Movement

The goal of this research project is to investigate the characteristics of molded plywood to better understand how various factors influence its movement. Plywood is a versatile material that can be used to build furniture, wooden structures, and much more. It is made by laminating thin sheets of wood (i.e. veneer) perpendicularly across each other, resulting in a piece of wood that has great structural integrity compared to its mass. They typically come in flat sheets, but the process of making plywood also allows them to be formed in organic curves, which are referred to as “molded plywood” or “bent laminations”. However, wood is an organic material, and is prone to shrinking and expanding depending on external factors. Though the crisscrossing layers of plywood minimize this effect, molded plywood reflect this warping, also referred to as “movement”, more distinctly than flat plywood. To minimize plywood movement, industry facilities use special drying chambers once molding their pieces. However, in an educational institution, such special facilities are unavailable. Due to this, many student molded plywood projects face unexpected shrinkage, resulting in final products that do not match their original design. Particularly for furniture projects, this shrinkage can compromise the usability of the piece, undermining the efforts behind perfecting the designs. To aid student facilities to achieve desired bending angles reliably, I conducted experiments on a few factors that could affect the movement of molded plywood; specifically the characteristics of the mold, including its initial angle and corner radius. Other variables, like veneer thickness, plywood thickness, or wood species, were kept constant, to keep results consistent. This investigation results in quantitative findings that define an estimated formulaic relationship between the mold angle and resulting plywood angle. With this information, students will be able achieve desired bending angles more reliably by creating the appropriate molds.

Helen Choe

Discipline: Psychology

Authors:

Abstract Name: Understanding Psychological Mechanisms of Rain Ceremonies and Modern Coping Responses to Environmental Uncertainty

This study is a cross-cultural content analysis of archival data that investigates the psychological mechanisms underlying rain ceremonies worldwide. Rain ceremonies are human attempts to influence weather patterns, which have been observed throughout human history, gaining prominence as agriculture developed. The researchers explore how cultural beliefs about nature shape rain ceremonies and their connection to psychological and scientific explanations of human behavior. Data collection is ongoing, sourced from archaeological, anthropological, historical, and contemporary empirical literature. Through qualitative analysis of rain ceremonies, ten primary themes have emerged, though these may evolve as data collection progresses. The study examines cultures (N=101) across all six historically inhabited continents, spanning ancient history to the present day. Once data collection is complete, a frequency analysis will be conducted to identify the most frequently recurring themes and subthemes within the dataset. The findings suggest that rain ceremonies reflect the universal psychological impulses to regain a sense of control, reduce anxiety, and create meaning and connection in times of stress. These same impulses are similar in modern behaviors observed during natural weather disasters, where individuals collectively participate to prepare and cope with uncertainties. Whether through emergency readiness practices or shared cultural behaviors and gatherings, people continue to rely on ritual-like behaviors found in rain ceremonies to cope with environmental distress.

By comparing the responses observed in rain ceremonies with the modern coping behaviors found during extreme weather events, this study reveals how humans continue to use ritualistic and collective actions as coping mechanisms in order to seek stability and control in environmental unpredictability.

Richard Choi

CA - University of the Pacific

Discipline: Biology

Authors:

#1 Zachary Stahlschmidt

#2 Jacob Lee

#3 Leah Chapman

Abstract Name: How Does Parental Exposure to Plastics Affect Offspring?

Microplastics (MPs; plastic particles <5 mm) have become ubiquitous in Earth's ecosystems, even reaching the most isolated environments and human tissues. In addition to their toxicity, MPs release harmful phthalate esters (PAEs), which are plasticizers that give plastics their unique characteristics of flexibility and durability. Unfortunately, PAEs are also problematic to animal health because they act as endocrine disruptors and interfere with steroid hormone regulation. Yet, we lack a comprehensive understanding of the combined effects of MPs and PAEs, which may entail additive or synergistic costs to important traits, such as reproduction and offspring fitness. Since environments exhibit long-term contamination by MPs and PAEs, it is also essential to characterize their transgenerational effects— that is, how parental exposure to MPs and/or PAEs have carryover effects that influence their offspring. Here, we used a factorial experimental design and fed four different diets (control [no additives], MPs added, PAEs added, and both MPs + PAEs added) to breeding pairs of the variable field cricket (*Gryllus lineaticeps*). We then determined within-generation effects on reproduction (mating success and egg production) and transgenerational effects on offspring (hatching success, hatchling starvation resistance, and hatchling development rate). Our study will be the first to test for the sex-specific effects of MPs and PAEs on fitness-related traits within and across generations.

Roma Chokshi

Discipline: Biology

Authors:

#1 Daniel Buchanan

Abstract Name: The Effect of Bisphenol A on The Neurodevelopment of *Drosophila melanogaster*

Bisphenol A (BPA), a common endocrine-disrupting chemical (EDC), whose worldwide presence in the environment is responsible for chronic exposure during vulnerable periods. BPA, whose contamination can occur via food, water, air, dust, and soil, has been proven to have adverse effects on the development of organs and tissues, but specifics are largely under-researched. BPA has been suspected to cause neurodevelopmental disruptions, though its specific effects remain poorly understood. This study investigates the impact of BPA on the neurodevelopment of *Drosophila melanogaster*, commonly known as fruit flies, a widely used model organism for studying neurological processes. Fruit flies were exposed to 4 μ L, 10 μ L, and 100 μ L concentrations of BPA during critical developmental stages. Behavioral assays will be conducted to assess locomotion and sleep patterns as indicators of neurodevelopmental changes. Results are being gathered, but trends show a concentration-dependent effect, with higher BPA levels correlating with reduced

locomotor activity. These findings suggest that BPA exposure negatively affects neurodevelopment by impairing essential neural functions. Further research is needed to explore the underlying mechanisms and potential long-term consequences of these disruptions.

Avi Chopra

Discipline: Biology

Authors:

#1 Ruiping Taung

#2 Lohitash Karumbaiah

Abstract Name: Investigating intracellular/extracellular Tau dynamics post-injury in a 3D Neuron-on-Chip platform

Traumatic brain injury (TBI) is known to be a high risk factor for the development of Alzheimer's disease and related dementia (ADRD). The progressive prion-like propagation of neurodegenerative Tau aggregates is a key contributing factor for the development of ADRD in TBI patients. It is commonly acknowledged that pathological tau aggregates escape from neurons into extracellular space and internalized by adjacent neurons in AD. However, it remains unclear the mode of transition of Tau and its intracellular/extracellular dynamics after TBI. To bridge this gap, we conducted a study on intracellular/extracellular tau dynamics to explore the behavior of pathological tau post-TBI. Our study used the Neuron-on-Chip platform, a microfluidic platform previously developed by our lab, culturing hPSC-derived prefrontal cortex neurons (PFCs). PFCs were subjected to a weight drop injury using a focal impactor. Tau pathology was evaluated using western blot for Tau46, pTau181, pTau231 and pT396, Immunocytochemistry for AT8 and neurofibrillary tangles (NFT), and secretome analysis for total Tau, pTau. Data was collected at days 0, 1, 3, 5, and 8, providing a comprehensive characterization of Tau dynamics. Western blot analysis showed a marked reduction in total Tau in injury groups across all time periods, elevations in pTau181 and pTau396, with no difference in levels of pTau231 across control and injury groups. Immunocytochemistry showed significantly elevated levels of AT8 and NFT on day-5 and -8, and day-8 respectively, indicating an acute increase in levels of intracellular pathological Tau. Secretome analysis showed increased levels of pTau181 and total tau from day 1-5, revealing progressive release of extracellular Tau. These results advance the understanding of the acute progression of tau pathology following TBI, further clarifying the role of TBI in the development of neurodegenerative diseases such as AD.

Amulya Chowdhory

Discipline: Biology

Authors:

#1 Rebekah Frye

#2 Dana Lapato

#3 Vasily Yakovlev

#4 Roxann Roberson-Nay

Abstract Name: Neuron-Enriched Extracellular Vesicle microRNAs Reflect Hormonal Suppression Associated with Oral Contraceptive Use in Young Women

Hormonal contraceptives alter hypothalamic–pituitary–ovarian (HPO) feedback, but their impact on brain-associated molecular communication remains poorly understood. Neuron-enriched extracellular vesicle

(nEV) microRNAs (miRNAs), isolated from plasma, provide a minimally invasive window into brain molecular activity. This pilot study examined nEV miRNA expression in young women (ages 18–22) who were either naturally cycling or using a combined monophasic oral contraceptive (OC) pill. To identify hormonally responsive miRNAs, we calculated effect sizes (Cohen's d) between the two groups and selected those showing large between-group differences ($|d| \geq 0.8$). These miRNAs were entered into a principal component analysis (PCA) to reduce dimensionality, and the resulting components were correlated with measured hormone levels (FSH, LH, estradiol, and progesterone) to determine biological relevance. Principal Component 1 (PC1), explaining the largest variance, correlated positively with log-transformed estradiol ($r = .64$, $p = .003$) and progesterone ($r = .70$, $p = .001$), representing an ovarian steroid axis consistent with endogenous hormonal activity suppressed by OC use. Principal Component 2 (PC2) correlated positively with FSH ($r = .59$, $p = .006$) and LH ($r = .46$, $p = .041$), reflecting pituitary feedback mechanisms characteristic of exogenous hormone regulation. Scatterplots showed clear group-level separation along these components, highlighting distinct endocrine profiles between OC users and naturally cycling participants. Together, these findings reveal that nEV miRNA expression patterns align with hormonal regulation at multiple levels of the HPO axis—from pituitary gonadotropin signaling to ovarian steroid output. These data suggest that nEV miRNAs provide a molecular window into neuroendocrine adaptations to exogenous hormonal modulation.

Celia Christen

Discipline: History

Authors:

Abstract Name: A Look at Japan's Sartorial History: The Identity of the Kimono

A person's clothing is both among the most overt and most malleable aspect of their identity. By exploring material culture such as the formal dress kimono/wedding kimono (kurotomesode) housed at the Illinois State Museum, we can reveal an intimate look at how kimono embody the idea of self-fashioning. In particular, this research included reading works published both about kimono and material culture, conducting a personal interview, and attempting to uncover this object's personal history. Serving as the dominant wear of Japan for centuries, kimono were an integral part of Japanese everyday life. Not tied to a specific gender, class, or lifestyle, the robes changed with those who wore them, becoming an outward-facing and explicit message of identity. Every aspect—fabric, color, sleeve length, symbols, motifs—was chosen with intent to communicate something about the wearer. Through clothing alone, intimate details could be revealed, status hierarchies enforced, and art could be woven into a person's day-to-day life. This kimono specifically was created following the introduction of Western influence in the Meiji period of Japan, a time period that caused the solidifying of two distinct categories of being: Japanese clothing (wafuku) and Western clothing (yōfuku). The kimono, though eventually phased out of everyday wear, transitioned into a symbol of Japanese national identity, along with the idea of wearing the robe as a signifier of being Japanese. This kurotomesode stands as both a personal canvas for self-expression and a view into the extensive history of the garment at large, and its transformation throughout time.

Sophia Christensen

Discipline: Political Science

Authors:

Abstract Name: State Legislature Demographics and Anti-Transgender Legislation

Starting in 2015, anti-transgender bills have been introduced in state legislatures in exponentially increasing numbers, with a sharp uptick in 2020 and numbers that nearly doubled every year since then. These bills concern a wide variety of issues, from sports participation for transgender adolescents to drag bans to restrictions on bathroom usage. This paper finds that only a small percentage of the bills are passed into law, indicating that passing laws is less important to legislators than introducing bills. Given these intentions, this paper seeks to analyze the demographic makeup of chambers that introduce and pass these bills to understand who is supporting these bills and whether descriptive representation has a positive effect on transgender policy priorities. Data was gathered from various websites, including the ACLU's anti-LGBTQ+ bills databases, Out for America's list of LGBTQ+ legislators, and Center for American Women in Politics' databases. Linear regressions were run for continuous variables, such as bill percentages and the proportion that were signed into law, and logit models were run for binary variables, such as whether a bill was introduced or passed by a chamber. The results indicate that in tightly controlled chambers, more LGBTQ+ legislators indicate more anti-transgender legislation. Additionally, in Republican controlled chambers, having more women indicates a higher percentage of anti-transgender legislation. These findings have important implications for the causes of anti-transgender legislation and the effects of descriptive representation.

Katie Christensen

Discipline: Biology

Authors:

#1 Harmonie Bettenhausen

#2 Kendall Corbin

Abstract Name: Characterization of the barley microbiome through the malting process

Barley malt is a critical ingredient in brewing and distilling. Malt impacts the taste and aroma of beverages and contributes important enzymatic potential. The microbiome of any grain impacts the flavor it will contribute, the microbial load being added to mash or wort, and may be indicative of potential spoilage in both grain supply and ferments. One area where the microbiome on barley could contribute to these factors in beverage production is during the malting process. To determine if the microbiome of barley is altered through the malting process, the microbiomes of the grain surface and vessel surface will be analyzed through the three steps of malting: steeping, germination, and kilning. To determine whether the microbiome changes from step to step in the malting process or if it is affected by the vessels used, sterile flocked swabs dipped in a sterile wash solution will be used to sample both grains and vessels in each of the steps. The malting steps sampled will include raw grains, soaked grains at the end of steeping and the steeping tank, germinated grains at the end of germination and the germination tank, and grains after kilning as well as the two kilns used. Swabs will be transferred to Dr. Harmonie Bettenhausen at the James B. Beam Institute and will undergo DNA extraction in Dr. Kendall Corbin's lab in UK's Department of Horticulture. The extracted DNA will be sequenced for both 16s and ITS sequencing and analyzed for changes in the microbiome through the malting process using QIIME. Results from this project will reveal critical information on the barley microbiome as it progresses through the malting process. These shifts in the microbiome will benefit research on barley grain, the flavors associated with microbial changes, and overall microbial load issues for malt.

Eliana Christensen

Discipline: Exercise Science and Nutrition

Authors:

#1 Eric Conchola
#2 Kevin Fink
#3 Barrett Cowan
#4 Damon Walker
#5 Jacilyn Olson
#6 Tracy Morris
Marina Hartman

Abstract Name: Is There a Significant Difference in Sway Index (SI) as a Function of Rock-Climbing Status and Testing Conditions?

Background. The BIODEX Balance System SD is often used to determine multiple variables when it comes to postural stability. Unlike Thiele et al., who observed temporary balance impairments from acute fatigue, our study examines whether long-term climbing participation produces sustained improvements in postural stability. This supports the use of the BIODEX SI as our primary outcome measure. Purpose. The purpose of this project is to understand whether continued participation in rock climbing is associated with improvements in postural stability, as measured by the Sway Index (SI), in novice rock climbers. Specifically, the study aims to investigate whether SI becomes better (lower score) as participants gain more rock climbing experience over the course of the study. Both eyes-open and eyes-closed balance conditions will be assessed to determine whether visual input restricts this relationship. Method. This study will be conducted over the course of a 12 month period where Participants will complete two custom postural stability assessments using the Biodex Balance Systems under two conditions: Eyes Open and Eyes Closed. Each condition will be assessed separately. During these assessments participants will be instructed to maintain their center of gravity for three trials. They will be instructed to place their hands on their hips, while the surface changes dynamically for 20 seconds. There will be a minimum of 5 seconds rest between each trial. A higher Stability Index score reflects greater instability. The participants' amount of time spent rock climbing over the study period will be recorded (frequency and duration of climbing sessions). This variable will be examined in relation to SI scores to determine whether increased climbing exposure corresponds to improved postural stability.

Carissa Christensen

Discipline: Interdisciplinary

Authors:

Abstract Name: The Commercialization of Seasons and The Cyclic Nature of Health

The advancement of agricultural technologies has allowed for a new modern era of globalized food production and a global food marketplace. The definition of food seasonality has been divided in recent literature into food that is grown in season in the country that it is produced, and food that is grown and consumed in season in the country that it is produced. Western countries and other regions with connection to global food markets have access to seasonal foods on a year-round basis. Despite this ability to eat foods from any season year round, there is a tendency for people to reach for more seasonal foods. As well, the implementation of mass consumerism has produced marketable products for seasons. This explicit replacement of seasonal foods for commercialized products follows the same seasons, but through profit-rearing marketization. Continually, the literature presents findings that eating seasonally improves health. The literature also presents questions of why Body Mass Index and ability to exercise have not leveled out within seasonal differences because of the global food marketplace and having access to produce all year-round. This research claims to reframe these differences within seasonal contexts. With the review and analysis of literature, this research claims that the commercialization of seasonal products is a replacement for seasonal food and cultural affairs. Furthermore, this research attempts to connect health with the cyclic nature of seasons and their variation.

Carissa Christensen

Discipline: Anthropology and Archaeology

Authors:

Abstract Name: Traditional Healing Methods, Witchcraft, and History of Conventional Medicine: How Conventional Medicine Has Excluded Ancient Knowledge, and How It Denotes Credibility Problems Within Western Science

Similar healing methods are found in documented indigenous cultures from around the world. Furthermore, the belief systems attached to Indigenous cultures, societies, and healing are similar—that everything in the world has a spiritual interconnectedness. These methods and beliefs parallel ideas within witchcraft, another group that has been stigmatized by Western society. The stigmatization of witchcraft as a religion due to widespread Christian movements (along with enlightenment principles) indicates that traditional healing may have been ostracized because of racism and xenophobia. Because these healing methods (massages, herbal remedies, music/chanting, warming, rituals, etc.) and beliefs (spiritual interconnectedness) are globally widespread, there is little reason for Western societies to not have further researched it except for that their own belief systems stem from opposing Western philosophy/enlightenment principles. In this way, Western medicine is based on the same cultural properties that other traditional healing methods draw from, designating it more cultural than inherently credible. This designation is a source of concern for medical knowledge within the reasoning that traditional healing methods are not accepted by Western medicine because they're not clinically proven or have controlled trials, as traditional healing methods are more culturally credible within their own societies (Zhang). Western medicine is more widely accepted, however, because Western society dominates the global culture and has implemented a credibility basis solely within the rules of Western conventional medicine. Because the traditional healing methods, beliefs, and culture have been ostracized from Western medicine, science, and society, conventional medicine has left behind knowledge that could further healing methods. Through literature reviews, this research attempts to connect research surrounding the historic stigmatization of non-Western cultures/religions, traditional indigenous healing methods, and gaps in conventional medicine. Additionally, it presents a question of if conventional medicine is credible due to its purposeful exclusion of non-Western/non-Christian knowledge.

Julia Chrupek

Discipline: Psychology

Authors:

#1 Sarah Beamish

#2 Karyn Frick

Abstract Name: Examining 17β -Estradiol's Regulation of Ubiquitin-Proteasome System Activity and CA1 Spine Structure Following Object Training in Ovariectomized Female Mice

17β -estradiol (E2) enhances long-term memory formation and the function of the dorsal hippocampus (DH) by activating cell-signaling cascades in the DH that regulate synaptic structure. Although protein synthesis is essential for these effects, protein degradation via the ubiquitin proteasome system (UPS) is also required for memory function. This study examined how E2 influences proteasome activity following object learning and whether manipulating proteasomal degradation alters dendritic spine density on CA1 basal dendrites. In the first experiment, adult female mice were trained in a novel object recognition task and given 20 min to

accumulate 30 s of exploration time with two identical objects in an open field. Immediately after training, mice received an intrahippocampal infusion of vehicle or E2, and DH tissue was collected 5 min, 1 h, and 4 h later. Vehicle-treated trained mice showed reduced proteasome activity at 1 h later that returned to baseline by 4 h. In contrast, E2 prevents the training-induced reinstatement of proteasome activity 4 h later, suggesting that E2 suppresses proteasomal degradation at synapses during memory consolidation. To relate these molecular effects to spine structure, a second cohort of mice received intracerebroventricular (ICV) infusions of vehicle or E2 and simultaneous DH infusions of vehicle or the proteasome inhibitor β -lactone 2 h prior to whole brain collection. CA1 basal dendrites were traced, and spine density was quantified. E2+Veh treated mice had increased spine number on secondary basal dendrites, whereas E2+ β -lactone treated mice did not, suggesting proteasome activity is necessary for E2 to enhance spine density. Together, these experiments test the idea that E2 coordinates protein degradation dynamics and dendritic spine remodeling in the DH to support memory consolidation. Understanding these mechanisms may provide insight into age-related cognitive decline and neurodegenerative diseases such as Alzheimer's, in which synaptic plasticity is impaired.

Shoshana Chueca

Discipline: Psychology

Authors:

#1 Shoshana Chueca

#2 Rosanna Breaux

Abstract Name: Anxiety and Depression Symptoms in Youth with vs. without Chronic Illness: Exploring Demographic Differences

A chronic illness is a long-lasting health condition (i.e., lasting 3 months or longer) that requires continuous or ongoing medical attention and/or limits daily activities. While these conditions tend to be more prevalent in older populations, many children are also affected, with pediatric-onset conditions rising over 30% from 1999 to 2018. Currently, nearly 1-in-3 young people live with a pediatric-onset condition that significantly affects their lives. Children with chronic illnesses often experience emotional distress, including higher levels of anxiety and depressive symptoms due to factors surrounding pain, medical procedures, and social limitations. This study sought to examine whether the internalizing symptoms among 250 youth (32.9% female; ages 6-17 years) with chronic illness differed based on various demographic factors (age, biological sex, socioeconomic status [SES]). Families (family income = \$0-\$450,000) were recruited from a Child Assessment Clinic where youth received a comprehensive psychoeducational or autism evaluation. Parents reported on children's medical history as part of the intake process, with 57 children being reported to have a chronic illness (e.g., asthma, seizures). Youth reported their anxiety and depression symptoms using the Beck Youth Inventory. Regression main effects indicated that chronic illness did not significantly predict internalizing symptoms overall; however, interaction effects indicated that this association was significantly moderated by age. Specifically, for children, having a chronic illness was unrelated to anxiety and depression symptoms; whereas, for adolescents, having a chronic illness was linked to significantly more depression and anxiety symptoms. A main effect was found for SES such that families with higher annual income had children who reported fewer internalizing symptoms. Sex assigned at birth did not significantly predict internalizing symptoms or moderate the association between chronic illness and internalizing symptoms. The psychological impact of chronic illness is not uniform across development; interventions are needed supporting well-being in adolescents with chronic illnesses.

Bindu Chunduri

Discipline: Health and Human Development

Authors:

#1 Lindsey Jorda

#2 Amaya Aranda

#3 Joseph Storey

#4 Marissa Gogniat

Abstract Name: The Interactive Effects of Sleep and Physical Activity on Cognition

Inadequate sleep is known to be associated with impairments in memory, executive function, and processing speed, and physical activity is associated with preservation of cognitive function in these domains. This study's objective is to determine whether sleep interacts with activity levels in relation to cognitive outcomes. Data were analyzed from the CHAMP Lab's Fitbit study at the University of Pittsburgh's Alzheimer's Disease Research Center (ADRC) from February 2024 - June 2025. Participants ($n = 139$, 74.+7 years, 63.3% women) were eligible if they had a non-demented, eligible for PET imaging, and had completed an ADRC clinical visit in the past year. Participants wore a Fitbit Inspire 3 for one consecutive week, and the average sleep duration, efficiency, standard deviation (SD) of sleep midpoint, and physical activity measures were calculated. Interactions in linear regressions were used to examine the interactions between sleep duration, efficiency, regularity, and physical activity on cognitive domains, adjusting for age, sex, race, and education. There was a significant interaction between moderate to intense physical activity (MIPA) and SD of midpoint with the vegetable fluency cognitive outcome ($p = 0.036$, $\beta = -.332$) and the language composite ($p = 0.019$, $\beta = -.413$). In this sample, we found that the interaction between sedentary time and efficiency is significant with cognitive measures. Evidence suggests that sleep and physical activity depend on each other, rather than acting independently on cognition. Future research could include analyzing a multidimensional sleep score and its association with cognition.

Emma Ciesla

Discipline: Communications

Authors:

#1 Emma Ciesla

Abstract Name: Framing Generative AI's Impact on Public Relations: A Content Analysis of Public Discourse on X

The rise of generative artificial intelligence (AI) is rapidly changing the public relations (PR) industry. While existing scholarship has examined AI's implications for PR from professional and theoretical perspectives, limited research explores how the general public discusses these transformations on social media. This study uses quantitative content analysis to investigate how the impact of AI on PR is framed in public discourse on X (formerly Twitter). Using Brandwatch, all posts containing keywords related to both AI and PR published on X between May 13, 2024, and May 12, 2025, one year following the release of ChatGPT 4o, were collected. From this dataset, 5,000 posts were randomly sampled for manual content coding. Each post is analyzed for overall tone, framing types (e.g., risks/benefits, individual/societal, ethical, temporal, and other thematic emphases), references to PR functions and tasks, mentions of specific AI tools, anticipated roles of AI in PR, call-to-actions, and user engagement metrics (e.g., likes, reposts, and comments). Findings show that benefit-oriented and technological optimism frames dominate the discourse, particularly among PR practitioners and AI-focused companies. Most posts highlight efficiency and data-driven insights as key advantages of AI integration in media monitoring and audience engagement. At the same time, concerns about misinformation, loss of authenticity, and ethical transparency reveal a parallel narrative of caution. Societal frames appear more prevalent than individual perspectives, reflecting institutional efforts to negotiate technological change. By analyzing the evolving narratives that shape perceptions of AI in PR, this study contributes to an understanding of how new technologies are socially constructed and legitimized through

public communication. The findings underscore AI's dual role as both a strategic enabler and a reputational risk, emphasizing the importance of ethical accountability as PR adapts to an increasingly automated communication landscape.

Maximo Cisneros

Discipline: Biology

Authors:

#1 Sierra Beecher

Abstract Name: Growing Native Plants in Urban Green Spaces to Contribute to Local Biodiversity and Bolster a Local Gene Bank

Flying insects, many of whom are pollinators, have experienced marked declines since the industrial revolution. Intensifying agricultural outputs associated with widespread herbicide use may be driving factors, because declines in the native plants that support these insects confer a positive feedback loop. Monarch butterflies (*Danaus plexippus*) who rely exclusively on Milkweed plants (*Asclepias syriaca* and others) as hosts for their larvae are a key example. The goal of this project is to develop and document effective methods for propagating native species in the hope of bolstering the local pollinator ecosystem, specifically in the Richmond, Virginia area. By increasing the density of native plants in urban spaces, we will create more opportunities for pollinators to thrive on native species. *Asclepias syriaca* was grown from seeds using two different approaches: winter sowing outdoors and greenhouse starts that were later transplanted outdoors to a pollinator garden. Additionally, two different treatments during seed preparation were used as hormone treatments: cold stratification and application of gibberellic acid (GA3). Cold stratification was done in controlled greenhouse conditions and compared to outdoor winter sowing conditions. Each group was monitored and measured for its germination success rate. We expected to find that after germination is complete, the gibberellin treated seeds will have a higher rate of germination. Once established, seedlings were transplanted to a local Richmond pollinator garden for further observation. Plant health was monitored into the spring to ensure survival, as well as ecosystem impact measured in pollinator visits. We expect to find that the surviving plants will serve as a catalyst in a growing pollinator ecosystem. Phenotyping for plant identification and future seed collection are the methods employed by our team with the hope to preserve.

Aubrey Marie Clarito

Discipline: Health and Human Development

Authors:

#1 Aubrey Marie Clarito

#2 Cayley Velazquez

#3 Wallapak Polasub

Abstract Name: Sense of belonging and mental health outcomes among immigrants in British Columbia

Rates of mental illnesses, such as depression and anxiety, have continued to increase in recent years, especially among vulnerable populations such as immigrants. Immigrants comprise close to a quarter of the total Canadian population, many of whom face significant challenges regarding their health and well-being not only upon arrival to Canada but also throughout their lifetime. Mental health challenges and inequalities in the use and access of mental health services are felt by the immigrant population across the country, which can influence their overall quality of life. Sense of belonging, a key indicator that captures social connections

as valuable resources, is associated with mental health among Canadian adults. Where a strong sense of belonging has been connected to positive mental health, a weak sense of belonging has been linked to poor mental health outcomes and an increased risk of experiencing mental health challenges. Investigating the relationship between immigrants' sense of belonging and mental health outcomes will provide new insights into this growing body of research. Therefore, the main objectives are to: (a) assess whether sense of belonging is associated with experiencing symptoms of depression and anxiety, and (b) determine whether sense of belonging is associated with the likelihood of accessing mental health services. This study will focus on immigrants in British Columbia, utilizing data from the 2019-2020 Canadian Community Health Survey (CCHS), a two-year cross-sectional survey that collects information about the health status and health determinants of populations aged 18 and over across the country. Descriptive and inferential analyses will be performed using the Statistical Package for Social Sciences (SPSS) version 29 software. Study findings will add to the existing literature about sense of belonging and mental health and will support the development of programs and policies aimed at improving belonging among the immigrant population.

Sara Clark

Discipline: Psychology

Authors:

#1 Pooja Sidney

Abstract Name: Negative Schemas and Relationships: How do Sexual and Romantic Relationships Affect Second Year College Students Mental Health and Academic Achievement?

In college, many adolescents enter into their first sexual and/or romantic relationship (Tillman et al., 2019). Prior research suggests that young adults experience positive outcomes in long term healthy relationships, but negative outcomes among their counterparts in unhealthy relationships (Ritter et. al., 2022). Unhealthy relationships can be attributed to many factors, but one's beliefs about relationship norms can affect individuals' relationship schemas (Sakaluk et. al., 2019). In this study, we proposed to explore whether college students with negative relationship schemas have reduced relationship satisfaction, worse mental health, and less academic success relative to peers with more positive relationship schemas. Importantly, in contrast to prior work, we define relationships broadly to include a variety of more casual and more serious sexual and romantic relationships (Claxton & Dulmen, 2013). To test our hypotheses, we will collect survey data from second year college students at a large public university who self-identify as having a romantic and/or sexual partner. We plan to examine correlations between relationship schemas, relationship satisfaction, mental health (defined as anxiety and depression scores), engagement in risky behaviors, and perceived academic success. We expect that students whose relationship schemas reflect atypical and unhealthy norms (e.g., strict unspoken rules governing one partner's behavior) will be more likely to report engaging in risky behavior as well as a greater degree of anxiety and depression symptoms. We expect that, in turn, these students' academic success will be lower than peers with healthier beliefs about relationship norms. Additionally, we will explore possible moderating effects of relationship type and length. The long-term goal of this research is to inform novel interventions for supporting interpersonal development among college students.

Jason Clark

Discipline: Music

Authors:

Abstract Name: Schubert's "Themes of Death": the Denial and Eventual Acceptance of Mortality

Schubert's String Quartet no. 14 "Death and the Maiden" is an effective piece that conveys the nature of death through Schubert's own "themes of death" and avoidance of resolution. Schubert, despite clearly beginning in D minor, never confirms the opening key with a cadence in tonic until the last section. Instead however, Schubert cadences in a variety of different major keys without actualizing the tonic key in minor. This delay of resolution is unusual; however would Schubert really cadence in the incorrect key and never resolve his phrases without clear intention or is there some reasoning behind his suspension of resolution until the end? Is there some personal connection to this narrative and artistic decision? I firmly believe the choices are intentional and why Schubert would choose to disobey the formal structure and harmonic progressions standard of his time in favor of a calculated delay of resolution is the question I will answer in this paper. To support this claim, I will examine each thematic idea and motif to convey why Schubert delays harmonic resolution and modifies formal structure to encapsulate the idea of death being kept at bay, but always looming. While not uncommon to delay resolutions for short periods of time, it is quite an ingenious task to write a near 40 minute piece delaying resolution nearly the entire time yet still composing a hallmark of the String Quartet world. Schubert continually avoids the finality of death by delaying true resolution in the original key of D minor by utilizing his themes of death he expertly conveys the narrative of death lulling the maiden with his sweet melodies and the maiden's ever-growing fear until at last, death claims her. A tug of war between death and the maiden as she tries not to succumb to rest.

Karys Clark

Discipline: Interdisciplinary

Authors:

Abstract Name: Exploring Racial Disparities in College Expectations Among Female High School Students

This study examines racial differences in higher education expectations among Black and White female high school students through an intersectional theoretical lens. Using nationally representative data from the High School Longitudinal Study of 2009 (HSLs:09), the analysis focuses on female respondents identifying as Black/African American or White. A chi-square test of independence assessed the relationship between race and educational aspirations. Results indicate a statistically significant association between race and expected educational attainment, with Black female students more likely to aspire to professional or doctoral degrees, while White female students more often anticipated completing a master's degree. These findings highlight the importance of intersectional perspectives in understanding how race and gender jointly shape students' educational pathways and future planning.

Taylor Clark

Discipline: Gender, Ethnicity, Diversity, or Cultural Studies

Authors:

Abstract Name: Institutional Influences on Emotional Suppression and Gendered Racial Identity in Black Women

Black women have historically been excluded from dominant Eurocentric constructions of femininity, leading to stereotypes such as the Strong Black Woman (SBW) and Angry Black Woman that frame emotional resilience as required for survival. These racialized and gendered expectations continue to shape how Black

women navigate emotional expression, particularly within academic environments. This study explores how undergraduate institutional context influences emotional suppression, gender role performance, and responses to racial stress among Black women. It examines whether attending a Predominantly White Institution (PWI) or a Historically Black College and University (HBCU) affects the adoption of coping strategies rooted in the SBW schema. Sixteen Black women enrolled in graduate programs at an HBCU completed an anonymous online survey adapted from validated instruments measuring emotional suppression, perceived discrimination, and gender role beliefs. Quantitative items used Likert-type scales to assess frequency of discrimination, identity expectations, and emotional regulation across undergraduate and graduate contexts. Qualitative open-ended questions provided narrative insight into shifts in emotional expression, comfort, and femininity across institutions. Results showed that participants who attended PWIs reported substantially higher emotional suppression, perceived discrimination, and SBW identity endorsement than those who attended HBCUs. Large effect sizes supported these differences. Qualitative themes reinforced the quantitative patterns: PWI attendees described masking emotions and heightened vigilance, while many HBCU attendees reported greater emotional openness and institutional safety. However, participants also noted that respectability politics and narrow expectations of femininity persisted even in culturally affirming environments. These findings suggest that institutional environment meaningfully shapes how Black women regulate emotions and perform gendered racial identity. While HBCUs reduced reported discrimination, both contexts involved pressures that limited emotional freedom. This study highlights the complex psychological costs of navigating Black womanhood in academic spaces and underscores the need for environments that support vulnerability, belonging, and authentic self-expression.

Amira Clark

Discipline: Physics and Astronomy

Authors:

Abstract Name: Golden Years, Rapid Strides: Kinematics of the Senior Sprint

Aging is commonly associated with gradual declines in physical performance, yet many older adults continue to participate in competitive athletic events, including sprinting. Understanding the mechanical factors that contribute to sprint ability in later life can help clarify how aging affects movement and performance. This study investigates the kinematic variables that influence sprint performance in elderly athletes during a 60-meter dash. A previously recorded race involving senior competitors was analyzed using the Tracker Video Analysis and Modeling Tool. The winner of the race was selected for detailed examination, and key kinematic parameters included displacement, velocity, acceleration, kinetic energy, and force. During the analytical process, it became evident that the curved geometry of the track created challenges for accurate coordinate mapping within the software. As a result, several numerical outputs were distorted or inconsistent with expected physical values. The displacement was 0.233 meters, with an average velocity of -0.0714 m/s, acceleration of 0.9896 m/s², a kinetic energy of -2.831 J, and the force exerted was 78.479 N. These limitations highlight the difficulty of applying two-dimensional motion-tracking tools to curved sprint paths without calibration adjustments or additional reference points. Even with these constraints, the analysis provides valuable insight into the significant physical capabilities maintained by older adults who engage in regular training and competitive activity. The study illustrates the potential of kinematic assessment to deepen our understanding of age-related changes in human movement and performance. Furthermore, the findings emphasize the importance of promoting physical activity across the lifespan and suggest that tailored training and wellness programs may support improved functional capacity and overall health outcomes in aging populations.

Bryson Clarson

Discipline: Social Work and Human Services

Authors:

#1 Bryson Clarson

Abstract Name: Abstract Title: Long-Term Impacts of Childhood Emotional Maltreatment on Male Emotional Intelligence in Adulthood

This research will examine how childhood emotional maltreatment (CEM) affects the emotional intelligence (EI) of males in adulthood through a systematic review of existing literature. CEM refers to behaviors from parents or others that harm a child's emotional well-being, making them feel unloved or unwanted. CEM is broken into two categories: childhood emotional abuse and childhood emotional neglect. EI is the ability to recognize, control, and regulate one's own emotions and the emotions of others. EI impacts every relationship within our lives, and a person with lower EI may encounter more obstacles in their lifetime. However, the male population faces significant barriers in emotional development, ranging from societal factors to stigmas that surround manhood. Males are not always allowed to healthily express their emotions. This is reflected in statistics: men die by suicide nearly four times more often than women, and only 37% of men seek help for mental health struggles compared to 52% of women. Suicide is too late, and these statistics speak to the need within the male population. CEM is often underresearched because it is hard to measure, but the emotional scars can impact a person for a lifetime. The systematic review methodology will analyze peer-reviewed literature published between 2000 and 2025 from databases including PsycINFO and Google Scholar, applying strict inclusion and exclusion criteria to ensure quality and consistency. The review will explore key themes, concepts, and effective intervention strategies. Expected findings include a statistically significant relationship between CEM and reduced EI in adulthood. This research will illuminate how childhood experiences shape emotional development. It will be used to equip men emotionally and break generational cycles.

Caiden Claussen

Discipline: Environmental Science and Sustainability

Authors:

#1 Caiden Claussen

#2 Sarah Mittlefehldt

Abstract Name: An Analysis of Emission Control Technologies for Wood-fired Biomass Boilers: A Case Study of the Ripley Plant at Northern Michigan University

The heating and cooling system at Northern Michigan University (NMU) has the potential to transition from natural gas to woodchips in one of its boilers at the Ripley Plant. Northern Michigan University's administration has established goals of reducing greenhouse gas emissions on campus, and according to a 2023 Energy Master Plan Report, switching to wood as a fuel source could reduce emissions by about 27%. Although wood is renewable energy, combustion of biomass results in the release of harmful air pollutants including particulate matter (PM), sulfur dioxide (SO_x), nitrogen oxide (NO_x), and carbon dioxide (CO₂). Numerous studies have examined the efficiency of different emission control technologies used in industrial biomass boilers. However, little research exists on what pollution control technologies are best suited for an industrial biomass boiler firing northern hardwood chips, and how varying fuel characteristics between northern hardwood, soft woods or agricultural residues impact technology efficiency and selection. This study combines a systematic review of scientific articles on fuel characteristics and emission technologies with ten semi-structured interviews. The interviews provide information on how other facilities located in northern hardwood forests have managed emission levels through technology selection and operational strategies. We investigate the optimal pollution control technologies for a biomass boiler using northern hardwoods, and how different characteristics of woodchips affect emissions control technologies. Specifically, we will

examine how the operation of electrostatic precipitators, fluidized bed systems, wet scrubbers, fuel feeding systems, and fuel injection ratios are affected by the utilization of hardwood chips. The results of this study will not only provide understanding of how different feedstock types might impact the efficiency of emission control technologies at Northern Michigan University, but will also provide insight for other institutions located within northern hardwood forests that are interested in investing in renewable energy technologies.

Jaeson Clayborn

Discipline:

Authors:

#1 Jaeson Clayborn

Abstract Name: Reimagining Biology Labs: An Interdisciplinary Aquaponics Lab for Experiential Biology Education

Traditional biology labs often follow predetermined outcomes, limiting opportunities for authentic research and problem-solving. In contrast, our aquaponics lab at Miami Dade College engages students in building and maintaining integrated systems that combine aquaculture (raising fish) and hydroponics (growing plants without soil). These systems create a symbiotic loop where fish waste fertilizes plants, and plants purify water for the fish. Aquaponics offers a sustainable alternative to wild-caught fisheries, reducing ecological impact while supporting food production. Students gain hands-on experience with biological, chemical, and engineering principles while managing ornamental fish and edible plants. They explore microbial roles in the nitrogen cycle, monitor water quality, and troubleshoot system challenges. To deepen engagement, students breed fish and auction offspring at local fish clubs, introducing entrepreneurial aspects of ornamental aquaculture. This interdisciplinary, experiential approach fosters critical thinking and exposes students to potential career paths in biology and related fields. Conference attendees will receive a detailed lab handout, rubric, and a highlight video showcasing student projects.

Seth Clayton

Discipline: Gender, Ethnicity, Diversity, or Cultural Studies

Authors:

#1 Erik Huneke

Abstract Name: Low Retention from Lack of Attention: Transgender Students in STEM

Within the fields of science, technology, engineering, and mathematics (STEM), transgender people are a very underrepresented portion of the workforce. I believe that many of the reasons transgender people are not going into STEM is because of their time studying STEM as high school and university students. These students have negative experiences, or face a lack of positive experiences and do not receive the resources they need to feel like they will be accepted in a STEM field. This results in a lack of retention of transgender people in STEM programs in universities. Though, very little research has been done about this topic, and few solutions have been offered to either the students, or the educational institutions who seek to give these students a more inclusive environment. With my research, I aim to investigate what struggles transgender students in STEM go through, to what degree those struggles contribute to the lack of retention of these students, and what high schools and universities can do to ensure that transgender people feel accepted and included in their STEM programs. To do this, I will be interviewing transgender students, staff, and faculty at my university, the University of Central Oklahoma, and compare their experiences in their different STEM

fields to what research has been done previously. My research will bring a light to the lives of transgender high school and university students in STEM, reflecting on the problems they have, and propose solutions towards these issues.

Miguel Clemente

Discipline: Economics

Authors:

#1 Miguel Clemente

Abstract Name: Institutional Strength, Commodity Shocks, and Exchange Rate Volatility in Argentina

Argentina's economic history offers a distinct case study on the interaction between monetary regimes, institutional frameworks, and external shocks. This paper investigates the evolution of exchange rate volatility in Argentina, specifically analyzing how policy decisions and commodity cycles influence stability. Existing literature predominantly analyzes specific economic episodes in isolation. For instance, Gay & Pellegrini (2003) and Wang et al. (1995) focus on misalignments and stabilization under the Convertibility Plan. Conversely, Grigsby & Arnade (1986) and Campos (2019) examine the sectoral impacts of commodity markets and exchange-rate distortions. However, few long-run analyses apply a consistent volatility measure across these contrasting eras. This research addresses that gap by connecting institutional analysis with the study of commodity shocks, comparing volatility across the high-inflation 1980s, the Convertibility peg, and the post-2000s managed float. We utilize bilateral nominal ARS/USD exchange rate data at a monthly frequency, sourced from the Central Bank of the Argentine Republic (BCRA) and the IMF. Instability is quantified by generating a single annualized volatility metric per year based on the standard deviation of monthly logarithmic returns. Our results indicate that while Convertibility successfully suppressed short-term volatility, its rigid framework amplified the transmission of global commodity shocks. By contrast, the post-2000s managed float exhibits greater resilience, with institutional adaptability and countercyclical policies mitigating volatility despite persistent exposure to external terms-of-trade movements. These findings highlight the importance of institutional strength in shaping how economies absorb commodity-driven pressures and maintain exchange-rate stability over time.

Luke Clemmer

Discipline: Health and Human Development

Authors:

#1 Luke Clemmer

#2 Laura Bisailon

Laura Bisailon

Abstract Name: The Effectiveness of Planned Exercise in Reducing ADHD Symptoms in Children

Attention deficit hyperactivity disorder is one of the most common neurodevelopmental disorders in children and is characterized by various developmentally inappropriate symptoms including inattention, impulsivity, motor restlessness, and poor executive function. Medication is first line treatment, however this can come with adverse effects and high monetary costs. Research indicates that 70% of children diagnosed with ADHD have symptoms that continue into adolescence, with 50% suffering from lifelong effects. In addition, research indicates both overtreatment in individuals diagnosed with ADHD and misuse of medication in individuals without a diagnosis, demonstrating a need for non-pharmacological alternative treatments for ADHD. Studies

have shown that exercise and physical activity cause natural physiological and psychological processes which promote physiological and cognitive function. This literature review investigated the impacts of a plan of exercise compared to no plan of exercise in the reduction of ADHD symptoms. Executive functioning, hyperactivity, inattention, and impulsivity were all shown to be improved when interventions of physical exercise were implemented for children with ADHD. Regular, aerobic exercise that was cognitively-engaging and fun were the most effective interventions. Implications for practice include the use of physical exercise interventions as an effective way to manage ADHD symptoms and improve executive functioning in children diagnosed with ADHD. This literature review revealed that plans of exercise should be considered for incorporation into treatment plans for children with ADHD.

Johnathan Clemons

Discipline: Engineering

Authors:

#1 Garrett Pataky

Abstract Name: Microspeckle Stamping for using Digital Image Correlation on Carbon Fiber Reinforced Composites

The increasing push to understand material behavior at a micromechanical level requires evolving experimental techniques. Digital image correlation (DIC) is an experimental technique for measuring surface deformation of a specimen with no inherent length scale. DIC requires the application of a speckle pattern onto the specimen's surface, commonly created with spray paint at the meso- and macroscales. At higher magnifications, to understand behavior at smaller length scales, the speckles from spray paint are too large for DIC to correlate properly. Thus, microspeckle stamps have been invented to produce micron scale patterns. Existing stamping methods, however, have been optimized for black speckle patterns, particularly on metals. Therefore, applying current techniques to the black substrate of carbon fiber reinforced composites (CFRP) results in an unidentifiable speckle pattern. To solve this issue, microspeckle stamps coated with non-black inks were investigated as an alternative method for generating micron scale speckle patterns on black specimens such as CFRP. The features of these microspeckle stamps are on the order of microns, and thus ink chemistry, pigment size, and application conditions become relevant for successful application. Several ink sources, such as fluorescents, acrylic paints, and metallic Sharpies were investigated. The final choice, metallic Sharpies, had their ink applied directly to the microspeckle stamps, then the stamp was applied to the CFRP specimen to transfer the microspeckle pattern. Preliminary testing on smooth CFRP samples demonstrated that this method could produce distinguishable, high contrast, micron scale patterns that can correlate properly. The ability to produce a visible microspeckle pattern on CFRP enables DIC techniques to be used to obtain high resolution measurements of a specimen's strain under mechanical loading.

Eleanor Clough

Discipline: History

Authors:

#1 David Snead

Abstract Name: A Preventable Tragedy: Taking a Look at the Great Molasses Flood in Boston, 1919 and its Effect on the United States

On January 15, 1919, Boston's North End was struck with a tragedy unlike anything its residents could have

imagined. A wave of molasses ranging from 15 to 40 feet high washed across several blocks, destroying everything in its path. This Great Molasses Flood, caused by the collapse of a molasses tank made three years earlier by United States Industrial Alcohol, had devastating consequences. In its wake, it left twenty-one people dead and many more injured. Yet strangely enough, very few people know about it today. This project aims to introduce the event to those who are unfamiliar with it and draw together the scattered pieces of information that exist on the topic. It makes use of primary sources such as newspapers, death certificates, and quotes from the ensuing trial, as well as research from Stephen Puleo's *Dark Tide* (the only non-fiction book written entirely on this subject to date) and other sources. Through this research, it is made clear that the Great Molasses Flood was a tragic, avoidable event with far-reaching consequences. The failure of a company to prioritize safety over profit led to twenty-one deaths, several city blocks destroyed, and families all around Boston devastated. The court case afterwards, however, eventually helped spur the institution of safety codes and regulations that still affect construction and engineering today, such as licenses for engineers and stricter requirements for building plans.

Jackson Cochran

Discipline: Political Science

Authors:

Abstract Name: Freudian Analysis of the Relationship Between Religion and Politics Within Christian Nationalism

The cultural formation referred to as Christian Nationalism is a rising social phenomenon in American society, gathering support throughout the past decade in the election of right-trending politicians. Grounded in a narrative of a “power-devaluation crisis,” Christian Nationalism exhibits a reconfiguration of historically conventional relations between spheres of religion and politics that sees these spheres as inherently connected and syncretized, creating a seemingly odd and sometimes paradoxical combination of its beliefs, interests, and values among its adherents. In a September 2025 New York Times opinion column, David Brooks suggests that the phenomenon of Christian Nationalism raises several questions regarding the relationship between politics and religion, as well as issues stemming from groups that lack a coherent theory of that relationship. The presentation I am proposing here draws on Freud’s Group Psychology and the Analysis of the Ego to elucidate the relationship between religious and political spheres in Christian Nationalism as manifested in the memorial service of political activist Charlie Kirk. This analysis addresses aspects of Christian Nationalism such as the leader’s role within the group, the group’s love for conservatism and traditionality, and the group’s contradictory perspective on truth as these apply to the intersection of political ideas and religious belief. Within Freudian analysis the emergence of this phenomenon is referred to as idealization, in which the loved object within the group--in this case President Donald Trump--takes the place of the idealized version of oneself in the mind of its followers. This form of identification results in unwavering reverence of the idolized object as well as further identification procedures aligning the group with the leader’s character and will. This Freudian analysis explains the mechanisms behind Brooks’ concern that Christian Nationalism results in a degradation of religion and a totalization of politics.

Luke Cockerham

Discipline: Biology

Authors:

#1 Ashleigh Smythe
Skyleigh D'ambrosia

Abstract Name: Behavioral Responses of *Tenebrio molitor* to Volatile Cues Linked to Parasite Transmission

Chemical cues play an important role in how intermediate hosts interact with parasite-contaminated environments, particularly in systems where transmission depends on host foraging behavior. The tapeworm *Hymenolepis diminuta* infects rats as its definitive host, and its eggs are shed in rat feces that beetles encounter while foraging. Previous studies with *Tribolium confusum* and *Tenebrio molitor* have shown that beetles may prefer feces from infected rats, likely due to volatile chemicals associated with infection. These findings suggest that odor cues, along with hunger state and social interactions, can influence beetle behavior in ways that increase the parasite’s chances of completing its life cycle. This project expands on earlier work by testing whether specific fecal-associated volatile compounds can independently attract *T. molitor*. To investigate this question, adult beetles were fasted for 24 hours and tested in a two-choice circular arena similar to designs used in previous behavioral assays. Each trial presented beetles with a choice between cover slips treated with different odor solutions: deionized water, limonene, or a four-acid mixture consisting of butanoic acid, methyl butanoate, 2-methyl butanoate, and pentanoic acid. Thirty beetles were released into

the arena for each run, and their positions were recorded once per minute for ten minutes to determine whether they aggregated preferentially toward a particular odor. Preliminary patterns indicate that beetles distinguish between odor treatments and tend to move toward the area containing the four-acid mixture. These acids are known components of volatile profiles associated with infected feces, suggesting they may serve as cues guiding beetles toward parasite-containing substrates. This study helps clarify the role of individual volatile chemicals in *T. molitor* host-seeking behavior and contributes to broader understanding of how *H. diminuta* may influence intermediate host activity to enhance transmission.

Chip Cogdell

Discipline: Biology

Authors:

#1 Chip Cogdell

Abstract Name: Creating High Fidelity Data Sets Using Student and Community Involvement

Urban trees, both street trees and trees on other public lands, provide numerous ecosystem services, including stormwater regulation, carbon sequestration, and air quality improvement; however, the public is often unaware of the services that they provide. This project aims to partner with municipalities to increase awareness of the value of street and public land trees by utilizing i-Tree and scannable QR codes. Each tagged tree will link to a website that provides tree-specific ecosystem service valuations, while also providing educational materials on Municipal Separate Stormwater Systems (MS4s) and the broader role of urban forests in overall community health. By pairing economic valuation with accessible digital resources, the project aims to increase public engagement and municipal support. This project is also working to develop a Standardized Data Collection Protocol (SDCP) that enables biology students to contribute field data collected as part of biology courses at Gaston College directly to the municipal tree inventories. This will help build a large, long-term dataset for participating communities while integrating online with in-person, hands-on learning into biology courses. This SDCP will produce a replicable model that combines community outreach, municipal planning support, and student-driven research. By making the ecological benefits of trees tangible and assigning them economic value, the project will foster stronger connections between residents, local governments, and their urban forests, while arming them with additional knowledge to inform decision-making.

Henry Coghlin

Discipline: Engineering

Authors:

#1 Robert Davis

#2 Souradeep Roychowdhury

Abstract Name: Elastohydrodynamic Theory of Wet Particles

The dynamics of small, solid particles coated by thin layers of viscous fluid has many applications in the chemical industry space such as particle agglomeration, spray coating and fluidized-bed drying. In our work, we investigate the close contact, head-on collisions of two wet spheres in three regimes: (i) when the surface roughness of the particles dominates the collision, (ii) when the elastic deformation of the solids dominates and, (iii) when both length scales of roughness and elasticity are of the same order of magnitude. Much existing research focuses on hard and soft particle interaction in the fully immersed case, where the particles

travel through a large expanse of fluid. In our case, when the particle surfaces have sufficiently large roughness elements, the distance between the nominal surfaces decreases until physical contact, prior to any solid deformation. A nearly instantaneous, hard-sphere-like collision follows. In the other limit, we combine lubrication theory and Hertz contact theory of linear elasticity to model elastohydrodynamic deformation during a collision of two wet spheres. It is observed that as the particles approach each other, very high pressure develops, which both slows their relative motion and deforms their surfaces near the axis of symmetry even before physical contact occurs. When the stored elastic deformation energy is released, the particles rebound. The collision dynamics are governed by the interplay among the Stokes number, the elasticity parameter, and the dimensionless film thickness. No rebound occurs below a critical Stokes number, but above this threshold the coefficient of restitution increases with Stokes number and eventually plateaus at sufficiently large Stokes number. As the elasticity parameters increases, the critical Stokes number for separation decreases, whereas the deformation and separation times increase.

Nathaniel Cohen

Discipline: Engineering

Authors:

#1 Barry Rand

#2 Jonathan Scott

Abstract Name: Tuning and Fabricating PEDOT:PSS Films

PEDOT:PSS is a cost-efficient organic polymer that can be fabricated into conductive films with greatly tunable degrees of mechanical stability, thickness, carrier concentration, and carrier mobility. Mechanical stability and thickness are generally inversely proportional, likewise for carrier concentration and carrier mobility. Doping PEDOT:PSS with ethylene glycol would result in consistently thicker and more stable films. During the annealing process, films tend to shrink along the edges, resulting in a pinched shape to the film or, in some cases, tearing. This can be mitigated by heating the solutions in a vacuum oven and allowing for a much longer and slower heating process. With only PEDOT:PSS films, this results in high-quality, even films; and, for ethylene glycol-doped films, this prevents tearing and adds a noticeable increase to the evenness of the film while still being thicker. Another significant change as a result of ethylene glycol doping is a large increase in the conductivity of the film. The films produced by said solution are capable of being further bathed in ethylene glycol or DMSO for an even greater increase in conductivity. This bathing process significantly increases the carrier concentration of the film, but at the cost of carrier mobility. This inversely proportional relationship allows for more customization of the films depending on what is necessitated, though it is important to note that at the cost of an increase in carrier concentration, the film will be lifted off the substrate that which it was fabricated. For thin films, the method of spray-coating a heated substrate with a PEDOT:PSS solution produces uniform thin films regardless of the size of the film. These results depict the vastly varying parameters of PEDOT:PSS films depending on the specific planned usage of the film.

Nathaniel Cohen

Discipline: Engineering

Authors:

#1 Barry Rand

#2 Jonathan Scott

Abstract Name: Process of Fabricating Iodide Ion Gels

Ion gel films have the capacity to be finely tuned electrochemically and mechanically, all the while maintaining the ion conductivity of the used ionic liquid. The function of the solid-state ion gel can be tailored based on the polymer of choice, the ionic liquid composition, and dopants. Out of the various possible solutions, halide/iodide ion gels stand out as a result of their having a rich redox chemistry and strong ionic interactions. The research we did focused on fabricating a mechanically viable and functional iodide ion gel for application on solar cells. Our research followed an iterative process, thoroughly exploring the various avenues of fabrication and the quality that the ion gels yielded. Some of the major obstacles include the fact that the quality of the ion gels varied significantly and seemingly are inversely proportional to the presence of iodide ionic liquid in the initial solution. Alongside this, spincoating would consistently yield gels that are too thin and thus lacking the necessary mechanical stability to be freestanding. Dropcasting allowed for much greater quality control; however, it inherently has the capacity for a greater margin of error. Subliming iodine shows promising potential as a workaround for incorporating iodide in the ion gel without the presence of an iodide ionic liquid; rather, a ‘placeholder’ ionic liquid to absorb the gaseous iodine after the gel is formed. The mechanical limitations of iodide ionic gels can be mitigated to a degree by diluting the presence of the iodide ionic liquid with the aforementioned ‘placeholder’, resulting in a clear quality and ionic conductivity tradeoff. This tradeoff seems inherent to the nature of these iodide ion gels, though via dilution and sublimation, a functional middleground does exist.

M. E. Colby

Discipline: Communications

Authors:

#1 M. E. Colby

Abstract Name: Butterflies and You: Considerations of Human Relationships with the Natural World

Science communication only accounts for approximately 2% of the entire scientific output of 2017-2022 (Parejo-Cuellar et. al, 2024). It is an under-researched and under-valued field, especially in an age that has devalued science as a whole. The delicate art of explaining complicated ideas to people who are unfamiliar with scientific jargon is vital to humans’ understanding of the world. Butterflies & You is a documentary film exploring the relationship between humans and the many different butterfly species that call Illinois home. Video-based science communication is important to research and practice because of its impact on environmental advocacy and the growing popularity of video content. By making informative videos that appeal to a wide range of audiences, science communication can raise awareness for important environmental issues. Butterflies & You was informed by texts such as Ryan Vachon’s Science Videos: a User’s Manual for Scientific Communication, and Bill Nichols’s Introduction to Documentary. This project applies documentary film theory and industry standard practices. Impactful communication can only be achieved by identifying the intended audience and learning how to reach them (Vachon, 2018). These ideas were the guiding principles of my research, and the documentaries that inspired Butterflies & You are great examples of how to reach an audience. Many films influenced my work, including Dancing With the Birds. This film uses the strategies and visual language of expository and observational modes of documentary filmmaking (Nichols, 2017). The field footage of Butterflies & You includes uncommon butterfly species from around the state of Illinois, many of which are limited to very specific locations in Illinois, and have not been heavily documented on film. The results of my activity will contribute to the growing video science communication landscape, and raise awareness about butterfly conservation.

Daniel Colden

Discipline: Economics

Authors:

Abstract Name: Early Childhood Exposure to Maternal Depression: Health & Cognitive Development in India

This study explores the impact of early childhood exposure (6-18 months) to maternal depression on children's health and cognitive development in India. Focusing on the younger cohort of the Young Lives Study (YLS), which tracks 8,062 children over 15 years, I use propensity score matching to assess the effects on a composite health indicator (combining perceived health status and growth metrics including weight-for-age, height-for-age, BMI-for-age z scores), as well as cognitive outcomes, including vocabulary, math, and Peabody Picture Vocabulary Test (PPVT) scores. Preliminary findings indicate that early exposure to maternal depression has significant negative effects on health across all five rounds of the 15-year tracking period. Affected children have poorer health, with reduced PPVT and math scores in later tracking periods, though vocabulary scores were not significantly affected. While further research is needed to fully understand the underlying mechanisms, I hope to find that early exposure significantly worsens parent-child relationships, highlighting a critical area for intervention. Importantly, health impacts not only represent a direct effect of maternal depression but also potentially mediate the adverse effects on cognitive development, amplifying negative outcomes.

Naomi Cole

Discipline: Psychology

Authors:

- #1 Sukriti Gupta
- #2 Riley K. Kendall
- #3 Raegan S. Logue
- #4 Andrew M. Wikenheiser

Abstract Name: Rat Foraging Decisions in a Virtual Floor Patch Task

Foraging decisions require balancing patch quality and travel costs to maximize food intake. Typically, laboratory paradigms use spatially discrete patches with declining reward rates. Here, we developed a virtual foraging task with declining opportunity rates, where rats control reward timing. This design probes rats to actively take rewarding opportunities during virtual patch navigation. Behavioral sessions were conducted in a square, opaque-walled environment with flexible control over the environment floor (n = four Long-Evans rats). Each session began with a travel period, after which rats chose between two stimuli (patches). Each patch was associated with a distinct floor pattern. Within a patch, individual stimuli (opportunities) were presented at a random location, and rats earned a reward for each opportunity they selected. Rats could leave the patch by selecting a distinct "leave" stimulus, returning them to the travel period. Sessions were randomly assigned a long or short travel time. Patches within a session were randomly assigned a slow, medium, or fast declining opportunity rate. Across all sessions, rats selected 50-70% of the opportunities presented, and stimulus selection increased with decreasing patch quality. Speed profiles showed that rats could differentiate between the opportunity and leave stimuli. Latency between pellet deliveries increased as rats stayed longer in a patch, with separation between patch qualities emerging after the fourth pellet. These findings suggest that while rats distinguish travel and opportunity stimuli, they behave differently in the virtual foraging task compared to spatial foraging tasks. Future work will apply modeling and protocol adjustments to improve task engagement.

Tobi Coleman

Discipline: Art History

Authors:

#1 Tobi Coleman

Abstract Name: Pueblo Pottery: Early Existence, Colonization, Rebellion and Resilience

Pottery by the Pueblo peoples transformed over time, based on many factors, including access to raw materials and colonization. While scholars mostly focus on technical aspects of pottery, this study emphasizes how Pueblo peoples used the traditional methods of pottery production maintain their identity under colonial power. To demonstrate the continuation of these Ancestral practices, this comparative study focuses on pre-colonial Pueblo pottery and the colonial period of the early twentieth and twenty-first centuries. First, I will discuss the Ancestral Pueblo pottery designs. Next, I will briefly discuss the colonization of the Pueblo peoples by Spain and its impact on the pottery production, followed by the Pueblo Revolt of 1680 that led to the expulsion of the Spaniards and the revitalization of the Ancestral Pueblo pottery methods. Following, I will discuss how Pueblo pottery transformed from utilitarian use to commercialized art following the establishment of the railroad in the late 19th century. I will focus on monochrome pottery created by early twentieth-century San Ildefonso Pueblo artist Maria Martinez and contemporary biochrome pottery about the Pueblo Revolt by Pueblo artist Virgil Ortiz, demonstrating the resilience of traditional methods. This study is based on historical, archaeological and scholarly research about Ancestral Pueblo and the website of artist Virgil Ortiz. This study is important because it demonstrates how traditional practices of pre-colonial Pueblo pottery have survived colonization and are still prevalent in the current work of Pueblo artists.

Tobi Coleman

Discipline: Art History

Authors:

#1 Tobi Coleman

Abstract Name: Identity Labels and Aesthetics of Native American Art

This research project focuses on the adverse social meaning of the concept of “Native American” art in the 21st century based on examinations of artwork by four well-known contemporary artists. The research demonstrates that while many previous artists chose to be identified as an American artist, the artists in this study embrace their Native American identity to reclaim their heritage and ancestral identity, as reflected in their work. I will examine four contemporary artists who are descendants of First Americans, but with different life experiences. I will examine “Neufs for Oklahoma Autumn” by Edgar Heap of Birds, “Lexicon” by Rose B. Simpson, “The Animal That Therefore I Am” by Jeffery Gibson and “Singing Everything (Refrain)” by Marie Watt. First, the introduction to contemporary notion of “Native Americans” will be provided, including the historical changes in nomenclature. Second, a formal examination of each of the artworks with historical context will be provided. Third, conduct and/or review interviews with each artist to gain perspective on their art in relation to their identity through their lens as well as their experience as a contemporary artist and how identity labels have impacted each of them. Lastly, the comparative conclusion will demonstrate the influence that identity labels have on contemporary artists that are First American descendants.

Jaylee Collier

Discipline: Education

Authors:

#1 Jaylee Collier

#2 Will Tidwell

#3 William Falkner

Abstract Name: Reexamining the Alignment of STEM General Education Learning Outcomes in the 21st Century

General education curricula in the United States have long aimed to cultivate critical thinking skills, civic engagement, and democratic responsibility. Foundational reforms—such as Columbia University’s 1919 Peace Studies course and Harvard University’s 1945 General Education in a Free Society—helped define these aims. More recently, questions have arisen about whether general education still meets these goals, especially in science, technology, engineering, and mathematics (STEM), where scientific literacy and critical reasoning are increasingly vital. This project aims to determine whether the course-level learning objectives of STEM general education courses are consistent with both their institutions’ stated student learning outcomes (SLOs) and the historical mission of general education in the United States. Specifically, we address two preliminary questions: Which SLOs are most common in STEM general education courses, and do these differ by Carnegie Classification or regional accreditor? In the current phase, we examine how these course objectives align with institutional expectations and assess whether they continue to fulfill the foundational aims of general education. To address these questions, we used a qualitative codebook developed through iterative refinement to analyze general education SLOs from more than 60 institutions. Continuing this approach, we coded five syllabi per institution for the courses that fulfilled these requirements. Early results indicate that problem-solving, content knowledge, and mathematical reasoning dominate the course objectives, while gathering information, communication, and technical proficiency appear far less frequently; as coding progresses—with completion of R1 institutions anticipated in January—we expect to determine whether these trends persist across the full dataset. These findings will reveal how closely STEM general education courses align with institutional goals, historical intentions, and the broader purpose of preparing college graduates for scientific literacy and civic engagement.

Ray Collins

Discipline: Gender, Ethnicity, Diversity, or Cultural Studies

Authors:

#1 Stephanie Peebles-Tavera

Abstract Name: Queer Distortion: Analyzing the effects of Greer Lankton’s misrepresented “Lonely Dolls” during the AIDS epidemic

In this research project, I analyze artist Greer Lankton’s exhibit *Doll Party*, an installation of various dolls created throughout the AIDS epidemic that offer satirized, grotesque visages of trans and queer women as inherently effeminate or feminized by their proximity to AIDS. Using a queer studies and medical humanities approach that deploys Jack Halberstam’s concept of female masculinity and Priscilla Wald’s examination of outbreak narratives, I highlight how Lankton’s work problematizes cultural narratives of binary gender that feminize AIDS and its predominantly gay male victims, leading to the medical industry’s stigmatization and neglect of queer-folk and AIDS carriers during 1980s America. This hostile relationship between (presumably cis) practitioners and queer patients continues into the twenty-first century. I firmly argue that Lankton’s over-usage of horror elements and grotesqueness in her work satirizes this hostile relationship and the media narratives that pathologize queer victims of AIDS to create a cognitive dissonance—which I call queer dissonance—between her audience and the media narratives themselves, intending to correct this hostile

relationship. I suggest that in over-satirizing the misrepresentation of queer-folk during the AIDS epidemic, Lankton's work fails to appeal to twenty-first-century audiences and ironically contributes to the stigmatizing narratives of queer-folk that she aimed to prevent.

Allison Collins

Discipline: Visual Arts

Authors:

#1 Shannon Hickok

Abstract Name: Building up Arts in a Small Community

Cultural awareness is so important in today's society. This is something I have been hearing a lot in my art education classes. Coming from a small predominantly white community, cultural awareness is something that wasn't talked about while I was growing up. Art is the universal language of shared human experiences. It has the ability to cross cultural bridges and overcome barriers, such as language, dialect, and time. Art has the ability to create a common meeting space where people of all cultures and identities can be expressed and understood. Through this research project I have had the privilege of learning about the different cultural facets within my small community. The art pieces that have been created, represent each of the different cultures by celebrating our differences and unifying a small town in a common meeting space. These works of art are displayed on the outside of the Cultures, Humanities and Arts center in Virginia, Minnesota. My goal for this project was not only to pay tribute to each of our unique cultures. It is also meant to educate the next generation about the beauty and uniqueness that is inside each and every one of us. In order to move forward as a society it is important for all peoples to celebrate and embrace their differences, their beauty and different ways of life. I believe that art is a key component to understand one another. Art is transcendent and has the ability to reach us beyond our minds and into our souls. Art speaks to all people's no matter who you are or where you come from. I believe that art should be at the forefront of education. I am beyond grateful for this project and it's opportunities in educating the next generation.

Katherine Collins

Discipline: Art History

Authors:

Abstract Name: European-Islamic Ceramics from the Eighteenth Century Onward

Expanding upon prior research on the stylistic ceramics of the Safavid, Mughal, and Ottoman Empires (fifteenth and sixteenth centuries), this study illuminates a crucial moment in time; Islamic ceramic traditions providing an indispensable foundational catalyst for European ceramic modernity, profoundly shaping both aesthetic form and critical technical practice. Historically, Islamic ceramic traditions were an origin point for monumental technical advancements, including lusterware, cuerda seca, and underglaze painting. These techniques were transmitted through conquest and trade, leading to precursors like Spanish Lusterware or Hispano-Moresque, and Italian Maiolica. The technical legacy of tin-glazing continued to influence century production, such as Dutch Delftware. By the eighteenth century, Islamic aesthetics manifested as Orientalism and Turquerie, making Islamic forms desirable for elite consumption, as seen in Meissen porcelain. This foundational interest intensifies dramatically in the nineteenth century, sparking a technical resurgence where European manufacturers address their debt by rediscovering and adapting Islamic glazing chemistry to industrially refine luster and tin glazing. This technological boom presented opportunities for the Arts and

Crafts movement and figures like William de Morgan, who directly emulated Persian Lusterwares and employed palettes inspired by Iznik ceramics. Crucially, European manufacturers simultaneously leveraged industrial methods such as transfer printing to customize and export mass-produced earthenware featuring Islamic motifs back to the Islamic world, demonstrating a complex, transactional, and commercial dynamic based on the Islamic foundational aesthetics they appropriated. This paper validates profound historical debt, showcasing how the migration of Islamic ideas led directly to the developmental shifts extending into the Art Nouveau and Art Deco styles, and discovering its presence as far west as North American museums, private estates, and auction houses.

Erik Collins

Discipline: Psychology

Authors:

#1 Erik Collins

Abstract Name: Altered Entorhinal–CA2 Circuit Dynamics Underlying Social Memory Dysfunction in Schizophrenia

Schizophrenia is a severe neuropsychiatric disorder characterized by profound deficits in social cognition and social memory, yet the circuit mechanisms that drive these symptoms are yet to be fully understood. The CA2 hippocampal region and its inputs from the lateral entorhinal cortex (LEC) have emerged as a key pathway for encoding social identity and shaping social behavior, raising the possibility that dysfunction within this circuit directly contributes to the social impairments observed in schizophrenia. The goal of this project is to determine how LEC-CA2 communication supports normal social memory and to identify the specific ways in which disruption of this pathway leads to schizophrenia-related social deficits. Using an animal model with strong behavioral and circuit-level relevance, we combined targeted manipulation of entorhinal inputs, measurements of neural activity, and quantitative behavioral assays of social recognition memory to probe how this pathway transforms social information into hippocampal representations that guide behavior. Focusing on the LEC projections to the CA2 as a circuit, this work seeks to reveal how alterations in synaptic drive and population coding at the circuit level translate into changes in social decision-making and memory performance. Ultimately, finding how LEC-CA2 dysfunction contributes to social symptoms has the potential to identify mechanistic targets for future circuit-based interventions aimed at improving social functions and quality of life in individuals living with schizophrenia.

Jaedyn Colon

Discipline: Biology

Authors:

Abstract Name: Anti-Cancer Properties of the *Acacia raddiana* Acacia Tree Extracts

Cancer treatments are rapidly becoming more expensive, with the average cost of chemotherapy being around \$12,000 per month. The continuous time commitment required for treatment also reduces accessibility for many patients. Therefore, osteopathic treatments are often the only options for many people, including those in economically disadvantaged countries. The use of Acacia tree extracts is a popular cancer treatment in many nations with savannas, such as Africa and South America. However, there are over 1,300 acacia species and not all of their anti-cancer properties have been fully evaluated. The aim of this research was to determine the anti-cancer efficacy of leaf, seed, and gum extracts from *Acacia raddiana*, an acacia species that grows in

Morocco and nearby countries. Activity against many cancer types, including breast, colon, cervical and lung cancers, was determined. In addition, anti-cancer properties of water and ethanol-based acacia extractions were compared. The acacia extracts were incubated with the cancer cells and cell proliferation was measured using the MTT assay. All acacia extracts significantly decreased proliferation with the ethanol-based extractions having the largest effect on decreasing proliferation. Cellular death was measured using the Lactate Dehydrogenase release assay. Similar to the proliferation data, all acacia extracts induced significant levels of cell death. To calculate antioxidant levels, a Trolox equivalent activity capacity analysis was completed. All extracts contained compounds with anti-oxidant activity with the seed ethanol extract showing the highest antioxidant levels. These data demonstrate that extracts from the *Acacia raddiana* tree could possibly be developed as cheaper and more accessible cancer drugs.

Angel Colon-Zapata

Discipline: Environmental Science and Sustainability

Authors:

#1 Kayland Huckaby

#2 Paulinus Chigbu

Abstract Name: Comparison of One-Step Methyl Ester and Microwave-Assisted Fatty Acid Extraction using *Synodus foetens*

Fatty acid (FA) profiles are essential biomarkers for assessing food web structure, fish health, and environmental changes in marine ecosystems. Effective FA extraction is essential to ensuring efficient and accurate FA analysis. This study compared two extraction methods, one-step methyl ester (OSME) and microwave-assisted extraction (MAE), using dorsal muscle tissue samples from inshore lizardfish (*Synodus foetens*, $n = 11$) collected from five sites off the coast of New Orleans in the summer of 2023. Fatty acid methyl esters were extracted from muscle tissue using both methods, and FA concentrations were quantified using gas chromatography–mass spectrometry. Extractions were performed in duplicate to test the efficacy and consistency of the FA extraction methods. Statistical comparisons were performed using Friedman’s test followed by Wilcoxon signed-rank tests for pairwise analysis in R. OSME yielded 30 of the 33 fatty acids detected and consistently yielded the highest concentrations across all compounds it identified. Three fatty acids, heptadecanoic acid, eicosanoic acid, and methyl stearate, were only detected in MAE samples. Hexanoic and tridecanoic acids were not detected by either method, likely due to low concentration or degradation. Out of the 33 fatty acids quantified, 29 showed statistically significant differences between methods, with OSME yielding higher FA concentrations than MAE ($p < 0.05$). Concentrations of 9-octadecenoic acid, methyl ester, E differed significantly between OSME duplicate trials. ($p=0.905$). These findings indicate that OSME is the most efficient and reliable method for broad FA quantification, offering higher yields compared to MAE. However, MAE contributes complementary detection of certain minor or thermally sensitive compounds.

Caroline Comeaux

Discipline: Environmental Science and Sustainability

Authors:

#1 Dr. Nan Nan

#2 Dr. Joshua Adams

#3 Dr. Gordon Holley

Abstract Name: The Effects of Thinning on Wood Density Among Different Loblolly Pine Genotypes

Loblolly pine (*Pinus taeda* L.) is the most valuable timber species for the southeast US forest products sector. Over the decades of managing this species, growth of the trees have continued to accelerate but effects on wood quality must constantly be reassessed to meet current practices. A common practice is thinning in which initially planted trees are removed to decrease the overall stand density and increase future growth capabilities of the remaining trees. The presented research is to compare the difference in density of the earlywood and latewood of three different families of loblolly pine, before and after a thinning treatment. The three loblolly families were the LA (Louisiana Family), a common North Carolina coastal family, and the 93 family which is a clone selected from the North Carolina coastal family. Multiple trees from each family were harvested, and tree cookies were taken three feet above the stump. These samples were dried to a moisture content of 12%. Small squares that are roughly 1 ½ x 1 ½ inch were cut from all tree cookies. A Laboratory Density Profile Analyzer DENSE-LAB X-light , was used to measure the density of each sample, focusing on the last five years of the tree before harvest. Samples are put into the machine in the orientation of pith to sapwood. The DENSE-LAB uses x-ray technology to measure the density of the entire sample and outputs all measurements in a detailed graph. The first two years, (pre-thinning treatment) and the last two years (post-thinning treatment), were compared across the three families. This research allows for effects on wood density to be explored under the very common thinning silvicultural practice.

Ryan Compton

Discipline: Psychology

Authors:

Abstract Name: Relations Between Personal Identifiers and Outlook on Existential Futures

The central research question I would like to tackle with my research is how personal identifiers and life events can predict or inform general outlook on various existential futures, to give a general understanding of our common purpose and shared experiences and with which further research could be built upon to better our society in some way. A study by Alrofi et. al. in 2020 forms a large part of the basis for my interest in pursuing existential psychology, and outlines a concept of “authentic temporalizing”, the culmination of our moments. There are several limitations to this study though and the authors encouraged further research in light of modest results. An article in 2025 by Riker, professor of philosophy, discusses how we typically seek meaning in our lives and significance in death. Another relevant study in 2020 by Tomaszek & Muchacka-Cymerman investigated existential awareness of mortality during Covid and identified a similarity between the pandemic and negative or traumatic experiences resulting in loss of life satisfaction. I will be using a questionnaire and different methods of comparison to evaluate trends and correlations with the intention of finding any surprising or valuable results in regard to the states of mind of respondents and how they might be based on their individual qualities or characteristics. I will then compile the results of these analyses onto a poster to present my findings. I expect to find some common trends and associations such as religiousness and positive outlook, which I would then discuss in the appropriate context from which the link may arise. My hope is that this research would provide some basis or association to other works that may benefit the humanities and add to the body of research on the psychology of long-term outlooks on life for use by other works.

Allison Condra

Discipline: Anthropology and Archaeology

Authors:

Abstract Name: The Theoretical Framework of North American Indigenous Archaeology and its Influence on the Field

The field of archaeology continues to adapt as anthropologists work to expand the theoretical framework that it operates from. As time progresses, archaeologists understand and critique the political and biased nature that is subconsciously present in their research. The foundation of the field centered on profits and exoticizing other cultures which meant that there was a limitation of ethically studying and respecting other cultures. In my research I will argue how those who work in the field of archaeology have ethical obligations to foster relationships and promote stewardship to respect the rights and beliefs of Indigenous peoples. "Indigenous archaeology" is a relatively new theoretical framework that prioritizes strong relationships and collaboration with Indigenous communities. I have gathered through reading generally in this field and analyzing academic scholarship that both Indigenous and non-Indigenous people collaborate intimately to recover the traditional knowledge and heritage of Indigenous communities. This in turn ensures that their cultural heritage, agency, and dignity are preserved in their own terms. North American Indigenous archaeology and its theoretical framework will lead to the evolution of the field of archaeology as researchers will ethically and responsibly research and collaborate with other cultures. With this research I will ultimately be creating my own definition of what Indigenous archaeology is based on previous theoretical framework and academic literature to form one uniform definition. This idea will be furthered as this is applied to the concept of repatriation in relation to Indigenous archaeology theoretical framework.

Corben Conklin

Discipline: Geography/Geology

Authors:

Abstract Name: Spatiotemporal Patterns of Meteorological Hazards and Climate Change in Pennsylvania (1960–2023)

Human-driven climate change is reshaping natural systems, including the frequency and characteristics of natural hazards. Meteorological hazards, while often perceived as less severe than other natural hazards, consistently remain among the most frequent and damaging events in the United States from 1960 to the present. Pennsylvania, with its mix of densely populated cities and extensive rural communities, provides an ideal setting to examine how climate-related hazard patterns and impacts vary across geographic contexts. This study analyzes meteorological hazard frequency and associated monetary and human losses across Pennsylvania's 67 counties from 1960 to 2023 using data from the Spatial Hazard Events and Losses Database for the United States (SHELDUS). State temperature records from the Pennsylvania State Climatologist were utilized to quantify warming trends in Pennsylvania. Meteorological hazards were identified as severe storms, thunderstorms, hail, lightning, wind, and tornadoes. Results indicate a statistically significant increase in average annual temperature over the study period. This increase was significantly correlated with rising meteorological hazard frequency, suggesting a climatic influence on storm occurrence. However, no clear relationship was found between warming and changes in economic or human losses, indicating that mean annual temperature alone does not capture the complexity of hazard severity or impacts. Monetary and human losses showed no consistent upward trend but remained substantial each year. Geographic disparities were evident in the way meteorological hazard damages presented across Pennsylvania. Rural counties experienced a greater total number of events and cumulative losses due to their larger area, while urban counties exhibited higher losses per event, on average, likely due to greater infrastructure density. These findings emphasize the need for hazard mitigation and climate adaptation strategies that consider both climatic trends and geographically distinct vulnerabilities across urban and rural Pennsylvania.

Abigail Connell

Discipline: History

Authors:

#1 Sarah Wiggins

Abstract Name: A Comparison of the Work-Life Balance of American, British, and Germany women in the Second World War

The Second World War has long been regarded as a watershed moment for women and their role in the work force. Historians such as Becky Aikam and Tilar J. Mazzeo have primarily focused on women's military and espionage service, noting how it helped the war effort. As important as these stories are, the efforts of women on the home front were just as vital to winning the war. My research aims to highlight those women in Germany, Britain, and the United States who worked to support the war, their families, and their nation. By looking at propaganda posters, letters, and oral histories, I have pieced together how women supported their nation while maintaining a work-life balance. I have also drawn comparisons between the roles of women in German, British, and American wartime societies and how they were treated by their respective governments. The working world they were entering was crafted by and for men. The women entering it were not only mothers, but students fresh out of high school. They had their own money, they had new freedoms. They bought themselves new watches, navigated rationed food and materials, and maintained contact with their brothers, spouses, loved ones. In some cases, they were by themselves for the first time, learning how to carve out a space in society. By revisiting oral histories, government documents, and propaganda, my research aims to answer the following questions: How were women mobilized by their governments? What types of jobs were they called into? How did the war change their day-to-day routine? How did working mothers care for their families? What were the main differences between the experiences of German, British, and American women?

Mariah Contreras

Discipline: Chemistry

Authors:

#1 Ariel E. Vaughn

Abstract Name: Through the Lenses of DEI and Personal Confidence: The Impact of Culturally Responsive Teaching on Students' Sense of Belonging in STEM Environments and on Campus

Culturally Responsive Teaching is a practice that emphasizes the students' experiences and diverse cultural backgrounds and has been shown to increase a sense of belonging. Students in a microbiology class participated in an Indigenized laboratory experiment, one form of culturally responsive teaching, where we measured their sense of belonging in STEM and on campus before and after the experiment. This study observed how participation in this Indigenized laboratory impacted how students' viewed Diversity, Equity, and Inclusivity, (DEI) in these spaces and their personal confidence. Data was gathered using pre- and post-surveys collected through Google Forms where students responded to open-ended and Likert scale questions related to their sense of belonging in STEM environments and on campus. Qualitative coding of the student responses were sorted using NVivo 14. Based on preliminary results from the quantitative data, students' sense of belonging across the pre- and post-surveys at a STEM level slightly increased. There was an increase in the qualitative data with more positive responses regarding DEI and personal confidence. This is likely because the students created personal connections through the culturally responsive teaching activity. In contrast, there was no change observed at the campus level, possibly because the activity did not impact their feelings with the DEI on campus and their personal confidence. Evaluating student responses will determine

if Indigenizing this laboratory experiment affects a students' sense of belonging in both STEM environments and on campus. With a positive impact from this lab, we seek to encourage students to continue pursuing STEM.

Anna Contreras

Discipline: Biology

Authors:

#1 Anna Contreras
#2 Yuto Goto
#3 Harrison Wolf
#4 Sarah Lucas
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#6 Traesha Robertson
#7 Anne Mowry
#8 Ashlyn Kennedy
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#10 Stephanie Lockwood
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Abstract Name: Echinoderm Diversity in Roatán, Honduras

Echinoderms are marine invertebrates that function as predators, prey, filter feeders, and detritivores, filling diverse ecological roles supporting habitat structure, nutrient cycling, and biodiversity across marine ecosystems. Sea urchins regulate macroalgal growth, sea cucumbers enhance sediment oxygenation through bioturbation, and brittle stars and crinoids contribute to habitat complexity and energy transfer. Echinoderms are considered sentinels of reef health as sea urchin immune responses to environmental stresses, including changes in pH, temperature, and conventional and emerging pollutants. There has been a lack of data on echinoderm diversity, which limits the ability to detect ecological shifts. This study was conducted to document echinoderm diversity in Roatán, Honduras. Data was collected from 27 - 30 May 2025, using the Randell Robertson Marine Survey Technique (RRMST) for shore and reef surveys. A total of 645 echinoderms were recorded with substrate preference across six sites. The most abundant classes were Echinoidea (74.9%), Crinoidea (14%), Ophiuroidea (9.9%), and Holothuroidea (1.2%). Overall, substrate preference by class was Rock for Echinoidea (85.9%), Coral for Crinoidea (93.3%), Rock for Ophiuroidea (42.2%), and Sand for Holothuroidea (100.0%). The most dominant species by class were *Echinometra lucunter* (80.8%) for Echinoidea, *Davidaster rubiginosus* (58.9%) for Crinoidea, *Ophiocoma echinata* (48.4%) for Ophiuroidea, and *Holothuria mexicana* (62.5%) for Holothuroidea. Chi-square tests revealed significant associations between echinoderm species and sampling method. Shore snorkeling surveys had the highest species richness and abundance. Significant relationships were found between class and substrate type, and within classes, Echinoidea and Ophiuroidea exhibited significant substrate associations, while Crinoidea did not. Sea urchin species with shorter lifespans, such as *Echinometra lucunter* should be monitored for population declines since they serve as bioindicators for ecosystem stability. Given the ecological significance of echinoderms and growing environmental pressure, this study establishes a baseline for future reef health assessments and conservation efforts in Roatán, Honduras.

Raquel Contreras

Discipline: Political Science

Authors:
#1 Raquel Contreras

Abstract Name: Water Conservation in Rural West Texas

Texas faces an escalating water crisis driven by prolonged droughts, population growth, and aging infrastructure. Projections by the Texas Water Development Board indicate a shortfall of up to 5.74 million acre-feet annually by 2050, with even greater deficits expected by 2070 if current trends persist. This research examines water conservation policy in rural West Texas through the lens of institutionalism theory, emphasizing the role of state and local institutions in shaping policy responses. Historically, Texas has implemented significant measures, such as the Water Planning Act of 1957 and the creation of the Texas Water Development Board, yet gaps remain in funding and research. Recent legislative efforts, including Proposition 4 and the establishment of the Texas Water Fund, signal progress but rely heavily on surplus revenue, creating uncertainty in long-term sustainability. This policy brief analyzes three potential policy solutions: (1) guaranteeing annual funding regardless of surplus, (2) requiring oil and gas industries to contribute a portion of revenue to water management, and (3) increasing allocations for scientific research on groundwater and climate impacts. Implementation strategies include tax adjustments, community outreach, and transparent fund management to ensure equity across regions. By analyzing institutional frameworks and proposing actionable solutions, this research contributes to ongoing discussions on sustainable water policy and highlights the urgency of addressing resource scarcity in rural West Texas communities.

Lauren Conway

Discipline: Environmental Science and Sustainability

Authors:
#1 Angela Allen

Abstract Name: Water Quality Monitoring and Analysis

Urbanization surrounding Richland Creek, including expansion of nearby residential areas and the development of a large global technology complex, has increased concern about the impacts of growing impervious surfaces on local water quality. Richland Creek flows through the 245-acre Carl Alwin Schenck Memorial Forest in western Wake County, an urban forest valued for education, recreation, and long-term research opportunities. Because the forest lies within eight miles of downtown Raleigh, it provides an important natural area within a rapidly developing region. To assess potential environmental shifts, researchers have conducted continuous weekly monitoring over several years to establish a baseline for comparison. At each site, a YSI Professional Plus multiparameter instrument is used to measure dissolved oxygen (mg/L), specific conductivity ($\mu\text{S}/\text{cm}$), and pH, while a portable turbidimeter records turbidity (NTU). When compared with earlier datasets, seasonal dissolved oxygen trends follow expected patterns typical of Piedmont streams. However, specific conductivity values show notable irregularities. In particular, readings from Spring 2025 were significantly elevated relative to other seasons and previous years. These increases may be associated with intensified runoff and sediment mobilization linked to greater rainfall and expanding impervious surfaces surrounding the watershed. Currently, chemical analysis has begun, with the data of each site monitoring heavy metal content. Monitoring of conductivity and other parameters, including chemical analysis, will continue, and updated Fall 2026 results will be incorporated, as preliminary observations indicate meaningful changes that require additional interpretation.

TaTyana Cook

Discipline: Gender, Ethnicity, Diversity, or Cultural Studies

Authors:

#1 TaTyana Cook

Abstract Name: Carrying What Isn't Spoken: A Young Black Woman's Autoethnography on Family Mental Health and Loss

This autoethnography examines how, as a young Black woman in college, witnessing mental-health challenges within my family and losing loved ones to these struggles shapes my daily life, communication patterns, and emotional expression. Rather than focusing on my own mental health, this project explores the perspective of navigating school, family expectations, and early adulthood while carrying the emotional impact of others' battles with depression, anxiety, and trauma. By reflecting on personal memories, family conversations, and cultural norms within Black communities, I analyze how ideas of strength, silence, and resilience influence the way I respond to conflict, offer support, and manage emotional boundaries. These experiences shape how I interpret others' behaviors, how openly I communicate, and how I balance empathy with self-protection. Connecting my story to broader conversations about mental health in Black families, this autoethnography highlights the often-invisible labor young Black women perform as supporters, observers, and survivors of generational emotional struggle. It demonstrates how loss and mental-health challenges around me continue to shape my identity, my communication style, and my understanding of healing.

Loraine Cook

Discipline: Biology

Authors:

#1 Jordan Metzgar

Abstract Name: Evaluation of Floral Hairs for Species Identification of Wild Gingers (*Hexastylis*)

Hexastylis is a genus commonly called wild gingers or heartleaves containing eighteen species that are endemic to eastern North America. Wild gingers are characterized by evergreen, variegated leaves and tubular flowers that can be found under the leaf litter. Recognition of the genus is a subject of taxonomic debate. While it is morphologically distinct from the closely related *Asarum*, phylogenetic studies hypothesize that *Hexastylis* is contained within *Asarum*. The genus is not well understood, as species identification is heavily reliant on the three-dimensional shape of the floral tubes and this character is lost in pressed herbarium specimens. There are a number of characters in wild gingers that have not been explored as identification characters but may be useful. One of these characters is the hairs found within the flowers as some species can be identified by their distinctive hairs. We combined field collecting with herbarium specimens of Virginia populations to evaluate the hairs for differences among species. We sectioned the flowers at the base of a lobe of the floral tube and treated them with a bleach solution to increase visibility of the hairs. The sections were viewed under a light microscope and photographed. The hairs were scored for the presence of distinct basal cells, hair length, and hair density to determine differences in hair structure among different species. We found that hair traits varied among individuals in the same species and these traits overlapped among species. This makes the character not useful for species identification, but other characters such as the bracts at the base of the flower stalk may be useful in this group. We will continue examining these potential characters to determine other useful tools for *Hexastylis* identification.

Allison Cooke

Discipline: Education

Authors:

Abstract Name: The Impact of Vocal Health on Burnout Levels in Choral Music Educators

Vocal disorders, stress-related injuries, and vocal health are increasingly relevant topics among choral music educators. According to Vimala Venugopal Muthuswamy, educators, particularly those in the field of music, are susceptible to voice-related disorders due to their reliance on vocal delivery in their professional duties (Muthuswamy et al. 2024). Research shows that a majority of music educators that do feel burnout, vocal fatigue, and have vocal health issues are choral music educators in jobs that have the potential to strain and damage vocal cords. “Voice disorders, such as vocal nodules or cysts can be complicated and attributed to various factors, including voice use, sleep, or illness” (Grady et al. 2022, p. 142). The purpose of this study was to shed light on what truly causes vocal fatigue, burnout, and other vocal health related issues in choral music educators in today’s classrooms. An anonymous survey was created using Qualtrics Software that included questions regarding vocal health issues, burnout commonalities, and overall self-care of choral music educators. This survey was open to all choral music educators throughout the United States. Open-ended questions were asked at the end of the survey, so educators could share how their personal experiences have impacted their lives within the education field. The results of this survey will inform choral music educators how to avoid burnout, vocal fatigue, and how to take care of personal vocal health, while also being a full-time educator. By analyzing data collected from the survey, results will inform choral music educators, administrators, and future music educators on how to create preventative habits to avoid poor vocal health and fatigue. This will impact both educators and students by creating an overall healthier environment in the classroom, while also improving mental health and vocal health in the process.

Camryn Cooney

Discipline: Interdisciplinary

Authors:

Abstract Name: Gendered Narratives and Institutional Power in the Integration of Displaced Women in Austria

Forced displacement disproportionately affects women and girls, who experience compounded risks of violence due to legal precarity, economic instability and gender inequality. As of 2024, over 110 million people are forcibly displaced worldwide, with females making up half of the population, yet research on how they develop the personal, cultural, spiritual and social resilience to navigate the complexities of healthy integration remains limited. Popular discourse often frames displaced women as powerless, overlooking the strength and redefinition needed for them to adapt their faith, culture and often their families to new host contexts. Europe, and particularly Vienna, Austria, is a key hub for displaced communities and peacebuilding initiatives that often shape public discourse about integration. This research situates Vienna as a case study site for examining how narratives of and about displaced women are framed, iterated, resisted and/or reinterpreted within cultural and religious contexts. It investigates the patterns in shaping both representation and agency within often patriarchally-gendered integration processes. Adopting a mixed methods approach from a feminist and decolonial perspective, I draw from institutional reports, field observations and discourse analysis of gendered integration strategies to examine how institutions in Vienna translate women’s lived realities and trauma, both within policy and practice. Preliminary findings suggest that while many European institutions adopt feminist language, they often reinforce Western-centric narratives positioning displaced women as passive recipients of aid. On the other hand, the study found that grassroots organizations and women-led initiatives in Vienna actively reinterpret religious and cultural narratives as tools of empowerment, fostering spaces of solidarity, agency and self-representation. This research underscores the

need to reimagine integration and peacebuilding through intersectional, religious and culturally grounded perspectives. By centering patriarchal narrative reinterpretation and institutional reflexivity, it contributes to broader debates on women's empowerment, resilience building, host city integration, and gender inclusive policy design.

Peyton Cooper

Discipline: Philosophy, Ethics, and Religious Studies

Authors:

Katherine Berensen

Abstract Name: A New AI Crisis in Mental Healthcare

Technology companies are bringing LLM tools to healthcare, e.g., Wysa's AI mental healthcare chatbot was recently designated as a 'breakthrough device' by the FDA. We argue that the principles of medical ethics need to be treated as obligatory rather than as mere guidelines in the development of these technologies. This not only safeguards end-users from potential harms but the companies as well, helping align stakeholder interests in bringing these technologies to the market in beneficial ways. We review Wysa's chatbot through the lens of the four principles of biomedical ethics: autonomy, beneficence, non-maleficence, and justice. Wysa's breakthrough designation was, in part, thanks to the expansion of access to mental healthcare by introducing a novel stratification of care. However, this newly tiered service of care is, by definition, suboptimal. Even where it is beneficial, it still introduces the risk of what we call the re-entrenchment of vulnerability: a cyclical pattern of harm faced by marginalized populations when they consistently receive suboptimal care, further embedding their pre-existing vulnerabilities. Wysa's device designation was for patients suffering from chronic pain and experiencing associated anxiety and depression. Their current messaging goes beyond that, claiming the chatbot is useful for patients struggling with low mood, stress, and anxiety, despite no clinical data supporting this utility. Another potential harm is the issue of data storage and encryption. Wysa is not transparent about how their LLM is learning from end users; patients are susceptible to being unwilling participants in the training and development of this program, in violation of standards of privacy for medical information. These are symptoms of an underlying problem: treating the principles of biomedical ethics as mere guidelines. That leaves patients more vulnerable to these and other harms. Those risks can be mitigated by treating ethical principles as obligatory.

Peyton Cooper

Discipline: Philosophy, Ethics, and Religious Studies

Authors:

Abstract Name: Join The Herd: A Processual View of Viruses

Connecting herd immunity gained through vaccination to the life cycle of an individual virus can feel a bit abstract. A conventional way to do this is by adopting a reductionist framework. Herd immunity is achieved when immune systems are trained to respond effectively to viral strains that cause disease, often through natural recovery or vaccination. But this view is too constrained. It promotes a naïve causal explanation and fails to capture the dynamic features of how these systems are connected. Instead, I argue that we ought to regard all these systems as processes. Adopting a process ontology has several advantages. It treats processes as being part of a "hierarchy of processes, stabilized and actively maintained at different timescales" (Nicholson & Dupré 2018). This reframes how we think about and research herd immunity. In this

project I will examine the connection of viral life cycles and herd immunity with a case study of measles. Measles undermines herd immunity through immunological amnesia. The processual stance allows us to examine in depth this connection to public health and individual viruses. This context adds another layer of complexity that can be difficult to interpret in the constantly evolving scientific space. I believe that adopting a process approach here will help scientists effectively communicate complex empirical data and systems in a way that is digestible and understandable.

Amira Cooper-Stennis

Discipline: Psychology

Authors:

Abstract Name: Navigating Through Compassion and Psychological Distress

Compassion can be a powerful balm against despair, especially for college students facing loss and uncertainty (Allen et al., 2012). Compassion is a crucial psychological and spiritual construct in emerging adulthood, yet little is known about how it emerges. Strauss's (2016) compassion theory consists of five elements: recognizing suffering, understanding its universality, feeling empathy for the sufferer, tolerating uncomfortable emotions, and being motivated to alleviate the suffering. This study investigated how individual and relational factors predict compassion and psychological distress among first-semester college students. Predictor variables included demographics (age, gender), community connection (student and faculty belonging), and spiritual traits (exhibiting Acts of Mercy and Acts of Piety) (Knight, 1992). First-time freshman participants from a private liberal arts university in the south central United States were asked to complete self-report measures, including the compassion scale, Kessler Psychological Distress Scale (K-10), Mercy and Piety Practices Inventory (MAPPI), and the Duke University Religion Index (DUREL). Results revealed that psychological distress did not significantly predict compassion. Older students reported higher compassion and greater psychological distress. Female students reported higher levels of both compassion and distress. Both student and faculty belonging significantly predicted compassion; however, only student belonging predicted lower psychological distress. Interestingly, practicing past piety predicted greater compassion, while present mercy was associated with higher distress. Present piety also predicted lower distress. Intrinsic religiosity consistently predicted higher compassion and lower distress. These findings offer a nuanced understanding of how belonging, spirituality, and personal factors interact in shaping compassion and distress during college.

Hannah Copenhaver

Discipline: English and Literature

Authors:

#1 Hilary Fezzey

Abstract Name: Pleasure or Pressure: Social Stigma in the Representation of Prostitutes in the Eighteenth Century

Prostitutes in eighteenth-century works, such as *Memoirs of Margaret Leeson* (Peg Plunkett) (1795) and Mary Wollstonecraft's *The Wrongs of Woman* (1792) endured many persecutions throughout their lives. Specifically examining Margaret Leeson and Jemima led to findings of extreme poverty, shame from societal stereotypes, violence endured from gangs, trauma in many forms, and various sexual double standards. When reviewing *The Old Bailey Proceedings* (1674), it is clear that bigotry and power dynamics played a key role

in the perception and mistreatment of prostitutes. This work builds on other studies regarding the representation of prostitutes in eighteenth-century fiction, non-fiction, historical documents, and the intersection of societal intentions throughout the different genres. I recognize the work of eighteenth-century scholars who have analyzed Wollstonecraft's language and politics to show how they ultimately affected her attitude towards sex workers. I argue that the illusion of progress and many other contributing factors affected the negative depictions of prostitutes in multiple genres of literature. Leeson and Jemima comparatively had different mindsets about their profession as well as different reasons for entering into this lifestyle, adding to the importance of examining the two women concurrently. In exploring the gendered language in The Old Bailey Proceedings, major evidence has shown society's, more specifically men's, demeanor towards prostitutes. This evaluation of sex workers will highlight their portrayal in literature, while spotlighting the neglected research about the reasoning behind different women becoming prostitutes.

Emma Corbett

Discipline: Communications

Authors:

#1 Julie Lellis

Abstract Name: Framing Abortion: A Content Analysis of the Pro-Choice Movement's Social Footprint Post-Roe

This project explores how advocacy organizations in the US vested in the abortion debate strategically shape public opinion about the debate through social media, a shift from the traditional focus of news media. Existing research has examined how organizations use traditional public relations tactics to frame abortion and sway public opinion. In recent years, social media platforms such as TikTok have become critical outlets for abortion discussion, particularly after the overturning of Roe v. Wade in 2022. There is little research, however, that explores how abortion is being framed by organizations when they are using social media to connect with audiences. The central purpose of this project is to conduct a qualitative content analysis to answer two research questions around the rhetorical frames and strategic communication techniques employed by pro-choice advocacy organizations in their TikTok messaging. This thematic content analysis uses an open coding procedure. Two reputable lists were used to identify prominent abortion advocacy organizations to include in the study. Using selection criteria, a total of 41 TikTok videos across 11 organizations were chosen for analysis. Atlas.ti, a popular qualitative data management tool, was used to transcribe the sample. An open coding process is underway to examine themes, frames, messages, and strategies of both visual and textual content within the TikTok videos. The research should uncover the strategies abortion advocacy groups use to share informative and persuasive content. Based on existing research, themes will likely center around reproductive justice and legislation, correcting misinformation, and educating on women's health. The findings will be discussed in the context of how digital advocacy is being used to shape today's abortion discussions. Ultimately, this study aims to fill the gap in the literature by exploring how pro-choice advocacy groups frame the abortion conversation to influence public opinion in the post-Roe landscape.

Kayron Corbin

Discipline: Psychology

Authors:

#1 Miles Gomes

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Abstract Name: Communalism Values and Centrality as Predictors of Negative Experiences in African American Students Across College Campuses

African American college students' experiences can be shaped by college environments, while cultural values and racial identity can simultaneously influence how they feel on campus. This project focuses on the role of Afro-cultural values (i.e., communalism) and their racial identity (i.e., centrality). In this study, we examined whether students with higher communalism values would report higher racial centrality and whether those higher levels of racial centrality would be linked to more negative college experiences. We also wanted to see if these associations looked similar or different across three types of institutions: a predominantly White institution (PWI), a minority-serving institution (MSI), and a historically Black college/university (HBCU). 170 African American students across the campuses completed self-report measures of communalism, racial centrality, and negative college experiences, and separate mediation models by institution were conducted using Model 4 of the PROCESS macro for SPSS. Across all three campuses, higher communalism values were associated with higher racial centrality (PWI: $\beta = .50$, $p = .001$; MSI: $\beta = .53$, $p < .001$; HBCU: $\beta = .38$, $p = .018$). At the PWI, higher racial centrality was significantly related to more negative college experiences ($\beta = .44$, $p = .014$), and the direct link between communalism and negative experiences was small and non-significant ($\beta = -.02$, $p = .89$), which is consistent with full mediation. At the MSI and HBCU, racial centrality showed small-to-moderate positive, but non-significant, associations with negative college experiences (MSI: $\beta = .21$, $p = .088$; HBCU: $\beta = .24$, $p = .18$), and direct effects of communalism were also non-significant (MSI: $\beta = -.09$, $p = .46$; HBCU: $\beta = -.19$, $p = .29$). Overall, communalism predicts stronger racial centrality among African American college students, but how central one's race is to their identity and how it shapes their negative college experiences depends on the campus.

Edward Cordova

TX - The University of Texas at El Paso

Discipline: Physical/Occupational Therapy and Speech Language Pathology

Authors:

#1 Edward Cordova
#2 Nayeli Arreola
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#4 Juliet George

Abstract Name: Empowering Dame La Mano: Fostering Self-Efficacy and Emotional Well-Being Among Women in Transitional Shelters

Women residing in transitional shelters frequently experience complex emotional, psychological, and environmental stressors that can undermine personal stability, limit autonomy, and impede long-term wellbeing. Self-efficacy, the confidence in one's ability to navigate challenges, is a well-established protective factor associated with resilience, reduced stress, and improved health outcomes. The purpose of this project was to examine changes in self-efficacy and perceived stress among women living at the Dame La Mano Transitional Shelter after participating in a six-week, empowerment-focused, service-learning intervention designed to strengthen agency and problem-solving skills. Seven adult participants engaged in twice-weekly, student-led sessions that incorporated collaborative activities, reflective discussions, and presentations from community guest speakers. Topics were selected by participants and centered on priority concerns such as food access, transportation challenges, and navigating healthcare services. Outcomes were measured using the General Self-Efficacy Scale (GSE-10), the Health Self-Efficacy Scale (HSS), and the Perceived Stress Scale (PSS-10). Pre- and post-project scores were analyzed using paired-samples t-tests and Wilcoxon Signed-Rank Tests due to the small sample size. Quantitative analyses revealed no statistically

significant changes in general or health-related self-efficacy, $t(6) = -1.83$, $p = .118$, nor in perceived stress, $t(6) = 1.56$, $p = .168$. While preliminary, these patterns align with existing literature indicating that confidence in personal capability may buffer the psychological impact of adversity. Although statistical significance was not reached, the project demonstrated the value of participant-directed, sustainable engagement as a mechanism to promote emotional wellbeing, autonomy, and community connection among women in shelter environments. These findings highlight the need for continued research with larger samples and longer intervention periods to better understand how empowerment-focused initiatives can strengthen resilience and support long-term stability in vulnerable populations.

Diego Cordova

Discipline: Sociology

Authors:

#1 Ryan Cragun

Abstract Name: The Infernal Schism: Analyzing the Causes and Events behind the Departure of Congregations from The Satanic Temple

Research surrounding organizational splits has typically operated under the assumption that schisms occur due to some type of change within the organization, which members view as undermining the fundamental values of the group. During the summer of 2024, The Satanic Temple (TST) underwent its own schism in which ministers either left or were removed from their positions following the firing of a Canadian minister. Drawing on interviews with twenty individuals - some who left TST and others who stayed - this paper explores the factors that led to this schism. What distinguishes this schism from those previously examined by scholars is that there was no organizational change that preceded these events. Rather, many ex-members cited the firing of this minister as the tipping point, arguing that this was an abuse of power by the highest level of leadership in the organization. Other factors, including political activism and differences in perceived organizational goals, also played an important role in the dismissal and departure of many of the organization's members.

Joanna Corduan

Discipline: Biology

Authors:

#1 Brenton Bishop

#2 Leslie Corona-Martinez

Isabel Brazawskis

Grace Kaizer

Abstract Name: In Pursuit of Novel Bacteriophages

Bacteriophages are viruses that infect and kill bacteria. They are among the most abundant biological entities on Earth, with an estimated 10³¹ present. However, only a small portion have been discovered (only 13,571 genomic sequences have been deposited in NCBI as of December 2025). The goal of our project, part of the Science Education Alliance-Phage Hunters Advancing Genomics and Evolutionary Science (SEA-PHAGES) discovery program, was to isolate and characterize bacteriophages from the soil that target the bacterium *Arthrobacter globiformis*, an important member of many soil microbiomes. Isolating and characterizing such bacteriophages not only contributes to our general understanding of biodiversity and bacteriophage biology

but to our understanding of the soil ecosystem. Furthermore, though the clinical significance of *Arthrobacter* infection is limited, the occurrence of infection with members of the *Arthrobacter* genus in immunocompromised individuals has been reported. Thus, bacteriophage capable of killing *Arthrobacter* species have potential as alternatives to conventional antimicrobials. To date, four unique bacteriophages have been isolated and added to PhagesDB: Elsanna, Moseby, Tipton, and WileyJr. Elsanna was harvested from the soil of the Charlotte Codo Prairie in Frankfort, Illinois. Moseby, Tipton, and WileyJr were isolated from the soil of a retired urban garden plot in Joliet, IL. Biologically, all four bacteriophages produce clear plaques, indicating a lytic life cycle. All four phage display siphovirus morphologies, with two (Elsanna and WileyJr) having a prolate capsid and two (Moseby and Tipton) having an icosahedral capsid, as evidenced by electron microscopy. Genetic characterization (restriction enzyme analysis and genome sequencing, and annotation) of the bacteriophages is underway. Once completed, these phages will be added to NCBI for comparative analysis of novelty, gene content, and evolutionary relationships. Supported by NSF Grant 2516066.

Erica Correll

MD - Hood College

Discipline: Engineering

Authors:

#1 Erica Correll

#2 Elisha Kabongo

#3 Daehwan Kim

Elisha Kabongo

Abstract Name: Enzymatic Hydrolysis of Soybean Hull Without Pretreatment and Its Enhancement of Bioethanol Production Using Xylose-Fermenting *Escherichia coli* (FBR5)

Agricultural residues represent an abundant and renewable feedstock for sustainable bioproduct and biofuel production. Among these materials, soybean hulls, generated as a low-value byproduct during soybean oil and meal processing, offer significant potential due to their high carbohydrate content. However, the complex architecture of lignocellulosic biomass typically requires pretreatment to enhance enzymatic accessibility. Conventional pretreatment methods can generate inhibitory compounds such as furfural, hydroxymethylfurfural (HMF), phenolics, and lignin-derived degradation products, which reduce enzymatic activity and elevate processing costs. This study investigates the feasibility of direct enzymatic hydrolysis of untreated soybean hulls as a strategy to bypass pretreatment, improve process efficiency, and reduce production barriers for industrial biorefineries. Soybean hulls (5%, w/v) were hydrolyzed at 50 °C for 72 h using a dual-impeller mixing system operated at 250 rpm. Enzymatic saccharification was performed with two commercial enzyme preparations, Cellulase Blend and Multifect Pectinase, applied at 45 mg enzyme protein/g solids. A reduced enzyme loading of 10 mg/g solids was also evaluated to assess cost-effectiveness. Conversion of glucan, xylan, and arabinan into fermentable sugars was quantified, and hydrolysates were subsequently fermented with the xylose-utilizing *Escherichia coli* FBR5 strain to assess bioethanol production. High conversion efficiencies were achieved without any chemical pretreatment, yielding 94.4% glucan-to-glucose, 72.6% xylan-to-xylose, and 69.3% arabinan-to-arabinose. In contrast, control reactions lacking cellulolytic enzymes produced only 14.2–20.1% conversion. Notably, the moderate enzyme loading (10 mg/g solids) achieved 90.6% cellulose conversion, nearly equivalent to the higher loading, indicating strong potential for enzyme cost reduction. Fermentation of the resulting hydrolysate by *E. coli* FBR5 achieved 94% theoretical ethanol yield, with a production rate of 0.33 g/L/h and an overall productivity of 0.48 g ethanol/g sugar. These findings demonstrate that soybean hulls can be efficiently hydrolyzed and fermented without pretreatment, offering a cost-effective and scalable pathway for bioethanol production.

Sebastian Cortes

Discipline: Political Science

Authors:

#1 Alejandra Rios

#2 Helem Andrade

#3 Sofia Alvarez

#4 Daniel Londoño

Abstract Name: Poder y Democracia: Una Mirada Desde los Sofistas

Questions about power and democracy are as old as the Greek polis. Democracy is founded on the idea of a people whose citizens are both the holders of political power and the source of its legitimacy, while its institutions seek to rationalize the ever-present threat of violence through deliberation and collective judgment. Within this context, the sophistic movement argued that rhetoric is the central instrument of political action, since discourse and *lógos* make it possible to transform force into persuasion and to rationalize the exercise of power. This project aims to clarify the conceptual relationship between power, rhetoric, and democracy by examining key sophistic contributions and their relevance for interpreting contemporary political dynamics. In sophistic thought, *krátos*—or power—operates in both military and civic spheres. For thinkers such as Gorgias, the strength of the warrior shifts into the potency of speech: a form of “symbolic violence” capable of influencing collective decisions without physical coercion. Jacqueline de Romilly notes that the transition from warrior *krátos* to rhetorical power does not eliminate conflict but interiorizes it, relocating struggle into language itself. Recognizing this shift reveals that power does not disappear under democracy; it changes form and often hides beneath apparent consensus. Democracy, meanwhile, places authority in the *demos*, enabling citizen participation in institutions such as the Assembly and the Agora. Yet this openness also produces internal *stásis*—tensions that can lead to institutional crises or the concentration of power. This conceptual analysis argues that defending democracy requires maintaining a balance between force and speech—between *krátos* and *lógos*—and that this tension remains crucial for understanding contemporary political discourse and the challenges facing democratic societies today. This presentation will be delivered in Spanish, with English explanations available upon request.

Lizbeth Cortez Paz

Discipline: Engineering

Authors:

#1 Daniel Pintard

#2 Dr. Shama Iyer

#3 Dr. Susan Agolini

Abstract Name: Image clustering and analysis using K-Means for analysis of membrane damage in C2C12 cells

Image clustering and analysis using K-Means for analysis of membrane damage in C2C12 cells Authors: Lizbeth Cortez Paz, Daniel Pintard, Shama Iyer, Susan Agolini Microscope images of biological structures contain complex visual information that researchers manually analyze, a process that is time-consuming and prone to human error. This project aims to develop a tool for identifying, counting, and analyzing regions of interest in biological images, specifically measuring membrane damage in C2C12 cells, using the K-Means clustering algorithm. The methodology involves preprocessing microscope images using OpenCV to split color channels (red, blue, and gray) and applying techniques to isolate biological features. K-means clustering then groups similar regions, such as nuclei and myo strings, based on color and structural characteristics. The results are visualized using Jupyter Notebook, providing qualitative and quantitative insights for

researchers. Plasma membranes of C2C12 cells grown on coverslips were damaged using Streptolysin O, treated with and without calcium for 2 minutes, and labeled with membrane-impermeable dye, propidium iodide (PI), to assess membrane repair. Coverslips were mounted on slides with mounting media containing DAPI and imaged to assess the performance of the image analysis tool developed. Currently, the tool can identify the number of nuclei, the number of myotubes and/or myoblasts, and, using images of cells labeled with PI, detect which myonuclei are healthy or damaged. While the current version focuses on structural segmentation rather than disease diagnosis, future advancements could enable automated classification, more detailed measurements, and integration with medical applications. Its adaptability across various biological image types makes it a valuable resource for researchers in cell biology, pathology, and related fields.

Jenna Coss

WI - Alverno College

Discipline:

Authors:

#1 Jenna Coss

#2 Megan Krueger

#3 Heather Mernitz

Megan Krueger

Abstract Name: Creating a Successful STEM Pipeline: The Journey of a First Generation Student

Alverno College is a four-year, undergraduate liberal arts college and Hispanic-Serving Institution (HSI) located in Milwaukee, Wisconsin with a strong history in providing college access and success for first-generation, low-income women. Alverno's Natural Science faculty strive to serve students through research-based programming aimed at creating a supportive STEM community and promoting student confidence, leadership, sense of belonging, and STEM identity. This presentation will explore how we have intentionally scaffolded a developmental pathway of co-curricular programming, academic support, research opportunities, and scholarship assistance, all while emphasizing cohort- and community-building in STEM. We will follow a student's journey, from high school participation in our Girls' Academy program to graduation. This exploration will take us through her experiences in early and advanced research, peer tutoring, peer mentoring, attending professional conferences, and even a presentation to the college Board of Trustees. We will travel through the pipeline Alverno has crafted that especially supports first generation and low income students, allowing us to address disparities in higher education and STEM degree attainment, promoting the success of individual students and contributing more broadly to the workforce needs of our community and our nation.

Marissa Cossa

Discipline: Exercise Science and Nutrition

Authors:

#1 Marissa Cossa

#2 Ethan Rodriguez

#3 Andrew Moxley

#4 Audrey Harrington

#5 Austen Cave

#6 Ashley Edds

#7 Sierra Kaluzienski

#8 Carson Hughes
#9 Scott Mazzetti

Abstract Name: Initial Explosive Contractions Influence Metabolic Responses Within Sets Of Resistance Exercise More Than Heavier Loads

Our laboratory previously found that concentric repetitions (reps) performed prior to eccentric within the same set increased energy cost during subsequent eccentric reps. It is unclear whether heavier or explosive reps performed first would influence energy expenditure more in subsequent reps. PURPOSE: Therefore, we tested whether heavier or explosive reps performed first would enhance energy expenditure to a greater extent in the latter part of sets. METHODS: We used two exercise protocols (4x8 reps of squat) from a larger study that tested 7 men (20 ± 0.9 yrs; 82 ± 12 kg; 181 ± 5 cm). One of the protocols included 3 explosive reps followed by 5 recreational using 50% of maximal strength (1-RM) (3EXPL/5REC-50%). The other protocol required subjects to perform all 8 reps recreationally using 57% of 1-RM (REC-57%). Subjects' 1-RM was determined on a squat machine, and peak power was determined using an accelerometer. Repetition speed, ROM, and rest intervals were standardized among protocols. Expired air was collected 15min before and during using a metabolic cart. Data were analyzed using a 2-way repeated measures ANOVA with Fisher's LSD post hoc. We hypothesized that metabolic rate would be similar during the first three reps, but greater during the last 5 reps of 3EXPL/5REC-50% compared to REC-57%. RESULTS: Rates of oxygen consumption ($\text{ml} \cdot \text{kg}^{-1} \cdot \text{min}^{-1}$) were significantly greater ($p \leq 0.05$) during the last 5 reps of each set of 3EXPL/5REC-50% (sets 1-4: 15.4 ± 1.5 , 16.3 ± 2.2 , 17.3 ± 2.4 , 17.4 ± 2.3 $\text{ml} \cdot \text{kg}^{-1} \cdot \text{min}^{-1}$, respectively) compared to REC-57% (sets 1-4: 13.5 ± 1.4 , 14.2 ± 1.2 , 14.8 ± 1.6 , 14.2 ± 1.3 $\text{ml} \cdot \text{kg}^{-1} \cdot \text{min}^{-1}$, respectively). There were no differences in metabolic rate during the first 3 reps between protocols. CONCLUSION: Explosive reps performed first within a larger set appear to influence the subsequent energy cost more than heavier loads, despite higher work.

Adelaide Costello

Discipline:

Authors:
#1 Adelaide Costello

Abstract Name: AI as a Substitute for Student Writing: Effects on Confidence, Perceived Quality, and Academic Integrity

This proposed research study aims to explore and define what impact AI work in replacement of original work has on students' perception of and confidence in their own writing. Specifically, this study will consist of interviews of students at a small high school in rural Nevada. The research will notably evaluate the complex effect that AI generated writing has on students' academic performance and confidence in their own writing, and whether this practice of academic dishonesty makes it difficult for students to return to finishing their own writing. This research topic emerged from my own experiences witnessing my peers use AI, specifically with essays, which oftentimes look to be mostly AI generated. Included in this research, I will base further questions around the ubiquitous research question: To what extent does AI use (specifically ChatGPT) among students as a substitution for their own writing impact their confidence as writers? Additionally, I propose the following research questions: 1. To what extent do students use AI to complete assignments? 2. To what extent does AI use alter students' perceptions of the quality of their writing? 3. To what extent does AI use impact students' ability to complete writing assignments without AI support? As a result of this study, I anticipate finding that students who use AI to complete their assignments feel insecure with their own writing. I also expect to find that using AI is a slippery slope that makes it harder to stop using it as a replacement for their own work. Likewise, I expect for there to be pushback on certain questions due to the sensitivity of the topic. This proposed study will use semi-structured interviews, which will allow students to provide in-depth explanations regarding their feelings and experiences about the connections between AI and students' confidence in writing.

Lazaro Cota

Discipline: Engineering

Authors:

#1 David Margolis

Abstract Name: Continuous monitoring of fracture healing using wireless sensors

Bone fractures remain a significant clinical burden worldwide, affecting millions of individuals annually and leading to substantial economic costs. Despite advancements in imaging technology, accurately tracking the healing process of bone fractures in real time remains a challenge. This gap leads us to the research question: Can implantable bone strain gauges be used to continuously monitor bone healing in a sheep model? We hypothesized that for this study implantable bone strain (mechanical deformity) gauges can provide an accurate quantitative assessment of bone healing in sheep compared to radiographs. Sheep underwent sterile surgical preparation and implantation of calcium-coated strain gauge sensors onto femur fracture sites. Sensor function was verified with weekly strain data collection and compared against radiographic imaging. As healing progressed from the soft callus phase to the remodeling stage, a corresponding decrease in strain was observed. There was an overall decrease of 75 percent when comparing the averages from week 4 to week 11, this is correlated to the healing of the bone throughout the weeks. These results suggest that calcium-coated strain gauge sensors offer a promising solution to existing gaps in bone healing research. Ultimately, this work advances the development of continuous monitoring techniques that enhance our understanding of fracture repair and support more effective clinical interventions.

Cora Cotson

Discipline: Criminology/Criminal Justice

Authors:

#1 Cora Cotson

Abstract Name: The Comparative Analysis of Judicial Roles in Problem Solving Court Verses the Traditional Adversarial Model

This study compares the role of judges in problem-solving courts and traditional adversarial courts, focusing on how differing judicial functions influence case outcomes, courtroom culture, and concepts of justice. Problem-solving courts—including drug, mental health, and re-entry courts—operate as specialized forums emphasizing rehabilitation and reduced recidivism through collaborative, non-adversarial processes. Traditional courts, by contrast, follow an adversarial model centered on neutrality, procedural regularity, and resolving discrete legal disputes. The study examines how each model constructs the judge's role: an active, therapeutic decision-maker and case manager in problem-solving courts versus an impartial arbiter in adversarial settings. It analyzes how problem-solving judges directly engage with participants, motivate compliance, and function within multidisciplinary teams, compared with the more reactive, rule-focused work of adversarial judges who primarily safeguard due process. Methodologically, the study draws on empirical research evaluating both court types and theoretical work on therapeutic jurisprudence. It also considers critiques of problem-solving courts involving due process, coercion, and power imbalances. In addition, interviews with judges in local problem-solving courts provide insight into how they entered these roles, how the work differs from their prior adversarial experience, and what they view as essential for effectiveness. These interviews deepen understanding of judicial practice and support existing scholarship on

the problem-solving model. Findings indicate that problem-solving judges, through more active, relational, and therapeutic engagement, tend to promote stronger perceptions of fairness, collaboration, and compliance, and often achieve improved rehabilitative outcomes. However, these benefits come with risks, including judicial role strain, inconsistency, and due process concerns. The study concludes by identifying conditions under which problem-solving practices can be integrated into, or carefully limited within, adversarial systems to balance innovation with procedural safeguards

Madeline Couch

Discipline: Biology

Authors:

#1 Alex Ottimer

#2 Amber LaCrosse

Abstract Name: THE ROLE OF GAD67/65 AND PARVALBUMIN IN THE THERAPEUTIC EFFECTS OF KETAMINE AND FLUOXETINE IN FEAR-CONDITIONED MICE.

Post-traumatic stress disorder (PTSD) is a chronic psychiatric disorder and the most common disorder following exposure to a traumatic event. The most commonly used drugs in PTSD treatment are selective serotonin reuptake inhibitors (SSRIs), though only about 50% of patients respond to this treatment. Previous work in our lab demonstrated the combination of chronic fluoxetine (FLX) and acute ketamine treatment decreased fear response in a contextual fear paradigm in male C57/BL mice. In rodents, fear conditioning (FC) is commonly used in the literature to induce behaviors related to PTSD. The central fear memory circuit in mammals involves a dynamic interplay between excitatory projection neurons and inhibitory parvalbumin-positive (PV+) interneurons within the prefrontal cortex, hippocampus, and amygdala. Fear-related disorders, such as PTSD, are driven by dysregulation in GABAergic and glutamatergic function. Numerous studies have reported altered levels of GABA release, GABA receptor expression, and the rate limited enzyme: GAD67/65. Parvalbumin-positive (PV+) interneurons function as essential regulators of fear memory through their direct inhibitory influence on excitatory pyramidal cells (PCs) throughout the amygdala, hippocampus, and PFC. Limited research has been conducted on the combined effects of FLX and ketamine on inhibitory circuitry in the adaptation of fear memory. This study will quantify the expression of PV and GAD67/65 in brains harvested from mice that underwent FC and treatment from a previous study conducted in our laboratory. Specifically, this research aims to assess the expression and function of inhibitory neuronal populations in the infralimbic prefrontal cortex (IL-PFC), the CA1 region of the hippocampus, and the bed striatum terminalis of the amygdala (BNST).

Caroline Coughlin

Discipline: Social Work and Human Services

Authors:

#1 Karen Aicher

Abstract Name: Adapting Outreach Strategies for Violence Prevention and Relationship Education for Students with Disabilities

My project is to research a way to deliver content developed by the Sexual Violence Advocacy and Support Center to students with disabilities in EXCEL, which stands for "extraordinary expectations for career, education and life". The purpose is for neurodivergent and differently abled students to understand and apply

these concepts. I will also be developing support materials and resources for EXCEL faculty and mentors. During my time working at the SVASC on campus I have had the privilege of learning about what can be done to combat the prevalent issues of relationship violence, sexual violence, stalking and harassment. We must ensure that all students are aware of their resources on campus and have access to information that can help if a dangerous situation arises. The EXCEL program offers a secondary education to young adults with intellectual or developmental disabilities, providing them with the same college experience as their peers. For many, this is an educational opportunity to continue studying in an adaptive learning environment. However, with university life comes the healthy and normal desire to socialize. Topics such as dating, online safety, or violence may not be at the forefront of their or their caregivers' minds. There is a lot to learn about consent, healthy relationships and boundaries when beginning university. Young adults naturally create friendships, professional and personal relationships. Unfortunately, students with disabilities are at a higher risk of victimization. To protect and include this statistically vulnerable population, I will recommend delivery modifications of the safety and violence prevention content that the EXCEL program receives. The product of this research is a modified series of workshops that can be presented to the EXCEL program or other students with disabilities, along with evidence-based strategies for implementing these changes.

Emma Counts

Discipline: Mathematics

Authors:

Abstract Name: A note on a key inequality in a 2D Smoluchowski Equation

Recently, the two-dimensional Smoluchowski equation, which models the behavior of nematic liquid crystalline polymers, was reevaluated. A novel proof was subsequently established for determining the number of steady-state solutions. The original proof was when the intensity constant was less than 4, which made the derivation somewhat complex. To address this, I focused on the isotropic-nematic phase transition using the 2D Smoluchowski equation for specific cases when the intensity constant ranges from 0 to 4. An alternative proof of the key inequality was developed using elementary calculus, which gave a more transparent approach to understanding the steady-state behavior of the system. By simplifying the original argument, it improves the clarity of the mathematical reasoning, which makes the results more accessible to researchers outside of the field of liquid crystalline polymers. This work shows that classical mathematical techniques can still be applied to modern problems in statistical mechanics.

ISABEL COVARRUBIAS

Discipline: Architecture, Construction Management, and Interior Design

Authors:

Abstract Name: Designing an Innovative Adoption Center and Temporary Housing for Homeless Dogs and Cats

Dogs and cats have long been faithful companions to humans, yet many continue to experience abandonment, neglect, and abuse in communities around the world. For every dog or cat who enjoys a safe home and consistent care, countless others struggle to survive on the streets or inside overcrowded shelters. Even with the dedication of shelter staff, many animals endure stressful environments, and some ultimately face euthanasia. The purpose of this project is to design an adoption center that fosters a positive, supportive environment for dogs, cats, and the people who interact with them and to shift perceptions of homeless animals to increase and sustain adoption. This project uses a multi-method research approach, incorporating case studies of existing adoption centers, a literature review, and interviews with animal shelter staff. The proposed design prioritizes spaces that promote meaningful interaction between animals and people, ensuring that every dog and cat receives sustained human engagement that supports physical and emotional well-being. The center provides safe temporary housing, medical care, and behavioral rehabilitation delivered by trained professionals. Public areas are warm, welcoming, and educational, encouraging visitors to connect with animals and learn about responsible pet ownership. Animal housing emphasizes well-being, enrichment, comfort, and dignity, while staff and volunteers benefit from durable, flexible, and efficient workspaces. Dedicated areas allow adopters to meet animals in a calm, supportive setting and participate in structured educational programs. A media production space enables the creation of content that features animals seeking homes and encourages adoption rather than pet purchases. Sustainable finishes, natural daylight, and access to natural environments help enhance the health and well-being of both animals and people. Ultimately, the center will serve as a compassionate, sustainable community hub that supports strong human-animal connections and lasting adoptions.

India Cox

Discipline: Psychology

Authors:

#1 Shay Lumpkin

Abstract Name: From Custody to Care: Understanding Mental Health and Recidivism in the Criminal Justice System

Previous studies on genetic influences in mental health disorders have been shown to correlate with incarceration rates in families. Consequently, there are individuals within the criminal justice system under the clinical threshold of a mental health diagnosis; it has been found that almost half of the incarcerated population was arrested due to acting upon their mental health disorder, while 27 to 38 percent developed PTSD while imprisoned. Furthermore, the serious and exhausting cycle of recidivism within the criminal justice system highlights the failure to provide the necessary mental health treatment required to support rehabilitation while incarcerated and prevent reoffending upon social reintegration. At this time, few studies exist on restorative intervention methods and the impact of community engagement in criminal justice reform. To understand the effect of mental health rehabilitation programs in prison systems, research was extended to explore the quality of mental health treatment and identify factors influencing re-offense rates. This study uses a cross-case analysis to compare perceptions of care within the criminal justice system and recidivism data to present initiatives for prison reform and reentry support. Findings contribute to a holistic understanding of criminal offense by highlighting the complex role mental health plays in the legal system and broader aspects of society. Ultimately, addressing recidivism and rehabilitation efforts through intentional program development and evaluation strengthens community wellness, increases public safety, and improves local funding stability over time.

Mirsadey Coy

Discipline: Psychology

Authors:

#1 Lea Rudzena

#2 Amber LaCrosse

#3 Adam Prus

Benjamin Doriot

Abstract Name: Evaluating the Abuse Potential of Gabapentin in Combination with Buprenorphine Using Conditioned Place Preference in Female Mice

Medication-assisted therapy is common in opiate addiction treatment, often including suboxone, a combination of buprenorphine (BUP) and naltrexone (NAL). Recently, gabapentin (GBP) has been added to further reduce relapse risk. Though previously considered non-addictive, current studies suggest GBP may have abuse potential. Our lab has previously reported evidence to the rewarding effects of GBP in male mice using conditioned place preference (CPP). This study aims to replicate these findings in female mice to examine sex differences and the effects of additional doses. Treatment groups will include saline, GBP, BUP, NAL, and combination treatment groups will consist of BUP + NAL, GBP + BUP, and GBP + BUP + NAL. We will also assess subthreshold rewarding doses of BUP and GBP in combination with all other treatment variations. Mice will undergo standard CPP using a three-compartment apparatus. Drugs and saline are alternatively administered over eight consecutive days. We hypothesize that GBP and BUP, when administered alone and in combination, will induce CPP. We predict that NAL will attenuate the rewarding effects of GBP and BUP. Additionally, we hypothesize that proestrus and estrus phases of the estrous cycle will positively correlate with induced CPP, and the diestrus and metestrus will positively correlate with

attenuated CPP. These findings raise important concerns about the abuse potential of GBP and the effect of the female hormonal cycle on CPP. Results from these studies underscore the need for cautious clinical application and further investigation into GBP's non-opioid mechanisms of reward.

Nicole Craddock

Discipline: English and Literature

Authors:

#1 Nicole "Finch" Craddock

Abstract Name: The Magnus Archives: Cross Examination Between The Panopticon, Implied Author, Prosopopeia, and Metonymy

The processing of information, communication of concept, and modern story telling have come to depend largely on sight as a direct route of information sharing, arguably a more alluring approach to the horror genre. The Magnus Archives is a fictional horror narrative based in supernatural exploration through a framework of academic institutions. The importance is the medium the production company Rusty Quill chose to tell the story through, as The Magnus Archives is an audio-only podcast with a vivid soundscape. As a personal interest of mine, I have found ways to incorporate my studies through analysis of creative works, such as The Magnus Archives. This interdisciplinary overlap pertains largely toward Foucault's Panopticism and Booth's rhetorical theory of the implied author. The "found-footage" narrative lends heavy implication to the implied author, while the role of the protagonist within his academic institution implements a dynamic that beckons theories from Panopticism. The address of the audience within the narrative as implied listeners to the protagonists recorded tape statements suggests an intimacy, pulling the audience closer to the events within the plot. The main applicable rhetorical devices through which The Magnus Archives will be analyzed are Metonymy, synecdoche, and Prosopopeia. Synecdoche applies to the presence of watchers within the narrative as "The Eye", both the implied audience, the institution, and larger entities at work. The use of prosopopeia in the protagonist is in direct relation back to the figure of "The Eye". At the crux of these theories and devices, The Magnus Archives presents a unique focus on the relevant academic fields of this essay, but provides an enriching listening experience with a substantial foundation.

Sydney Craft

Discipline: Social Work and Human Services

Authors:

#1 Markus Whitehead

Abstract Name: Managing Negative Thoughts and Emotions in Times of Personal Stress and Crises Among Adult Black Women in Detroit, Michigan

This research was inspired by my own experiences growing up in a family where women were expected to stay strong and never show emotion. I often wondered if I was the only one struggling with heavy thoughts and overwhelming feelings. This project became a way to explore whether other Black women shared similar experiences and to create space for the stories that are rarely spoken aloud. It focuses on how adult Black women in Detroit cope with their thoughts and emotions during times of personal stress and crisis. The main question guiding this study is: How do Black women cope with emotional pain, and what helps them stay strong when life becomes overwhelming? Many studies show that Black women face high levels of stress due to financial challenges, caregiving responsibilities, social pressure, and the ongoing effects of racism. Yet

much of the existing research does not examine the deeper emotional side of their experiences. This project aims to fill that gap by using a storytelling and podcast-style approach that allows women to share openly, honestly, and in their own voices what they go through and how they heal. This study uses qualitative methods, including open-ended, conversation-style interviews. Participants describe how they manage stress, navigate negative thoughts, and cope with emotions such as fear, sadness, anger, and burnout. These conversations are recorded, transcribed, and analyzed to identify common themes related to resilience, faith, support systems, and emotional balance. Early findings show that many Black women rely on faith, close relationships, personal reflection, and intentional solitude to stay grounded. Participants also talk about the pressure to “be strong” even when they feel tired or unseen. Final results will highlight the importance of mental health equity, culturally responsive emotional support, and safe spaces where Black women can express their feelings without judgment.

Elisabeth Craig

Discipline: Art History

Authors:

#1 Maeve Doyle

Abstract Name: Depicting Multitudes: Juan de Pareja and Biracial Representation in Portraiture

For millennia, portraiture has been a vessel for expressing oneself without words. It's also a means for an artist to express their perception of their subject. Representations of ethnic minorities in art history are not unheard of, but in many Western narratives they're typically less flattering than their Caucasian counterparts and don't acknowledge people of multiple backgrounds. As a biracial woman, much of my research is dedicated to the legacies of biracial historical figures; I believe that Baroque painter Juan de Pareja exemplifies biracial representation succinctly. Pareja was born in 1606 in Seville, Spain, was a revolutionary painter of mixed African and Spanish descent. He spent the first 20 years of his life in captivity to baroque painter Diego Velasquez. After being freed, Pareja would lead his own life as a painter and depicted himself in his most famous painting, “The Calling of Saint Matthew.” Pareja's portrait differs greatly from Velasquez's, which toned down Pareja's appearance. This is frequent in depictions of biracial people, where their heritage would be visually erased by whitewashing or blackwashing their features. Using Velasquez's and Pareja's paintings as examples, I will explore portraiture of biracial figures and the general erasure of biracial people throughout history.

Abigail Craig

Discipline: Art History

Authors:

Abstract Name: The Preservation of the Past and Present in Contemporary Tibetan Artwork

Contemporary Tibetan artwork serves as a living archive, one that follows the traditions of the past, documents events of the present, and looks forward to the future. History inspires many contemporary Tibetan artists, as many include references to Tibet's harsh oppression from China in their artwork. Pop iconography often appears in juxtaposition with traditional themes, such as in the work of Gade's Mahākāla (2013), which depicts the god bursting through a pattern of Chinese soldiers, looking similar to a traditional thangka, or scroll painting. The soldiers stand on lotuses with haloes around their heads, and Mahākāla holds a sickle and little red book alongside various weapons, while wearing a gas mask. Shrek and Ronald

McDonald sprout from this protective gear, while Mahākāla wears a garland of Mickey Mouse heads. Western pop culture characters have long been used to mock Chinese political figures, such as comparing Mao Zedong to Mickey Mouse and Xi Jinping to Winnie the Pooh. This piece both documents the Chinese oppression of Tibet while referencing the repeated attempts at controlling Tibetan Buddhism. Similarly, Jhamsang's piece, *Mr. XXX* (2010), shows a passport alluding to the quiet erasure of Tibet through China's new name for the region into the name Xizang. Tibetan script and depictions of the Buddha run in the background, a grim reminder of a past that is being slowly and systematically washed away, while the rest of the passport is in Chinese and English. Through the interdisciplinary methods and study of art history, anthropology, and religion, this research aims to show how contemporary Tibetan artwork records the atrocities of the past and present while still holding onto traditions, and therefore becomes a form of historical documentation.

John Crain

Discipline: Engineering

Authors:

#1 John Crain

#2 Matthew Clontz

Abstract Name: Design and Implementation of Customized Instrumentation System to Measure Mountain Bike Trail Profiles

With rising mountain biking participation, both recreationally and professionally, precision development techniques are beginning to leverage trail topology analytics to enhance mechanical performance and rider-specific configurations. Mountain bike trail modeling and surface profiling remain underexplored areas in terrain analysis. To address this gap, a distance sensor-based system was developed which is capable of capturing detailed surface profiles using a dual-suspension mountain bike. The present approach utilizes two distance sensor arrays mounted on both the front and rear hubs, with three sensors per hub. Additionally, an inclinometer/gyroscope is included at each wheel hub to determine angular position/motion information at each location. Data from these sensors are collected and fed into an algorithm to calculate the vertical displacement of the front tire relative to the ground. To ensure durability and accuracy, custom mounting brackets were designed for both hubs. The front sensors are secured via a fabricated bracket connected to a rod extending from the bike's front axle, fixed to the rigid part of the fork. The rear bracket follows similar principles but is adapted to avoid interference with the brake rotor and gear system. This configuration protects the sensors from environmental and terrain-related damage while maintaining precise alignment. The collected data enables the creation of high-resolution surface models of mountain bike trails, which can be used for trail assessment, rider training, and performance optimization. This project presents a novel terrain profiling methodology utilizing a custom sensor array and integrated real-time data capture framework.

Robin Crane

Discipline: Biology

Authors:

#1 Robin Crane

#2 Shabab Md. Meheub

#3 Kirsten Pollok

#4 Linda Hanson

#5 Johanna Saldana

#6 Catalina Pislariu
#7 Camelia Maier

Abstract Name: Isolation and identification of fungal endophytes from *Euphorbia bicolor*

Endophytic fungi are organisms that inhabit plant tissues without being pathogenic. *Euphorbia* species are known to synthesize bioactive chemicals and have symbiotic relationships with endophytic fungi. We discovered the presence of endophytic fungi in *E. dentata* and *E. bicolor*, two native species not studied before. Our research goal is to identify the symbiotic endophytic fungi and determine the secondary metabolites they produce, since pharmacological studies are finding plant endophytic fungi as potential sources for bioactive metabolites. Isolation of the endophytic fungi from *E. bicolor* stem, leaf, and bract pieces was performed on V8 agar medium. The isolates were continuously cultured on the same medium until pure fungal cultures were obtained. Microscopic studies identified *Alternaria*, *Fusarium*, *Cladosporium*, *Phoma*, and *Nigrospora* as endophytic fungal species of *E. bicolor*. *Alternaria* has ovoid, pale brown, smooth walled conidia, with spores that have a clubbed tail. *Fusarium* presents filamentous and septate hyphae with a sickle shaped macroconidial spore. *Cladosporium* possesses olive-colored, branched conidiophores, with numerous branched conidia in chains. *Phoma* has unicellular, colorless spores with black, depressed pycnidia. *Nigrospora* showed short, clustered conidiophores, having single-celled, spheroid conidia. Genetic testing using ITS1 and ITS4 primers confirmed the species of fungal endophytes. Further research will focus on the identification of medicinal chemicals synthesized by fungal endophytes. These chemicals will be compared with secondary metabolites identified in the plant tissues, thus establishing the origin of the bioactive chemicals and get deeper insight into the symbiotic relationship between *Euphorbia* species and their endophytes. This study has both scientific and practical applications and could lead to the discovery of new pharmacologically active chemicals to treat pain and cancer.

Amelia Cranmer

Discipline: Environmental Science and Sustainability

Authors:

#1 Amelia Cranmer
#2 Hannah Miller
#3 Angela Allen
Hannah Miller

Abstract Name: Monitoring Water Quality Within the Walnut Creek Watershed in Southeast Raleigh, North Carolina

This study focuses on evaluating the impact of sewer infrastructure improvements, particularly those in downtown Raleigh, on the water quality of Little Rock Creek. Previous work in the training program examined water quality conditions before and during the infrastructure project. The current phase of the study aims to assess post-construction impacts and determine how water quality has changed since the project's completion. To achieve this, several water quality parameters, including dissolved oxygen (DO), specific conductivity (SPC), pH, nitrates and nitrites, and turbidity, were measured via YSI probes weekly. Additionally, biological parameters are performed once a month using Colilert for coliform and *E. coli* testing. This data will be compared across the three time periods: before, during, and after construction. The findings will provide insight into the current water quality status within the greater Walnut Creek Watershed and help evaluate the effectiveness of sewer infrastructure improvements in Southeast Raleigh. Ultimately, these results can inform future City of Raleigh initiatives related to sustainable sewer management and water quality protection.

Discipline: History

Authors:

Abstract Name: Reimagining the Renaissance: Analyzing Langston Hughes' poetry in the context of Florence Price's musical settings from the 1920s to the 1940s, in conjunction with the Chicago Black Renaissance

This paper explores pro-Civil Rights rhetoric spread during the Chicago Black Renaissance, particularly through Langston Hughes' poetry and Florence Price's settings of his poems. Moving between the critical analysis of Hughes' poetry and Price's compositions, this study shows how different interpretations of Hughes' poetic works could be utilized in spreading his anti-discriminatory message to larger audiences. Utilizing five different musical settings of five distinct poems, the research shows how Florence Price's music served as a unifying catalyst and call-to-action in Chicago from the 1920s to the 1940s. By examining the specific metaphors, personal responses, text painting, and intentional theoretical choices by Price, this paper explains how her music made Hughes' message more relatable to the middle-class Black community in order to set up a unified front as more specific political and social action was made for equality in the United States. This paper will contextualize how classical music aided movements such as the Chicago Black Renaissance and will build upon the limited research conducted regarding Florence Price's classical pieces with political and social undertones. The study ultimately argues for the consideration of Florence Price in the discussion of the Chicago Black Renaissance, as her works demonstrate how art can be reshaped through different interpretations in order to engage audiences of varying religious and socio-economic statuses in supporting a common cause for racial equality.

Savannah Crawford

Discipline: Environmental Science and Sustainability

Authors:

Abstract Name: Nomadic Herding as a Catalyst for the Expansion of The Great Green Wall

The Great Green Wall (GGW) initiative is an Africa lead project that aims to restore degraded landscape and enhance food security stretching across the Sahel region of Africa through a large-scale vegetation project. This project is projected to transform arid lands into fertile ecosystems that will be capable of sustaining both people and wildlife. Despite substantial progress, challenges remain ensuring the projects long-term sustainability and natural expansion. The traditional practice of nomadic herding may play an important role in this ambitious endeavor. This research explores how nomadic herding can serve as a catalyst for the expansion and sustainability of the GGW. The study compares the relationship between livestock mobility, seed germination rates and soil fertility, and how these factors reinforce vegetation growth. A mixed methods approach is being used to further explore this relationship. Satellite imagery is used to track vegetation changes along herding routes and monitor the greening trends among them. Case studies provide detailed insights into areas where herding practices have contributed to vegetation recovery. Community Engagement helps gather insights from herding communities regarding routes, seasonal movements, and traditional practices. Data will be analyzed using GIS mapping and qualitative analysis to identify patterns and relationships. Preliminary findings suggest that manure acts as both a fertilizer and protection for the young seedlings from the harsh environmental conditions. The movement of herds across the landscape unintentionally track seedlings and plant product to support wide-range growth. These patterns suggest that traditional herding routes could play a crucial role in the natural expansion of the GGW which will create both ecological and communal sustainability. Ultimately, this study envisions a future where indigenous practices and modern restoration efforts can coexist and thrive together.

Rebecca Cree

Discipline: Physics and Astronomy

Authors:

#1 Caitlin O'Dea

#2 Carl Faust

Abstract Name: Analyzing a Simple Mechanical Representation of ACL Injuries

The purpose of this project was to create an easily repeatable, mechanical representation of an ACL tear with soccer cleats. ACL tears are most common among female college soccer players and are often linked to the types of cleats worn. When determining which cleat style to purchase, athletes have to decide whether to prioritize performance or safety. Soccer cleats are designed to provide grip strength, but too much grip strength can result in an ACL tear. By simulating an external force in this mechanical model, this project investigated the primary causes of ACL tears to identify the cleat style and other parameters that best prevents these injuries.

Alexia Creeden

Discipline: Political Science

Authors:

Abstract Name: Gender-Responsive Asylum in France: An Analysis of OFPRA Reports Over the Last Decade (2014-2024)

The number of asylum-seekers is increasing in France. By 2024, female asylum-seekers made up 43.39% of total asylum-seekers, whereas in 2019, female asylum-seekers made up 32.55% of total asylum-seekers. Therefore, understanding the issues that female asylum-seekers face in France is increasingly important. Historically, asylum procedures in France have been gender-neutral or gender-blind, thus not taking into account gender-based discrimination in the asylum process. This study builds on existing literature about asylum in France, answering the question, "To what extent has the French government responded to trends among female asylum-seekers between 2014 and 2024?" Previous studies on the topic were either conducted before more recent refugee crises or did not focus on the information published in government reports. Therefore, through a gender analysis of 11 annual reports published by the French Office for the Protection of Refugees and Stateless Persons (OFPRA) between 2014 and 2024, I found that there are diverse trends among female asylum-seekers. Many women seek asylum due to gender-based violence in their home countries, and these female asylum-seekers have varied demographics. Additionally, through this analysis, I found that the French government has responded to these trends through changes to internal procedures and guidelines, as well as interactions with other government entities and nonprofits. However, there is still room for improvement in gender-responsive design and implementation in the French asylum process. Thus, I identified three policy recommendations focused on implementation, prioritization, and communication. Ultimately, this research has broad implications for not only improving gender-responsive asylum practices in France, but also implementing gender-responsive asylum practices worldwide.

McKenzie Creekmore

Discipline: Biology

Authors:

#1 McKenzie Creekmore

#2 Angela Wilson

Abstract Name: Factors Affecting Microbial Diversity in the Navel of Gen Z College Students: An Investigation of the Navel Microbiome in the Post-COVID Generation

The human skin microbiome plays a vital role in protecting against pathogens, supporting immunity, and maintaining overall skin health. The navel is a particularly informative site for assessing microbial diversity because of differing individual hygiene habits and its environmental exposure. Although several studies conducted before COVID-19 examine skin microbiota composition, little is known about how the microbiomes of the post-COVID Generation Z population may differ. This research aims to investigate the factors shaping microbial diversity within the navels of Gen Z college students. Participants (n=15) collected samples using a moist sterile swab inserted into their navels. De-identified samples were then struck on two blood agar plates: one incubated aerobically and the other anaerobically at 35 degrees Celsius. Swabs were also placed in cooked meat broth to screen for anaerobic bacteria. All plates were evaluated for growth after 48 hours. Abundance was assessed semi-quantitatively by examining colony distribution across the streak quadrants, recorded as rare, few, moderate, or many. Bacteria that could not be presumptively identified using morphology, hemolysis, bench-top biochemicals, and gram stains were identified using the Vitek 2 system. Cooked meat broth was subbed on day 14 to screen for slow-growing anaerobes. Participants also completed a correspondingly de-identified, IRB-approved survey that evaluated their navel shape and personal hygiene habits. Preliminary results demonstrated robust growth and microbial diversity however quantity varied widely among participants. Results will be analyzed alongside the corresponding survey data evaluating personal hygiene behaviors and individual characteristics of the navel.

Michael Crenshaw

FL - Florida International University

Discipline: Interdisciplinary

Authors:

#1 Rachel Benchluch

#2 Michael Crenshaw

#3 Dr. Lidu Yi

Abstract Name: Modernizing Technologies of Cultural Conservation for Tangible Heritage

Cultural heritage is best defined as the tangible and intangible heritage assets of a certain society which are inherited from previous generations. Where tangible heritage defines the scope of physical cultural property (ex. statues, clothing, paintings), intangible heritage defines nonmaterial heritage (ex. oral history, dance, song). The growth of heritage conservation as a field has led to a number of sustainability concerns, exacerbated by factors such as climate disasters, cultural tourism, vandalism and looting, leaving tangible heritage vulnerable to severe physical deterioration. Large gaps in conservation technology are only recently being addressed and innovated - from outdated digitization processes and inadequate copyright security, to labor-intensive inefficient strategies. Addressing technological limitations demands the development of advanced tools and restructuring how they are applied in order to effectively protect tangible heritage. Focusing specifically on tangible heritage is purposeful; the importance of physical cultural history has been lost on us in the modern digital age. Through a comparative case study analysis of the conservation flaws found in the tangible heritage fields of manuscripts and textiles, an alternative methodology based on an

interdisciplinary approach and advanced digital tools will address existing gaps in conservation efforts which suffer from gaps in innovation. This research's goal is twofold: First, it shines light on the shortcomings of current conservation technologies. Second, it offers an applicable innovative alternative for preservation of tangible heritage.

Lena Cressman

Discipline: Physics and Astronomy

Authors:

#1 Lena Cressman

#2 Aiden Ebner

#3 Adriana Banu

#4 Tilda Pendleton

Abstract Name: Photoactivation analysis studies at the Madison Accelerator Laboratory to investigate the copper origin of artifacts excavated in the vicinity of the "lost" Roanoke colony

In this presentation we will be discussing our summer research project related to the irradiation at MAL of copper artifacts from James River Institute for Archaeology. The goal of this investigation was driven by a key question about the provenance of the copper, that is, whether it was of European or Native Indian origin. Out of the 8 artifacts that we investigated, a band excavated from the Elizabeth Gardens, a site located within Fort Raleigh National Historic Site, was of particular interest to the team of archaeologists from James River Institute. Based on their previous work, there were qualitative differences in the chemical compositions of European and Native copper artifacts. For example, some elements like Zinc or Tin were present only in the composition of European copper. Qualitative Photoactivation Analysis (PAA) was applied to determine the chemical composition of the irradiated artifacts by the MAL's linac. The γ -rays following the β -decays of these activated artifacts via (γ, n) or (n, γ) reactions were subsequently detected with a 45% relative efficiency High Purity Germanium detector. The γ -ray emission energy peaks were recorded by the Genie 2000 data acquisition software and analyzed with a dedicated γ -ray spectroscopy data analysis tool. Our findings regarding the copper origin of the Elizabethan Garden band, based on qualitative PAA only, may be significant. The site where the band was found contains only Native American artifacts and therefore a European origin would be evidence of contact between Raleigh's colonists and the Roanoke Indians.

Elise Cridland

Discipline: Nursing and Public Health

Authors:

Abstract Name: Surrogate Endpoints in Oncology: Reassessing PFS, Patient-Centered Outcomes, and Policy Implications

Oncology research is making a dangerous shift away from patient-centered care. Blinded by shortened trials and sped up drug approvals, surrogate endpoints have greatly overcome the use of overall survival and quality of life as the primary goals of oncology drug trials, A figure decreasing from 49% to 36% by 2004. My study examines how reliance on surrogate endpoints, like PFS, reflects a growing ignorance of patient wellbeing at the center of treatment, ultimately putting patients at risk for far too modest strides in the field. This analysis uses case review and policy evaluation to compare surrogate-based approvals with outcomes in confirmatory trials, utilizing Avastin's trial timeline to highlight modern regulatory gaps that have caused

direct harm. I compare existing FDA guidelines and international standards (ex., IQWiG) are compared to assess surrogate validation strength, transparency, and consistency. Through research in current policy, trial design, and consent documents, this study exposes structural weaknesses and areas for reform. Regulatory language and the widely accepted “gold standard” of PFS have proven to allow poorly made drugs with limited effect on mortality and quality of life to flood the market, adding incentive to insufficient patient care. Alongside this, misinformation surrounding the correlation of overall survival and surrogates has created a gash in fully informed consent in clinical trial participation and drug use. The current use of surrogate endpoints requires a significant overhaul of regulations, function, and application to refocus cancer drug development on patient well-being, mortality reduction, and quality of life. My study aims to break down how the overuse of surrogate endpoints in cancer research harms patients, alongside suggestions for reform, in the hope that cancer patients will better understand the ethical and practical concerns surrounding prescribed drugs and clinical trial involvement.

Kaitlyn Criswell

Discipline: Health and Human Development

Authors:

Abstract Name: “Doomscrolling” on Instagram and Tik Tok: Positive Intermittent Reinforcement May Lead to Higher Risk of Developing Cross-addiction of Alcohol, Nicotine, and Marijuana in Adolescent American Females aged 12-15

The social connectivity that video-sharing social media platforms provide has allowed many benefits, such as increased access to information, enhanced communication, and community building. Unfortunately, this same social connectivity has given rise to the social media addiction phenomenon, “doomscrolling,” a consequence unconsidered by early developers. The “doomscrolling” phenomenon’s potential association with increased depressive symptoms, PTSD, anxiety, and addictive qualities, such as positive intermittent reinforcement and personalized feeds, may alter neurological pathways, including Resting State Functional Connectivity, the Fronto-Striatal Circuit, and the Amygdala. Altered reward-circuit pathways have been known to make the mind more vulnerable to cross-addiction, increasing susceptibility to alcohol, marijuana, and nicotine abuse. This susceptibility may be intensified by similarities in the neurological alterations resulting from behavioral addictions and chemical addictions present in social media addiction and substance abuse. Cross-addiction from problematic social media usage may be a factor in the increasing substance usage and addiction rates among American adolescents since 2016, with current adolescents having the highest rates of marijuana usage compared to previous generations. The adolescent female American population is especially vulnerable, stemming from heightened Instagram usage compared to their male counterparts. The potential neurological alteration caused by “doomscrolling” and the increased depressive symptoms, PTSD, and anxiety associated with “doomscrolling” may heighten substance usage and addiction within female American adolescents.

Jaide Crittenden

Discipline: Health and Human Development

Authors:

Abstract Name: Shifts in Menstrual Hormones and Their Impact on Joint Enzymes in College Athletes

Despite the growing participation of women in sports, research shows that female athletes are at a

significantly higher risk of injuries, such as anterior cruciate ligament (ACL) tears, compared to their male counterparts. However, studies addressing the origins of these complications remain limited, leaving female athletes at a disadvantage in how to prevent and treat injuries effectively. Relaxin-2 impacts cartilage and tendon function by enhancing collagenase activity directed at Type I and Type III collagen through Matrix Metalloproteinases (MMPs) involved in extracellular matrix degradation. It is presumed that Relaxin-2 similarly modulates Lysyl Oxidase (LOX) enzymes through similar receptor-mediated pathways. The purpose of this research is to see how Relaxin-2 and estrogen influence Matrix Metalloproteinase (MMP) and Lysyl Oxidase (LOX) enzyme production throughout the menstrual cycle, contributing to our understanding of tissue remodeling in women's reproductive health. Using repeated plasma and serum sampling from sixteen female athletes, Relaxin-2 and estrogen levels were correlated with MMP1, MMP2, and LOX1 enzyme concentrations. Prior to analysis, all samples were maintained at -20°C. It is anticipated that Relaxin-2 acts synergistically with estrogen to elevate MMP expression and suppress LOX activity during the luteal phase. Data collection is currently underway in the form of various ELISA tests to determine enzyme concentrations. Statistical analysis of the data obtained from the Relaxin-2 ELISA, Human MMP Panel 2 ELISA, Human MMP3 ELISA, and Human LOX-1 ELISA will be performed using one-way analysis of variance (ANOVA). It is expected, based on prior research on hormone expression in female athletes and joint laxity, that Relaxin-2 will act synergistically with estrogen to elevate MMP expression and suppress LOX activity during the luteal phase.

Katy Croft

Discipline: Economics

Authors:

Abstract Name: Rain in the (Education) Desert: The Importance of Community Colleges in Rural Areas

This study examines areas that qualify, or have qualified, as “education deserts” -- areas with no more than one public broad-access postsecondary institution -- and measures how new access to higher education affects long-term outcomes. In this research, I focus on areas in Oklahoma that due to the openings of community college campuses no longer qualify as education deserts and assess how employment and earnings have changed for both men and women. A quasi-experimental differences-in-differences regression analysis model is used to measure the change in economic stability according to census data from before and after the openings of campuses using areas that have not had new community college campuses as a control group. Additionally, I take an ethnographic focus using surveys and interviews of graduates surrounding the opening of the Northern Oklahoma College campus in Enid, with specific attention to educational outcomes of graduates from Medford High School and Tonkawa High School.

Megan Cronje

Discipline: Biology

Authors:

#1 Andrew McIntosh

#2 Megan Cronje

Abstract Name: Locomotor Ecology Shapes Pelvic Evolution in Rodents

Rodents are the most evolutionarily and ecologically successful mammalian clades, with over 2,200 extant species distributed across all continents except Antarctica. This study investigates the influence of locomotor

ecology on pelvic morphology across 44 phylogenetically diverse rodent species. Whole-body micro-CT scans were used to segment the pelvis, which was analyzed using 3D geometric morphometrics. Landmark data were processed through generalized Procrustes analysis to quantify shape variation. A phylogenetically generalized least squares (PGLS) analysis revealed that locomotor mode, categorized as arboreal, terrestrial, fossorial, semifossorial, and ricochet, is a significant predictor of pelvic shape. In contrast, a test for phylogenetic signal indicated no significant effect of phylogeny on pelvic morphology. Our findings suggest that rodents exhibit a high degree of morphological plasticity in the pelvis in response to ecological demands. This evolutionary lability may help explain the group's remarkable adaptability and diversification across habitats, contributing to their global success.

Mariah Cropp

Discipline: Nursing and Public Health

Authors:

#1 Mariah Cropp

Abstract Name: Using the Oral Health Impact Profile-5 (OHIP-5) to examine oral health-related quality of life in a sample of Latin* adults

Oral health is a multidimensional construct that impacts overall health. Understanding how patients perceive their oral health is essential to designing effective interventions to promote positive outcomes for overall well-being. Oral health related quality of life (OHRQoL) provides a framework for evaluating individuals' perceptions of their oral health using validated instruments such as the Oral Health Impact Profile-5 (OHIP-5). Although the OHIP-5 has been applied across diverse populations, its use among Latin* adults remains limited, despite this group experiencing disproportionately high rates of periodontal disease compared with other populations. To address this gap, the present study examined OHRQoL among Latin* adults. Participants (N = 189) were recruited from an academic dental center in the Greater Richmond area and completed a phone survey on sociodemographic characteristics and oral health. OHRQoL was assessed using the Oral Health Impact Profile-5 (OHIP-5), which includes five questions rated on a Likert scale (never, hardly ever, occasionally, fairly often, and very often). OHIP-5 item and summary scores were analyzed using Chi-squared tests of independence to compare both overall and domain-specific categories: oral function, orofacial pain, orofacial appearance, and psychosocial impact. Means and standard deviations were also calculated. Additionally, OHIP-5 total and domain-level scores were compared across sociodemographic variables (age, sex, marital status), socioeconomic factors (educational attainment, household income), and health-related variables (insurance status). The total average OHIP-5 score among participants was 4.01 (SD = 3.7). The highest subdomain scores were observed for orofacial appearance (mean = 1.34, SD = 1.42) and oral function (mean = 1.35, SD = 1.68). Findings highlight the importance of implementing culturally and linguistically tailored strategies to improve the oral health-related quality of life of Latin* adults, with particular emphasis on oral aesthetics and function.

Lena Csaszi

Discipline: Psychology

Authors:

#1 Lena Csaszi

#2 Sofia Salinas

#3 Sophie Blair

#4 Yanbin Li

Abstract Name: Parenting Aspirations among Young Adults of Diverse Sexual Identities and Racial/Ethnic Identities

Our study investigated the parenting aspirations among heterosexual and sexual minority young adults of diverse racial/ethnic identities. We recruited 1024 participants who were 18-35 years old in the United States (549 identified as heterosexual, Mean age = 28.00 years old, and 461 as members of sexual minority groups, Mean age = 27.38; 507 identified as female, Mean age = 27.20, and 503 as male, Mean age = 28.23; 540 identified as non-Hispanic white, Mean age = 27.98, and 470 as Hispanic or other groups of people of color, Mean age = 27.41). Participants completed a questionnaire survey via Qualtrics. Results of the ANCOVA analyses showed that parenting desire, with sexual orientation, race/ethnicity, and gender as the independent variables, demonstrated that participants' desires for becoming parents differed as a function of their sexual orientation ($F(1, 862) = 26.93, p < .001, \eta^2 = .030$) and the interaction of sexual orientation and gender ($F(1, 862) = 4.03, p = .045, \eta^2 = .005$). Overall, heterosexual participants expressed stronger parenting desires compared to their sexual minority peers. Female and male heterosexual participants reported similar levels of parenting desires. Although there was no significant effect of race/ethnicity, sexual minority non-Hispanic white male participants reported the lowest level of parenting desires compared to participants of other groups. Regarding parenting intentions, the ANCOVA analysis showed that intentions for becoming parents differed as a function of sexual orientation ($F(1, 861) = 33.77, p < .001, \eta^2 = .038$). Heterosexual participants expressed stronger parenting intentions than their sexual minority peers. Our study highlights the role of sexual orientation in how young adults envision their future parenthood and calls for the public and policymakers' attention in supporting sexual minority young adults in achieving their life goals in family formations.

Ashley Cua

Discipline: Engineering

Authors:

#1 Mari Domingo

#2 Lily Buchanan

Abstract Name: Changes in Uniaxial Contractility of the Murine Cervix with Age

Due to various societal and socioeconomic factors, women are having children later in life. Advanced maternal age increases the risk of birth complications such as preterm birth (PTB). Reported PTB rates are the lowest for women aged 30-34 years old, with an increase for women aged 40 and older. While the exact mechanisms of PTB are not understood, improper cervical function may contribute, as the cervix aids in keeping the fetus inside the uterus during development. These functions are influenced by both the cervix's contractile and extracellular matrix properties. Understanding remodeling with age in the nonpregnant cervix may give insight into age's effect on these properties, which may then correlate with risk of adverse outcomes. Past research in the murine vagina has shown that stiffness increases with age while contractility decreases. However, the murine cervix's stiffness decreases with age, and changes in contractility are unknown. Therefore, this study aims to quantify contractile behavior with age in the nonpregnant murine cervix by utilizing an organ bath with potassium chloride (KCl) as an agonist. We hypothesize that contractility will decrease with age. Testing with 50mM KCl resulted in an average maximum contractile force of 550.96 ± 383.50 mN/g ($n=8$) for mice 1-3 months of age, 991.92 ± 433.09 mN/g ($n=8$) for 4-6 months, 759.99 ± 478.00 mN/g ($n=8$) for 7-9 months, and 363.27 ± 146.72 mN/g ($n=8$) for 11-14 months, and 517.36 ± 231.36 mN/g ($n=8$) for 16 month or older mice. Maximum cervical contractility decreased with age ($p < 0.0001$). This decreased contractility of the cervix may indicate impaired or reduced cervical function

for older mothers, which may contribute to the observed increased PTB risk. Understanding the changes in baseline cervical behavior with age will inform future studies on PTB etiology and prevention.

Orestes Cubas

FL - Miami Dade College

Discipline:

Authors:

Abstract Name: Mentorship in Action: Guiding Students in Developing Low-Cost Technologies for Wildlife Research and Environmental Sensing

This mentor-led initiative highlights how hands-on guidance enables undergraduate students to engage with authentic environmental challenges through the development and refinement of low-cost technology tools. The work is grounded in real community needs, including rising pollution levels around the Miami Dade College Wolfson Campus, as well as ecological concerns presented by faculty collaborators (i.e., biology) whose observations of predation affecting endangered butterfly species helped shape the direction of this research. Through these experiences, students engage in applied STEM investigation using Raspberry Pi-based systems that support both wildlife observation and environmental sensing. Students often require structured support to connect foundational STEM concepts to real-world applications, particularly in fields such as physics where theory can feel abstract without practical context. Through guided experience, students learn to apply scientific reasoning, programming skills, engineering judgment, and analytical thinking to tangible environmental questions. Applying fundamental principles through low-cost, accessible technologies gives them a strong foundation for designing more complex systems and prepares them for future STEM workforce challenges. Together, these experiences demonstrate how guided research opportunities enable students to transform classroom knowledge into practical contributions, strengthening their scientific identity and deepening their engagement with real-world environmental challenges.

Jasmine Cuellar

Discipline: Environmental Science and Sustainability

Authors:

#1 Jasmine Cuellar

#2 Pete Peterson

#3 Lesley Bulluck

Abstract Name: Influence of Nest Box Characteristics on Box Temperature and Prothonotary Warbler (*Protonotaria citrea*) Nestling Fitness

Man-made nest boxes are commonly used by researchers to study cavity-nesting birds with the benefit of offsetting natural cavity losses due to habitat destruction. However, few studies address how nest box construction and placement may impact internal box temperatures and consequently nestling fitness. This study investigated the relationships between box characteristics, temperature, and nestling growth rate within an existing Prothonotary Warbler (*Protonotaria citrea*) nest box system located at Deep Bottom Park along the lower James River in Henrico, Virginia. During the 2025 breeding season, nest box characteristics (e.g. size, entrance diameter, % canopy cover) were collected and hourly temperature loggers were deployed at 44 of the 65 nest boxes to capture internal box temperatures. We also deployed two loggers in nearby vegetation to capture ambient environmental temperature. Nestling mass was recorded twice throughout the developmental

period to determine growth rate. We found a significant negative relationship between canopy cover and box temperature. We also found a significant negative relationship between nestling growth rate and both minimum and average box temperature during the early breeding season, with nestlings growing faster in cooler conditions. These results demonstrate that box placement influences internal box temperature which has an effect on nestling growth rate and therefore should be considered when deploying nest boxes. We plan to assess if nestling growth is associated with nestling condition and the mechanisms that may link cooler temperatures with faster growth rates.

Victoria Gabriella Cuellar

Discipline: English and Literature

Authors:

#1 Emily Sendin

Abstract Name: Polarized Persuasion: Socioeconomic Divides and the Mechanics of Propaganda from Chávez to Putin

Propaganda often functions as a catalyst and driving force behind the rise of authoritarian regimes. Venezuela's late president, Hugo R. Chávez, made himself a brand associated with underserved communities through his policies and speeches. One of his main tactics was polarization, dividing politics between *el pueblo* versus *los oligarcas*. Similarly, Vladimir Putin has applied such tools in his presidency, demonizing any opposition to the Russia-Ukraine war. This documentary implements a literature review on the limits of polarizing propaganda and how it is influenced by class division, exploring whether citizens can recognize or resist messages that conflict with their reality. The film also uses a comparative approach, analyzing both dystopian literature and interviews with Venezuelan and Ukrainian citizens, to examine propaganda tactics under Chávez and Putin. Socioeconomic status influences responses to propaganda, and those with lived experiences that contradict political messaging will demonstrate greater resistance. Understanding the effects of propaganda is imperative for democracy; this film will equip societies with the tools to defend themselves against new manipulation and division and lay the foundation for new policymakers to promote public accountability.

Mikkel Cullen

Discipline: Music

Authors:

#1 Mikkel Cullen

#2 Jeffery Yunek

Abstract Name: The Reversed Recapitulation of Schubert's Piano Sonata in A minor, D.845

Franz Schubert's Piano Sonata in A minor, D. 845, is an interesting piece that deviates from the expectations of classical sonata form. This sonata is the first of a set of three composed during a brighter period of Schubert's life. It bears the title of *Premiere Grand Sonata* and showcases the development of Schubert's mature style for piano sonatas. It was composed in May of 1825, and the other sonatas of its set are *Piano Sonata in D major, Gasteiner*, and *Piano Sonata in G major, Fantasie*. As Schubert's music is a considerable part of Western repertoire, and has been for centuries, examining the form of his work offers opportunities for novel interpretation. The first movement of this particular work was analyzed with Hepokoski and Darcy sonata theory as well as theorized variations of those forms. Key areas and cadences were found in order to

assist in assigning formal names to sections of the music. These sections were compared to typical sonata form based off of their place in the work and key centers. Much of this work follows the expectations for the genre; however, there are deviations, most notably in the recapitulation. There is a delayed statement of the primary theme in tonic after the secondary theme. This is unexpected as the primary theme typically resolves at the beginning of the recapitulation and does not come back later on for its final resolution. This unusual reversal can be analyzed as a reversed recapitulation and further suggests ambiguity as a central theme of this piece.

Paris Cumba

Discipline: Psychology

Authors:
#1 Paris Cumba

Abstract Name: The Adjustment of Autistic First-Generation Students to Higher Education

First-generation students and students on the autism spectrum each have a unique set of challenges as they navigate higher education, but little research has explored how these identities intersect. Seeing the rise in autism diagnoses in recent years and given the large population of first-generation students in college, it is important to understand how these students adjust to higher education and the additional barriers they may face through the lens of intersectionality. The purpose of this study is to examine the adjustment and sense of belonging of autistic first-generation college students compared to autistic continuing-generation students, neurotypical first-generation students, and neurotypical continuing-generation students. To address this research question, a sample of undergraduate students will be recruited to complete an anonymous virtual survey assessing multiple dimensions of college adjustment and sense of belonging, including self-efficacy and academic motivation. It is hypothesized that autistic first-generation students will report lower levels of adjustment and higher levels of autistic masking than their peers. Findings aim to highlight the experiences of this underrepresented population, identify unmet needs, and inform future efforts to create a more supportive and accessible college environment.

Jalyn Cummings

Discipline: Education

Authors:

Abstract Name: Creating A Sense of Belonging for Black Students in the High School Classroom

High school is an important time for all students because it is the point where they are moving through adolescence and looking for a space to belong. For Black students in a high school classroom, feeling a sense of belonging is especially important. However, during my time in school I noticed that many classrooms struggled to create environments where Black students felt both seen and heard. This research aims to explore what makes Black students feel a sense of belonging in the classroom. This research also aims to explore relational factors that contribute to creating a sense of belonging for Black high school students. The research design is qualitative. Data will be collected through structured interviews and observations, in order to get a firsthand understanding of what students believe belonging looks and feels like in the classroom. The goal of this study is two-pronged. First, I aim to discover what makes Black students feel a sense of belonging in the classroom. Second, to share that data with teachers in order to strengthen their level of sociocultural knowledge toward supporting Black students in the classroom. The implications of centering this research

around the experiences of Black students could encourage culturally inclusive environments and intentional relationship building that support academic and socioemotional success.

Sophie Cunningham

Discipline: Biology

Authors:

#1 Ryan Tuckey

#2 Vamsi Singu

Abstract Name: ApoE4-R251G Corrects Dynamical and Conformational Features of ApoE4

APOE-ε4 is the most studied risk factor associated with development of late onset Alzheimer's disease (AD). R251G, a rare APOE variant, was discovered to neutralize the risk associated with apoE4 and potentially even decrease overall risk of developing AD. Examining how the R251G substitution protects against AD would also provide insight into the key pathogenic features of apoE4 and possibly reveal novel therapeutic strategies to mitigate the risk associated with apoE4. ApoE is synthesized as nonlipidated monomers but is largely lipidated in vivo, which induces distinct structural changes. Therefore, to understand the effects of R251G on apoE4, it is important to evaluate both nonlipidated and lipidated states. We used molecular dynamics (MD) simulations to determine how apoE4-R251G alters apoE4 by comparing closed/open non-lipidated and lipidated apoE structures. The starting closed nonlipidated apoE structure (PDBID: 2L7B), was run through a coarse-grain molecular dynamics simulation in the presence of dipalmitoylphosphatidylcholine (DPPC) lipids by Prakashchand et al. (PMID: 33979165), to generate a starting structure for lipidated apoE. The open nonlipidated apoE structure derived from Stuchell-Brereton et al. (PMID: 36749730). Using the equilibrated trajectories, we generated four representative structures for each apoE3 rep which were then used to generate four structures each for apoE2 and apoE4. The representative apoE4 structures were then converted to apoE4-R251G to run the final simulations. Subsequent analysis was performed on the equilibrated trajectories of four simulations for each apoE isoform. Analysis included examining changes in apoE structure, conformation, dynamics, and molecular interactions. ApoE4-R251G appeared distinct from apoE4 in secondary structure, conformational stability, and dynamics in both the nonlipidated and lipidated simulations. Structural analysis of apoE4-R251G provides insight into unique and shared characteristics with apoE4 and highlights potentially targetable regions for future therapeutics. This work was supported by the NIH R01AG068395 and Alzheimer's Drug Discovery Foundation.

Eleanor Curatolo

Discipline: English and Literature

Authors:

Abstract Name: The Spectral and Sherlock Holmes: How Spiritualism Influenced Sir Arthur Conan Doyle's "The Adventure of the Sussex Vampire"

Authors write in the context of spiritual movements that occur during their lives. My overall project shows how the fluctuating beliefs of Sir Arthur Conan Doyle affected the short stories he wrote. In his autobiography *Memoirs and Adventures*, a timeline of his morphing faith is apparent. Though born Roman Catholic, he proceeded to dabble in Unitarianism, materialism, and Theosophy before devoting his life to Spiritualism. Doyle's religious and philosophical development paralleled his short story output. By reading these short stories through the lenses of biographical, psychoanalytic, and cultural criticism, religion's impact

on the author and his works becomes apparent. My proposed presentation focuses on a story from later in Doyle's life. In 1886, Doyle was first attracted to Spiritualism. By 1894, he had dedicated himself to the religion, and soon became a leading figure in it. In early 1924, *The Strand* and Hearst's *International* magazines published his short story "The Adventure of the Sussex Vampire," which contrasts Spiritualism and Psychology. In this story, Sherlock Holmes and Dr. Watson investigate an injury to Robert Ferguson's infant son. Ferguson has Spiritualist tendencies and therefore assumes a supernatural cause: he claims his wife is a vampire who has harmed her own baby. However, Holmes is skeptical of the supernatural, and seeks an alternative explanation. He discovers that her violent behavior is psychological in nature. Holmes concludes that Ferguson's wife's allegedly vampiric behavior is actually motivated by her obsessive love of her family. This story and others during this period reflect Doyle's deep, and even somewhat obsessive, commitment to Spiritualism.

Kathryn Curran

Discipline: Biochemistry

Authors:

#1 Anne Brown

#2 Anastazja Kiselka

Abstract Name: Evaluation of binding and intermolecular forces of Chloramphenicol across *S. aureus*, *D. radiodurans*, and *L. monocytogenes* Ribosomal Peptidyl Transferase Centers

Antimicrobial resistance is a growing concern as antibiotics become less effective in treating infectious diseases, posing a potential global health crisis. To address this growing concern, a comparative study of the peptidyl transferase center (PTC) of three different gram-positive bacterial ribosomes, *Staphylococcus aureus*, *Listeria monocytogenes*, and *Deinococcus radiodurans*, was performed using computational methodologies. This analysis focused on how the broad-spectrum antibiotic chloramphenicol interacted within the PTC, using molecular docking to characterize the types of intermolecular interactions formed and to determine whether interactions bind to similar nucleotides across all three ribosomes, which may influence antibiotic efficacy. As chloramphenicol inhibits bacterial protein synthesis through A-site binding in the 50S ribosomal subunit, this is well-documented in *D. Radiodurans*, but not in *L. monocytogenes* and *S. aureus*, as visualizing the interaction between the A-site and chloramphenicol could display antibiotic efficacy. After molecular docking, a fingerprint analysis was performed, which revealed a consistent nucleotide interaction between chloramphenicol and nucleotides U-2483 through U-2485, highlighting conservation in the PTC of the studied species. Nucleotide U-2485 demonstrated hydrogen bonding with chloramphenicol throughout all three ribosomes, which displays the validity of the chloramphenicol binding pocket. This highlights U-2485 as an essential residue that aids in the binding of chloramphenicol. A CavitOmiX analysis was performed and showed an overlay of the three individual ribosomes displaying highly conserved structural alignment. Therefore, conservation of the chloramphenicol binding pocket in the PTC across the three ribosomes, along with detailed characterization of residue-level interactions, provides a structural basis for the rational design of next-generation antibiotics targeting Gram-positive pathogens.

Alexandria Currier

GA - Kennesaw State University

Discipline: History

Authors:

Abstract Name: Cataclysm within the Court: The Bosnian Genocide Case and its Implications on Historical Understanding of Calamity

The Bosnian Genocide remains one of the most challenging cases within the history of modern conflict and calamity. As the first occurrence in which the International Court of Justice applied the Convention on the Prevention and Punishment of the Crime of Genocide to a state, the International Court of Justice's legal proceedings on the Bosnian Genocide set a new standard for the obligations of the international community to act in the occurrence of genocide. This research aims to clarify the nature of the 1992-1995 conflict between the nations of Serbia-Montenegro and Bosnia-Herzegovina using primary source documentation, modern commentary, and the codification of genocide prevention under the United Nations arbitration between Bosnia and Serbia. It also serves to identify how the understanding of the Bosnian Genocide has changed over time within both the legal discipline and the historicization of violence as a whole.

Alexandria Currier

GA - Kennesaw State University

Discipline: History

Authors:

Abstract Name: The Death of Isolationism: U.S. Foreign Policy and Afghanistan

The September 11th attacks ignited a new era of American foreign policy—the Global War on Terror. As the United States sought out punishment for those responsible, it facilitated the creation of a new narrative in which the U.S. played a more centralized role within the deterrence of globalized terrorism. Academic literature published after 9/11 has maintained that the United States became aware of threats from Afghanistan as a result of the 1998 Kenyan and Tanzanian embassy bombings; however, this study argues that the United States government was aware of terrorism from the nation of Afghanistan earlier than 1998 and ignored it in a larger effort to absolve the U.S. from participation in international affairs. While this study does not explain the events of modern political discourse between Afghanistan and the United States, it serves to analyze the pre-existing history between the two nations up to and including 2011 and contribute to existing scholarship about U.S.-Afghan relations.

Isaiah Curry

Discipline: Chemistry

Authors:

#1 Shanlin Pan

Abstract Name: Understanding Advanced Lab Methods in Polymer Chemistry

Anion exchange membranes (AEMs) are a part of fuel cells and other electrochemical devices. Anion exchange membranes (AEMs) move hydroxide ions that are needed for energy reactions. The long term performance of Anion exchange membranes (AEMs) depends on whether the chemical structure of Anion exchange membranes (AEMs) stays stable in alkaline environments. During my internship I tried lab methods to test Anion exchange membranes (AEMs) materials. I also got hands on experience, with the techniques that polymer chemistry researchers use. I was curious, about how ion exchange capacity (IEC) works. I learned how to measure ion exchange capacity (IEC). When I measured (IEC) with titration I could see directly how many active sites were present and how that number affected the membrane ability to transport

ions. I used H NMR spectroscopy to examine the chemical structure of the AEM samples. I examined the AEM samples before the alkaline exposure and, after the alkaline exposure. I watched the hydrogen peaks. The appearance of hydrogen peaks or the disappearance of hydrogen peaks gave clues, about the polymer backbone. The polymer backbone broke down when the hydrogen peaks disappeared. The stable spectra stayed the same. The stable spectra indicated that the material stayed whole. I also did conductivity testing to see how well hydroxide ions move through the membrane. Changes, in conductivity showed breakdown or bad membrane shape. The measurements and the conductivity testing gave a picture of how the membrane works under operating conditions. I learned to read chemical data to use instruments and to solve problems, in the lab. The experience showed me how polymer chemistry can help improve energy technologies. By linking chemical ideas to real world uses the project provided an understanding of how advanced materials are tested, refined and used to support cleaner and more efficient energy systems.

Jose D Auria Altuve

Discipline: Biology

Authors:

#1 Joseph Goode

Abstract Name: PERK/FGFR4 Dual Inhibition with AMG PERK 44 and BLU-554 in proliferation and survival of colorectal cancer

Cancer is one of the leading causes of death across the world. Although recent advances in medicine have allowed for novel and effective treatments to develop, there are still many cases in which these novel therapies are not effective. FGFR4 upregulation has been linked to drug resistance, along with the survival and proliferation of cancer cells. PERK has also been linked as one of the proteins that helps cancer survive different therapies by managing cellular stress. The link between these two proteins and potential novel therapies that target FGFR4/PERK resistance pathways that fight against chemotherapeutic treatment are still unknown. We plan to evaluate the potential of a dual inhibitor therapy that uses AMG PERK 44 to target PERK and BLU-554 to target FGFR4 in colorectal cancer cells. A cell viability assay and a scratch assay will determine the effects on cancer survival and proliferation. We also aim through Western blotting to evaluate the signaling pathways affected by this dual therapy. This will provide a reflection of what is going on inside the cell upon dual inhibition. Altogether, we expect to find effectiveness with this dual inhibition treatment to target cancers that upregulate FGFR4 and PERK for drug resistance to other therapies.

Iyanu Dabiri

Discipline: Computer Science

Authors:

Abstract Name: Pushing Artificial Intelligence (AI) to Its Limits: Developing Red Teaming and Adversarial Prompting Methods

Background: Red teaming is a structured attempt to test generative artificial intelligence (genAI) models to uncover weaknesses, pushing models beyond their expected behaviors. Adversarial prompting, a specific red teaming technique, is defined as inputting prompts to expose vulnerabilities in genAI, leading to unexpected or misinformative outputs. Together, these techniques help identify and differentiate AI-generated content from human-generated content. Purpose: The goal was to develop and evaluate successful red teaming adversarial prompting methods with multimodal genAI using single-request prompt engineering techniques to

assess their consistency and effectiveness. Methods: Seven genAI models (ChatGPT, Grok, Gemini, DeepSeek, Copilot, Llama, Claude) were evaluated using diverse linguistic, unicode and special characters, programmatic simulations, visual recognition tasks, and multimodal prompts, to discover unexpected outputs when exposed to adversarial conditions. Successful methods were compared across all models using identical prompting techniques to assess cross-model consistency, with reassessment utilizing most up-to-date genAI models nine months later. Results: Red teaming adversarial prompts produced consistent patterns across models including incorrect translations, non-sustained repetitions, unreliable interpretation of visuals, error-terminated outputs, issues counting, and unreliable performance with compound single-step prompts, though not all models failed in every approach. However, all seven models (100%) consistently failed Ishihara color vision tests (Pass/Fail) and incorrectly interpreted images when modified, reformatted, or hand-drawn. All models (100%) correctly interpreted factual requests within compound single-step prompts and saw improved repetition-based output consistency up to each model's repetition tolerance limits. Conclusions: Red teaming adversarial prompt performance was mixed, with some methods maintaining consistency, while others' effectiveness declined as new models versions were released during the study. As genAI continues to evolve, our methods must be regularly reassessed and refined. Successful prompting approaches can be applied to distinguish AI-generated content from human-generated content. Our findings support researchers, educators, and everyday users to effectively assess genAI content authenticity and reliability.

Joseph D'Acquisto

Discipline: Interdisciplinary

Authors:

#1 Katharina Uhde

#2 Rick AmRhein

Abstract Name: The 'Candide' Role of Voltarianism at the American Opera: On Bernstein's Cross-Centuries' Channelling of Voltaire

From the curious jungles of Paraguay & El Dorado, to warzones of Westphalia & Dutch Colonial Surinam, to beautiful cosmopoleis Venice & Constantinople, the whirlwind adventure of his namesake takes Candide on a manic globetrot about Voltaire's world, real & imagined. Enduring perilous pursuit of his lost love, Cunégonde, Candide encounters several companions of differing socio-philosophical dispositions. Written in just 3 days—Upon reading, it's obvious why this hilarious novella has been enjoyed in high esteem across centuries; satisfyingly electrifying, yet a succinct read. Voltaire's just as brilliant, witty, & packing of political resonance as the orchestral showpiece written in honour. Encoded into the cultural climate of 1950s America, composer Leonard Bernstein became an FBI target during the infamous Red Scare—censored & considered “too controversial” to appear publicly; placed on the Security Index; denied a Passport. It's highly coincidental, then, for Voltaire himself, exiled for critiques of authority, was denied a Passport, too, but 200 years before; in the 1750s—which may play into why, not physically traveling as other intellectuals, he could inscribe mental & hearsaid travels into the theme of exploration throughout his novella. This personal, overarching historical, & artistic alignment created a spectacle, a musical rendition mirroring absurdities of Voltaire's era to ideological absurdities of their own. Bernstein saw a kindred spirit in Voltaire's use of satire to challenge present dogma & hypocrisy. The 1956 operetta, likewise, mocks blind optimism, religious hypocrisy, & authoritarianism; defending intellectual freedom, laughing in the face of tyranny. Accompanying historical & political significance of this operetta's circumstances, its musical motifs aren't just sonic elements; we pinpoint where & how recurring motifs trace across Bernstein's operetta, establishing linkage to particular narrative elements, revealing their role in articulating cultural memory between these two figures. Beyond musical function, semiotics encode references to real history & philosophical disposition. Finally, archival methods bring new understanding to the works' cultural, historical contexts.

Discipline: Psychology

Authors:

#1 Sophia Barrett

Abstract Name: Sleep Duration and Mental Health in College Students

College students experience substantial academic and social pressures that frequently disrupt sleep. Insufficient sleep has been consistently associated with higher symptoms of anxiety and depression, yet large, nationally representative samples of college students remain understudied, and few analyses distinguish between weekday and weekend sleep patterns. The purpose of this project is to examine whether sleep duration is associated with symptoms of anxiety and depression among college students using secondary data from the 2023–2024 Healthy Minds Study. By analyzing sleep hours alongside validated mental health measures, this project aims to contribute to ongoing research by evaluating these relationships in a diverse college population and by identifying behavioral trends that may influence student well-being. The study uses self-reported weekday and weekend sleep durations, along with anxiety and depression scores, to assess whether shorter sleep corresponds with higher emotional distress. Because this project involves secondary analysis, no new data were collected. Instead, existing survey responses were analyzed using descriptive and correlational methods appropriate for large datasets. Results are currently in progress, but it is expected that students reporting fewer hours of sleep will also report higher symptoms of anxiety and depression, consistent with previous behavioral and stress-related research. These findings will be discussed in the context of student wellness, behavioral stress indicators, and potential implications for campus mental health practices. The presentation will also address limitations of self-reported and cross-sectional data, as well as future research directions that may incorporate sleep quality, longitudinal designs, or physiological measures to better understand mechanisms linking sleep and emotional well-being.

Ashiyana Dahiya

Discipline: Biology

Authors:

#1 Ashiyana Dahiya

#2 Nicole Pinzón-Hoyos

#3 Amy Brewster

#4 Eva Oberdorster

Abstract Name: Analysis of Pituitary-Regulated Hormones in the Serum of Healthy Individuals and in Epilepsy Patients

Alterations in hormone levels have been reported in some individuals with epilepsy, potentially arising from chronic seizure activity, long-term antiseizure medication use, or interactions between the nervous and endocrine systems. Therefore, we analyzed serum levels of key pituitary-regulated hormones in a well-characterized large cohort of adults with epilepsy and age- and sex-matched healthy controls. Serum samples were collected from patients with epilepsy and healthy controls ($n = 80$ per group; 40 male and 40 female), with informed consent under approved IRB protocols, and obtained from the Indiana University Health ECRO Biorepository. Hormone levels, including follicle-stimulating hormone (FSH), growth hormone (GH), luteinizing hormone (LH), prolactin (PRL), and thyroid-stimulating hormone (TSH), were quantified using multiplex enzyme-linked immunosorbent assays (ELISAs). Group differences between epilepsy and control cohorts were assessed using Student's t -tests. Sex-based comparisons were conducted using one-way ANOVA. Pearson correlation coefficients were calculated to evaluate associations between hormone levels,

age, and epilepsy duration. Serum levels of FSH, GH, LH, and PRL were higher in all females compared to males. No differences were observed between the groups. TSH levels were similar across groups. FSH levels increased with age in both female groups and in the male epilepsy group. LH levels increased with age and epilepsy duration, but only in females with epilepsy. Higher TSH levels correlated with longer epilepsy duration only in males with epilepsy. Comparable hormone levels between the epilepsy and healthy groups indicate normal pituitary function. Females showing expected higher levels of FSH, GH, LH, and PRL than males confirm the internal validity of our measurements. These findings suggest that although overall hormone profiles are similar between epilepsy and control populations, subtle age- and sex-dependent endocrine variations may emerge with longer disease duration. Further work is needed to clarify whether these correlations reflect physiological adaptation, medication effects, or epilepsy-related neuroendocrine modulation.

Marcus Dahlin

Discipline: English and Literature

Authors:

#1 Marcus Dahlin

Abstract Name: Dragons, Starships, and Mental Health: How Speculative Fiction Uniquely and Effectively Explores Mental Health Through Worldbuilding.

This paper explores how speculative fiction is an effective genre for exploring mental health in unique and compelling ways. Although these genres are often ignored for their entertainment value, science fiction and fantasy use worldbuilding, magic systems, and technology to explore the struggles of their characters in ways that traditional fiction cannot. Through an analysis of *The Poppy War*, *The Stormlight Archives*, *The Magicians*, *The Murderbot Diaries*, and *The Lord of the Rings*, this study examines how characters experiencing a variety of mental health issues are portrayed within their fantastical worlds, thereby highlighting their respective struggles. In addition, this study examines how the authors of these novels utilize these settings to explore various aspects of the human condition, incorporating their own personal experiences and research to make these portrayals more authentic. These novels help readers gain a deeper understanding of mental health, both in others and in their own lives, by transporting readers outside their own context and engaging with these issues in a new way.

Ann Dai

Discipline: Nursing and Public Health

Authors:

#1 Ratna Dougherty

#2 Elizabeth Dunn

Abstract Name: From Silos to Synergy: Improving Healthcare and Disaster Relief Coordination After Hurricanes Helene and Milton

In 2024, Hurricanes Helene and Milton devastated the Tampa Bay area, forcing 53 healthcare facilities to evacuate and triggering the deployment of almost 3,000 rescue personnel. Local disaster relief organizations (DRO) provided shelter, meals, and emotional support to almost 20,000 residents. Post-hurricane reports cite a need for enhanced horizontal collaboration and coordination among DROs to improve community resilience. This study investigates strategies to strengthen coordination between healthcare facilities and

DROs in Hillsborough County to provide lifesaving and life-sustaining services to those affected by disasters. In particular, the United Nations' Sustainable Development Goals (SDGs) serve as a framework to categorize these organizations. Representatives of disaster relief organizations gathered for a World Cafe-style round table event to gain a variety of perspectives on improving resiliency. Both oral and written data were collected and coded to perform a qualitative thematic analysis. Additional interviews were conducted with health-focused organization representatives. Research found that most frustration stemmed from organizational objectives overlapping without shared communication of each organization's needs. This lends to a lack of knowledge and regard about what resources can be shared. Results found little connection between local healthcare facilities and other DROs, with healthcare being mentioned the fewest times among the three SDGs coded. Findings suggest that disaster relief networks would benefit from more integrated collaboration between healthcare facilities and other DROs. This could include exchanging staff, resources, and training in order to understand and work towards the common mission of saving and sustaining life during disasters.

George Dai

Discipline: Computer Science

Authors:

Abstract Name: Timeline and Systematic Implementation of Bitcoin's Post-Quantum Security

The current global market cap of cryptocurrencies is 2.5 trillion dollars, predicted to be 6.3 trillion dollars by 2033, indicative of the immense and growing popularity of cryptocurrencies. However, with the emergence of quantum computing and Google's demonstration of quantum superiority in 2019, the security of cryptocurrencies has been called into question. Specifically, the public and private key cryptography, such as Bitcoin's use of Schnorr encryption in securing an individual's wallet, was proven to be decryptable by a quantum computation method known as Shor's Algorithm. This paper analyzes that a reasonable timeline for when quantum computers would be strong enough to crack Bitcoin's Schnorr encryption is from 2 to 8 years in the future, meaning that 2 to 8 years into the future, quantum computers can potentially rewrite transaction information before the transactions are confirmed by Bitcoin. Furthermore, this paper builds a two-phase roadmap following the estimated timeline so that by the time Schnorr keys are easily decryptable, Bitcoin would have replaced all instances of Schnorr encryption with the quantum-safe CRYSTALS-Dilithium signature scheme. Ultimately, we implement a post-quantum signature scheme for Bitcoin while retaining all of Bitcoin's current attributes, functionalities, and systems, complete with Python code modeling the changes on a Bitcoin test chain.

Jazmin Dajcz

Discipline: Business

Authors:

#1 Kathryn Weaver

Abstract Name: A Comparative Analysis of Women Entrepreneurs in the United States and Europe

Entrepreneurship is an evolving field dedicated to increasing understanding of the factors that influence venture creation. This study focuses on an understudied area of entrepreneurship, a lack of literature examining the entrepreneurial experience of women in the United States and Europe. Guided by institutional theory and social capital theory, it examines how institutional frameworks and social relations influence an

entrepreneur's outcomes. Institutional theory investigates the effects of formal, such as laws, and informal, like societal expectations, systems on venture activity. Social capital theory examines how connections and networks influence entrepreneurs' access to capital and other resources. Drawing on existing literature, it suggests that women entrepreneurs in the U.S. benefit from larger markets and comparatively better access to monetary resources. However, they continue to encounter struggles with cultural norms and lack of support. In comparison, women entrepreneurs in Europe enjoy better work life balance but struggle to gain access to funding for growth. By integrating both theories, this research seeks to uncover the institutional forces and interpersonal dynamics that shape women's entrepreneurial experiences across these regions. Through a thorough examination of how cultural norms, formal structures, and network relationships intersect, this study seeks to provide a more comprehensive understanding of both the opportunities and constraints women entrepreneurs encounter when starting and scaling their ventures. The findings of the research can serve as a valuable resource for scholars and governmental figures to improve inclusivity within entrepreneurial environments.

Yasmine Dakak

Discipline: Biology

Authors:

#1 Yasmine Dakak

#2 Anup Srivastava

#3 Robert Keating

#4 Masaaki Torii

Abstract Name: Mapping Seizure-Driving Inputs in a Mouse Model of Focal Cortical Dysplasia

Focal cortical dysplasia type II (FCD-II) is a leading cause of drug-resistant epilepsy in children, yet the neural circuits that initiate and sustain seizures remain poorly understood. While FCD is defined by a localized cortical malformation, clinical and experimental evidence indicates that seizures often engage brain regions beyond the dysplastic site, suggesting that epileptogenesis depends on a distributed network rather than isolated pathology. Understanding these network-level interactions is critical for developing targeted therapies, as current treatments for FCD-related epilepsy are limited and often insufficient. This project aims to identify and map cortical and subcortical inputs that interact with dysplastic cortex and contribute to seizure activity. Using in utero electroporation, the mTOR pathway will be hyperactivated in layer 2/3 progenitors of the embryonic mouse prefrontal cortex, generating focal dysplastic regions that recapitulate key features of human FCD. Retrograde and anterograde tracing with CTB-Alexa488 will label incoming and outgoing projections connected to the dysplastic area. Following perfusion and sectioning, confocal microscopy will quantify labeled neurons and projection patterns across multiple brain regions, enabling the construction of high-resolution maps of connectivity in FCD mice compared with controls. By pinpointing regions that provide seizure-relevant inputs or receive aberrant outputs, this study will elucidate how local cortical malformations interact with broader neural circuits to sustain epileptic activity. These findings are expected to advance fundamental understanding of seizure network dynamics and may guide the development of network-targeted interventions. Ultimately, this work has the potential to reduce seizure burden and improve long-term outcomes for individuals with FCD-related epilepsy, providing a foundation for more precise, circuit-based therapies.

Yasmine Dakak

Discipline: Biology

Authors:

#1 Saravana Murthy
#2 Taisen Zhuang
#3 Olivia Jones
#4 Yasmine Dakak
#5 Michael Keidar
#6 Aviram Nissan
#7 Jerome Canady

Abstract Name: Non-Thermal Plasma-Mediated Irreversible Electroporation for Targeted Elimination of Residual Breast Cancer Cells at Surgical Margins

Residual tumor cells left behind at the surgical margin are a major cause of local recurrence in solid tumors. The Canady Helios Cold Plasma (CHCP) system is a non-thermal, non-contact cold atmospheric plasma technology that generates brief electric fields and reactive species capable of disrupting cancer cell membranes. This study investigated whether CHCP produces voltage-dependent irreversible electroporation across biologically distinct breast cancer subtypes. Four breast cancer cell lines were tested: two triple-negative lines (MDA-MB-231 and Hs578T), one ER+/PR+/HER2- line (MCF-7), and one ER+/PR+/HER2+ line (BT-474). Cultures were exposed to cold plasma for five minutes at either 25 V or 30 V, and membrane permeabilization was assessed through propidium iodide uptake over 120 minutes. Additional analyses evaluated morphological changes, functional pore formation via delivery of BCL2A1-targeting siRNA, and clonogenic survival. Tumor margin samples from a Phase I clinical trial (NCT04267575) were examined ex vivo to assess tissue-level responses. CHCP exposure produced clear voltage- and time-dependent membrane permeabilization in all four breast cancer lines. Treatment at 30 V resulted in strong and sustained dye uptake, whereas 25 V generated a shorter, less intense response. Cells displayed structural changes consistent with membrane disruption, and CHCP enabled intracellular siRNA delivery and significantly reduced colony formation, confirming effective electroporation. Ex vivo analyses demonstrated selective injury to malignant cells while preserving adjacent non-cancerous tissue. Overall, CHCP functions as a non-thermal, non-contact plasma-based electroporation platform capable of controlled membrane permeabilization and selective cancer cell death. These findings support its potential intraoperative use to eliminate residual tumor cells at the surgical margin and reduce the risk of local recurrence.

Binay Dalai

Discipline: Computer Science

Authors:

#1 Mahfuza Farooque

Abstract Name: Automating the Security Verification of 5G Networks Using AI and Logic-Based Tools

The 5G Authentication and Key Agreement (5G-AKA) protocol helps protect users in modern cellular networks by confirming identities and securing communication. However, the official protocol description is written mostly in natural language, which makes it difficult to analyze and increases the chance of human error during security review. This project introduces an automated system that transforms these text-based protocol descriptions into precise logical statements that can be checked by computer programs. The system uses a large language model (LLM) to break the 5G-AKA procedure into small steps and translate each step into logical rules. These rules are then tested with verification tools to examine important security properties, such as whether both parties can trust each other and whether secret keys remain protected. Early results show that the system can correctly represent key parts of the protocol and match known behaviors. The long-term goal is to create a reusable tool that reduces the manual effort of analyzing communication protocols and makes formal security verification more accessible to both researchers and engineers.

Aidan Dalleck

Discipline: Engineering

Authors:

#1 Luis Navarro

Abstract Name: Exploring Volume Emission Rate asymmetries for the ICON-MIGHTI observations

The Ionospheric Connection Explorer (ICON) satellite mission, launched in 2019 by NASA, investigated the relationship between Earth's upper atmosphere and space. One of the instruments onboard, the Michelson Interferometer for Global High-resolution Thermospheric Imaging (MIGHTI), was designed and operated by the U.S. Naval Research Laboratory (NRL). MIGHTI's primary goal is to measure neutral wind velocity and temperature in the thermosphere (~90–300 km) by observing Doppler shifts and spectral line broadening in two key atomic oxygen (OI) airglow emissions: the red-line at 630.0 nm and the green-line at 557.7 nm. From these same observations, the Volume Emission Rate (VER), a measure of excited or ionized oxygen density, can also be derived through analysis of the interferometer's fringe amplitude and phase. MIGHTI retrieval algorithms assume that wind and emission rates vary only with altitude and are horizontally uniform along each viewing altitude shell. While this assumption simplifies data processing, it is inaccurate in regions where large horizontal gradients occur, such as near the solar terminator, or within the Equatorial Ionization Anomaly (EIA). These regions produce large electric field variations that alter the VER and drive larger than expected vertical components in the neutral wind. Currently, data in these regions is often flagged as low-quality or invalid, since the assumption of horizontal uniformity no longer holds and as such the retrieval algorithm can no longer return a reliable profile. This research examines how horizontal density and emission variations affect MIGHTI's wind and VER retrievals. By quantifying the influence of these gradients on measured fringe patterns, we aim to improve the interpretation of MIGHTI data under non-uniform atmospheric conditions. Ultimately, this work enhances the reliability of ICON's observations and advances our understanding of thermospheric dynamics, ion-neutral coupling, and space weather variability in Earth's upper atmosphere.

Mariam Dalqamouni

Discipline: Biology

Authors:

#1 Bin Liu

#2 Pooja Chopra

Abstract Name: Nutrient-Dependent Transport of Run-and-Tumble Escherichia coli in Micropillar Arrays

The ability of motile bacteria to navigate structured environments is central to processes ranging from colonization to infection. In this study, we investigate how run-and-tumble Escherichia coli move through arrays of micron-scale pillars when suspended in two chemically distinct nutrient-rich fluids: Motility Buffer (MB) and Tryptone Broth (TB). Using high-resolution 4D (3D + time) tracking microscopy, we reconstruct full bacterial trajectories within the structured domain. Surprisingly, the micropillar lattice enhances bacterial dispersal rather than hindering it. This enhancement is medium-dependent: in MB, where cells exhibit longer runs and fewer tumbles, transport becomes more persistent and super-diffusive; in TB, cells show more frequent directional changes and slower spreading. Spatial variations in swimming behavior suggest that hydrodynamic interactions with pillar surfaces and local run-tumble dynamics jointly shape escape rates and long-term transport. Our findings highlight how nutrient conditions and geometric confinement together

modulate bacterial motility, with implications for microbiome engineering, antifouling strategies, and the design of structured microbial habitats.

Samantha Daly

Discipline: Chemistry

Authors:

#1 Adaickapillai Mahendran

#2 Alvaro Castillo

Abstract Name: Probing Stability and Hydrogen Bonding in Heteroatom-Containing Cyclopentadiene Carbaldehyde oximes: Dual AICD & GIMIC Approach

Hydrogen bonds are a physical phenomenon that arises from the distribution of electrons in chemical species; most commonly, how they are shared between a directly bonded pair and a nearby species ($\text{OH}\cdots\text{X}$). This atomic triad is inner system hydrogen bonding. If present in a molecule within a certain distance and orientation, they lower its energy and make it less reactive. As reactivity is the heart of chemistry, this is important knowledge to assess for. Electrons can be delocalized over several atoms, a behavior known as resonance. Such behavior is amenable to computation, a discipline within chemistry that involves the use of computers to simulate physical phenomena. It is a common method used to validate experimental data. We want to see if computation can then be used to model or describe this behavior in hydrogen bonds. To test this, we used two main methods: Anisotropy of the Induced Current Density (AICD) and Gauge-Inducing Magnetically Induced Currents (GIMIC) along with Density Functional Theory (DFT). These computational methods have been widely used to simulate and visualize electron delocalization in chemical systems, particularly in the study of aromaticity. In this work, their potential for identifying hydrogen bonding is investigated using a series of cyclopentadiene carbaldehyde oximes, in which the sp^3 carbon is systematically replaced by chalcogen atoms, from Oxygen down to Tellurium, (1-4). Through this analysis, the combined usefulness of AICD and GIMIC for characterizing hydrogen bonding in 1-4 is assessed, as well as insights into the factors contributing to stability. Our work so far rejects AICD due to indistinct values, and literature favors GIMIC for characterization.

Skyleigh D'Ambrosia

Discipline: Biology

Authors:

#1 Ashleigh Smythe

Luke Cockerham

Abstract Name: Behavioral Responses of *Tenebrio molitor* to Volatile Cues Linked to Parasite Transmission

Chemical cues play an important role in how intermediate hosts interact with parasite-contaminated environments, particularly in systems where transmission depends on host foraging behavior. The tapeworm *Hymenolepis diminuta* infects rats as its definitive host, and its eggs are shed in rat feces that beetles encounter while foraging. Previous studies with *Tribolium confusum* and *Tenebrio molitor* have shown that beetles may prefer feces from infected rats, likely due to volatile chemicals associated with infection. These findings suggest that odor cues, along with hunger state and social interactions, can influence beetle behavior in ways that increase the parasite's chances of completing its life cycle. This project expands on earlier work by testing whether specific fecal-associated volatile compounds can independently attract *T. molitor*. To

investigate this question, adult beetles were fasted for 24 hours and tested in a two-choice circular arena similar to designs used in previous behavioral assays. Each trial presented beetles with a choice between coverslips treated with different odor solutions: deionized water, limonene, or a four-acid mixture consisting of butanoic acid, methyl butanoate, 2-methyl butanoate, and pentanoic acid. Thirty beetles were released into the arena for each run, and their positions were recorded once per minute for ten minutes to determine whether they aggregated preferentially toward a particular odor. Preliminary patterns indicate that beetles distinguish between odor treatments and tend to move toward the area containing the four-acid mixture. These acids are known components of volatile profiles associated with infected feces, suggesting they may serve as cues guiding beetles toward parasite-containing substrates. This study helps clarify the role of individual volatile chemicals in *T. molitor* host-seeking behavior and contributes to broader understanding of how *H. diminuta* may influence intermediate host activity to enhance transmission.

Samanvitha Dammalapati

Discipline: Biology

Authors:

#1 Rutvi Desai

#2 Sharon Swanger

Abstract Name: Serotonin Dysfunction in the Anterior Thalamus may be Implicated in Dravet Syndrome

Dravet Syndrome (DS) is a severe, genetic epilepsy starting during infancy, leading to long-term intellectual and developmental disability. Serotonin is thought to play a critical role in regulating brain excitability, as prior research links enhanced serotonin signaling to reduced seizure activity. In the last five years, serotonin-based therapies such as fenfluramine have been approved to treat DS. Despite recent advancements, there is still little scientific understanding of how serotonin suppresses seizures in DS. Previously, we showed that serotonin is involved in feed-forward inhibition in the thalamocortical circuits, with serotonin reducing excitatory neuron spike firing in the anterior thalamus and increasing inhibitory neuron spiking in the reticular thalamus. A DS mouse model displayed decreased feed-forward inhibition to the anterior thalamus, suggesting that this circuit may be impaired in DS, leading to increased thalamocortical excitability. Moreover, the impact of serotonin on this circuit is reduced in DS mice, but it remains unclear if this results from a decreased response of thalamus neurons to serotonin, or if there is less serotonergic input in the thalamus circuitry. To assess this, we imaged fluorescently labeled serotonin neurons and measured the quantity of serotonin cell bodies in the raphe nuclei as well as axons in the anterior thalamus region of wild type (WT) and DS mice. If serotonin cell count and axon innervation in DS versus WT mice are similar, it would indicate that serotonin connectivity is normal. Alternatively, a difference would suggest an impairment in serotonin innervation that potentially disrupts thalamocortical circuit function and contributes to the disease state. Investigating the means by which serotonin suppresses seizure activity in DS will elucidate mechanisms underlying hyperexcitability in seizure circuits and advance therapeutic treatments targeted towards areas of dysfunction.

Norah Dana

Discipline: Biology

Authors:

#1 Flor Acevedo

Abstract Name: Not a picky eater: Re-documenting the feeding habits of the grape berry moth, *Paralobesia*

viteana (Lepidoptera: Tortricidae).

The grape berry moth (GBM), *Paralobesia viteana* (Lepidoptera: Tortricidae), is one of the most important pests of grapes in Eastern North America. The insect is native to this region and established its association with wild grapes well before grape cultivation. For over a century, GBM have only been documented feeding and developing exclusively on grape berries. However, GBM larvae were found on galled wild grape (*Vitis riparia*) leaves infested with phylloxera (*Daktulosphaira vitifoliae*) in field conditions in Erie, Pennsylvania. This study tested GBM larval development on alternative diets consisting of ungalled leaves, galled leaves, and fruit from commercial and wild grape species. GBM neonates from a laboratory colony were individualized in cups and reared on each of the following treatments: phylloxera galls from *V. riparia* leaves (with and without phylloxera eggs) ungalled *V. riparia* leaves, phylloxera eggs only, Concord (*Vitis x Labruscana*) leaves, Riesling (*Vitis vinifera*) leaves, and grapes from *V. riparia* and Concord (control). Larval mortality and development, pupae development, pupae weight, and adult emergence were monitored daily. GBM larvae successfully developed into adults when fed on all diet treatments, except for those provided with Concord leaves and phylloxera eggs only. GBM larvae developed faster when fed on all diet treatments compared with those fed on Concord grapes. Larvae fed on galled *V. riparia* leaves developed faster than those fed on any other treatment, but there were no differences in pupa development or pupa weight. Viable eggs were produced from adults reared on both gall diets, *V. riparia* leaves, Riesling leaves, and grapes. These results demonstrate that GBM can develop and reproduce when feeding on phylloxera galls and leaves from wild and cultivated grapevines, broadening our understanding of GBM ecology with potential vineyard management implications.

Anjalika Dandamudi

Discipline: Biology

Authors:

#1 Sahiti Chukkapalli

#2 Keyonna Williams

#3 Payton Thayer

#4 Erika Newman

Abstract Name: Prenatal High-Fat Diet Accelerates Neuroblastoma Progression via Increased Tumor Burden and CD4⁺ T Cell Exhaustion in Offspring

Maternal nutrition during pregnancy is a key determinant of offspring health, influencing susceptibility to cancer. Neuroblastoma, a pediatric malignancy arising from neural crest cells, is highly sensitive to genetic and environmental factors. While oncogenic drivers like MYCN amplification are well-characterized, in utero environmental exposures, particularly maternal diet, remain underexplored. This study investigates how a prenatal high-fat diet (HFD) influences neuroblastoma progression and anti-tumor immunity in predisposed offspring. Using the TH-MYCN transgenic mouse model, which develops spontaneous neuroblastoma, pregnant dams were fed either a control diet or an HFD. Offspring were assessed for tumor onset, progression rate, tumor burden, and survival. Immune profiling of the tumor microenvironment helped evaluate T cell function and exhaustion status. Offspring exposed to HFD in utero exhibited significantly earlier tumor onset, accelerated progression, and increased tumor burden compared to controls. These changes were accompanied by reduced overall survival, indicating a more aggressive tumor phenotype and enlarged spleen in HFD mice. Flow cytometric analysis of spleen immune composition revealed a suppressed anti-tumor immune response, particularly among CD4⁺ T cells. These cells displayed elevated expression of exhaustion markers, including PD-1, TIM-3, and LAG-3, alongside reduced proliferation and diminished cytokine production (IL-2, IFN- γ). A notable increase in CD4⁺CD44⁻CD62L⁻ cells was also observed, suggesting abnormal T cell differentiation or functional impairment. The HFD-exposed mice showed increased immunosuppressive signaling and altered antigen presentation, further supporting a state of immune dysfunction. These results suggest that prenatal HFD exposure induces long-lasting immune alterations that compromise anti-tumor immunity and

promote neuroblastoma progression. In summary, prenatal exposure to HFD accelerates neuroblastoma development and impairs adaptive immunity through the exhaustion and dysfunction of CD4⁺ T cells. These findings underscore the importance of maternal nutrition in shaping offspring's cancer susceptibility and immune competence. Targeting maternal diet may offer a novel approach to reducing childhood cancer risk.

Caden Dang

Discipline: Biology

Authors:

#1 Yannis Paulus

#2 Phuc Nguyen

Abstract Name: Multimodal Imaging System for Diabetic Retinopathy using DL-alpha-aminoadipic Acid Rabbit Model

Known as one of the leading causes of blindness, diabetic retinopathy (DR) can lead to permanent vision loss due to the late detection of pathological angiogenesis. Current imaging systems lack adequate diagnostic capabilities to detect DR in rabbit models which increases the risk of significant structural damage to the eye. To address this challenge, we propose a longitudinal multimodal imaging system that's composed of spectral-domain optical coherence tomography (SD-OCT), fluorescein angiography (FA), and color fundus photography to detect the DL-AAA induced retinopathy model. The DL-AAA induced retinopathy model is used to selectively target Müller glial cells which triggers sustained blood-retinal barrier breakdown via a single intravitreal injection of DL-AAA. In contrast to acute models, studies have found that this imaging system could detect and quantify specific biomarkers of chronic diabetic retinopathy that are generally missed by successfully visualizing the progression of vascular incompetence. SD-OCT with its depth-resolved capabilities can accurately identify structural pathologies such as acute retinoschisis, internal limiting membrane thickening, and the protrusion of neovascular tufts into the vitreous cavity while FA can distinguish trends of persistent leakage and vessel tortuosity for up to 52 weeks. The high-contrast resolution enables automatic quantification of the Mean Leakage Area (MLA), validating that the model achieves 100% reproducibility in generating a sustained angiogenic phenotype like DR. In conclusion, this multimodal imaging system has the capability to become the new standard for evaluating diabetic retinopathy. Its integration of advanced imaging modalities with the DL-AAA induced retinopathy model addresses the diagnostic limitations of the outdated imaging systems by allowing us to detect early signs of diabetic retinopathy.

Andre Dang

Discipline: Exercise Science and Nutrition

Authors:

Abstract Name: Stimulating Myofibrillar Hypertrophy for Optimal Volume Ranges, Rest Times, and Training Loads: Mechanical Tension, Metabolic Stress, and Muscle Damage on Myofibrillar Hypertrophy

Resistance training (RT) is a widely practiced exercise modality for inducing skeletal muscle hypertrophy, primarily through two mechanisms: myofibrillar hypertrophy, which involves growth in myofibril size and number, and sarcoplasmic hypertrophy, characterized by volumetric expansion of non-contractile elements such as the sarcolemma, mitochondria, sarcoplasmic reticulum, and enzymatic content. Mechanical tension, driven by actin-myosin cross-bridging; metabolic stress, marked by metabolite accumulation; and muscle

damage, characterized by inflammatory responses, are physiological byproducts of RT that are widely believed to promote skeletal muscle hypertrophy. However, their relationship with myofibrillar hypertrophy remains unclear in the literature. These physiological byproducts are thought to be influenced by the manipulation of RT variables, including set volume, inter-set rest intervals, and training loads. This study investigates the mechanisms behind myofibrillar hypertrophy, excluding increases in the size of non-contractile elements within the muscle. The research consists of two parts: (1) investigating the direct effects of metabolic stress, muscle damage, and mechanical tension on myofibrillar hypertrophy using animal and human muscle biopsies, and (2) examining the interactions among key RT variables—set volume, inter-set rest intervals, and training loads—and their influence on metabolic stress, muscle damage, mechanical tension, and myofibrillar hypertrophy. The study aims to determine the effects of these factors on myofibrillar hypertrophy and to propose practical RT programming recommendations.

Avery Daniel

Discipline: Psychology

Authors:

Kai Wakeman

Abstract Name: The Influence of Biological Sex, Relationship Status, and Adult Attachment Styles in Features of Histrionic Personality Disorder

Background: Considerable research has focused on sexual attitudes/behaviors of Cluster B personality disorders (PDs), including borderline PD, yet few studies have focused on sexual attitudes/behaviors of individuals with histrionic PD (HPD) features—inclusive of males and females. Further, maladaptive personality traits underlying PDs have been clearly linked to insecure attachment. The purpose of this study was to assess features of HPD and attachment patterns. Method: The sample comprised 627 undergraduate students ($n = 481$ females and $n = 146$ males); mean age = 19.49 years ($SD = 1.21$). Along with demographics, HPD features were assessed using the Brief Histrionic Personality Scale (BHPS); communication of sexual needs was assessed using the Hurlbert Index of Sexual Assertiveness (HISA); adult attachment styles were assessed with a four-group model. Results: Three-way (2 [biological sex] $\times$ 2 [relationship status] $\times$ 4 [adult attachment style]) factorial ANOVAs were performed for the following: Seductiveness and Attention Seeking subscales of the BHPS and HISA total scores. For the BHPS Seductiveness subscale, there were significant main effects for biological sex, ($F[1, 610] = 5.46, p < .05$) and for relationship status ($F[1, 610] = 6.35, p < .05$). For the BHPS Attention Seeking subscale, there were significant main effects for biological sex ($F[1, 611] = 5.84, p < .05$) and for attachment style ($F[3, 611] = 9.23, p < .001$). For HISA total scores, there significant main effects for biological sex, ($F[1, 540] = 8.82, p < .05$) and for attachment style ($F[3, 540] = 4.39, p < .01$). Discussion: Addressing biological sex differences in the presentation of HPD features and associated sexual attitudes/behaviors provides additional insight to this topic area. Similar to other studies of HPD and attachment, this study highlights how attachment disturbance may play a key role in development of core personality traits underlying PDs.

Rochelle Daniel

Other/Institution Not Found

Discipline:

Authors:

#1 Rochelle Daniel

Abstract Name: Are You Looking for A Research Project for the First Time Student Researcher?

The purpose of my mentee's project was two-fold: to satisfy honor's coursework in the form of "something different" and to support the mentor's research on portfolios in capstone public relations courses. The mentee agreed to develop an annotated bibliography of 10 peer-reviewed journal articles that discuss experiential learning and public relations portfolio assignments in capstone courses at the college/university level in the United States. The student received honor's credit for the project, and the bibliography sources will be added to other journal articles to be collected for the mentor's research. A comprehensive collection of articles will help the mentor researcher to understand what the literature says about the topic, to formulate a thesis, and to understand how to build on the existing research. The annotated bibliography summarizes each article, which includes the purpose of the research, teaching methods, findings and conclusions. This type of annotated bibliography contrasts with those that provide an evaluation of an article and may discuss how the research fits in one's own research. Mentors and mentees may find that annotated bibliographies can serve as a valuable research project for novice undergraduate researchers and student-faculty collaboration. It enhances student learning and research skills and faculty teaching and mentoring skills. In the case of this research, the annotated bibliography was the first research project for the student researcher. Due to the time limitations of the project, the student researcher found it challenging to find articles that focused only on public relations portfolio assignments. A few articles focused on other communications courses including journalism and mass communication, magazine writing, and advertising.

Kaprice Daniels

Discipline: Sociology

Authors:

#1 Kaprice Daniels

Abstract Name: When the School Split: Students on the Front Lines of New Orleans' Education Reform

This study examined the long-term educational and social impacts of New Orleans' post-Hurricane Katrina shift to a charter-based school system through a focused case study of George Washington Carver High School. While charter schools were often praised for academic improvement and operational flexibility, critics argued that they operated as business-driven institutions prioritizing funding, efficiency, and test performance over student well-being and equitable access. Carver High School's unusual transition, splitting its student body so that 9th and 10th graders remained under charter management while 11th and 12th graders were displaced due to funding constraints, revealed how financial interests shaped policy decisions at the expense of student stability. Despite the profound disruption students experienced, most existing discourse centered on administrative perspectives, leaving student narratives largely undocumented. To address this gap, the project collected interviews from 20 former students and additional staff members to understand how the split transition affected academic trajectories, emotional well-being, and perceptions of the charter system. Archival data, including school demographics, funding sources, and operational records, supplemented these firsthand accounts and provided broader policy context. The final outcome was a long-form, journalistic feature that foregrounded student voices while critically examining the influence of privatization on public education. Drawing on both personal experience within New Orleans charter schools and academic training in race, journalism, and educational policy, this study illuminated how business-oriented reforms continued to shape the lives of students nearly two decades after Katrina.

Samantha Dann

Discipline: Biology

Authors:

#1 Annika Vanderzon
#2 Franchesca Fiorello
#3 Walter Thompson
#4 Roshna Wunderlich
Isabella Klimavicz

Abstract Name: Maternal positional behavior and energetics during infant carrying in Coquerel's sifaka

Infant carrying has evolved multiple times in primates and is hypothesized to be energetically expensive. Lemurs either carry or park their infants. Infant parking leaves them vulnerable to predation while carrying protects the infant at the potential expense of increased maternal energy expenditure. Coquerel's sifaka (*Propithecus coquereli*) are strepsirrhine primates who use dynamic locomotor modes such as leaping, yet they still carry their infants for more than 6 months and at over 30% of maternal body weight. We hypothesized sifaka mothers will experience higher energy expenditure and/or modify their locomotor behavior in response to infant growth. We fit two sifaka mothers at the Duke Lemur Center with Technosmart Axy-5 accelerometer collars and collected simultaneous video and acceleration data for 3 1-week intervals from 2 mothers carrying infants 3-6 months old. We quantified positional behavior, overall dynamic body acceleration (ODBA, a proxy for energy expenditure due to movement), and peak acceleration relative to age and weight of the infant using Chi-square and generalized linear models. Overall frequency of infant carrying did not change significantly as the infant grew in weight, however carrying frequency during leaping decreased when the infant was in the heaviest weight class ($>1500\text{g}$). The frequency of resting increased and traveling frequency decreased as the infants grew in weight. Between infant ages of 3-5 months the mother's ODBA increased, however, ODBA decreased around 6 months when the mother's carrying frequency was reduced. Infant carrying in sifakas is energetically expensive, it is associated with behavior modifications in mothers, and it is likely related to the relatively slow somatic growth observed in sifakas. Examination of the energetics of infant carrying in additional strepsirrhine primates can help us better understand the evolution and implications of this infant care strategy in primates.

Rachel Danzitz

Discipline: Biology

Authors:

Abstract Name: Isolation of Iron-Oxidizing Bacteria from Environmental Sampling

Iron-oxidizing bacteria (IOB) are nonpathogenic microorganisms that convert soluble ferrous iron (Fe^{2+}) into insoluble ferric iron (Fe^{3+}). This metabolic process generates the reddish-brown deposits that often appear in well-water systems and are frequently misinterpreted as chemical corrosion. In Southside Virginia, these stains are common due to naturally acidic groundwater, yet the biological source of the problem is not widely understood. This project investigated which IOB species are present in local private wells and household plumbing and how they contribute to visible iron staining. Samples of well water and biofilms were collected from multiple residences across the region. They were cultured on three iron-enriched media under microaerophilic and slightly acidic conditions to promote IOB growth. Resulting isolates were examined through Gram staining, light microscopy, and PCR for preliminary identification. Scanning electron microscopy paired with energy dispersive X-ray spectroscopy was used to verify iron deposition on bacterial structures and to characterize cell morphology. Preliminary work identified several distinct IOB morphotypes across sampling sites. Final results are expected to provide a localized profile of IOB species in Southside Virginia and clarify which taxa are most strongly associated with visible staining. These findings will help

refine isolation and identification methods, supply baseline data for future genomic analysis, and support community education aimed at improving understanding and management of rural well-water systems.

Viet Dao

Discipline: Biology

Authors:

#1 Sareh Bayatpour

#2 Huiping Zhou

Abstract Name: Investigating the Effects of Bile Acids on B-Cell Function and Immunity

Bile acids, key factors in lipid digestion, are critical signaling molecules influencing metabolic and immune responses. Studies suggest that bile acids interact with immune cells, such as T cells and macrophages, via receptors like the G protein-coupled bile acid receptor (TGR5), Sphingosine-1-phosphate (S1P) receptor 2 (S1PR2) and the farnesoid X receptor (FXR). However, their impact on B cells—key players in adaptive immunity responsible for antibody production—remains unclear. B cells are essential for humoral immunity, and their dysfunction is implicated in autoimmune diseases, infections, and metabolic disorders. More than 98% of the human genome consists of non-protein-coding sequences, including long non-coding RNAs (lncRNAs), and microRNA (miRNAs). MiRNAs have been recognized as crucial regulators of numerous physiological and pathological processes by acting as activator or suppressor for RNA translation. By pinpointing the specific sequences of miRNAs associated with FXR and TGR5, it is possible to explore how different bile acids control gene expression by regulating the expression of those receptors. Bile acids modulate B-cell function by activating TGR5 and/or FXR, leading to generating more miRNAs that alter cell proliferation and cytokines production. Therefore, applying any change on bile acid structure and concentration has potential implications for immune regulation and metabolic-immune crosstalk. Bile acids may enhance or suppress B-cell proliferation depending on concentration and receptor activation, and subsequent activation of FXR/TGR5 could upregulate anti-inflammatory pathways. Discovering the impact of bile acids on B-cell biology may uncover new therapeutic possibilities for immune-related disorders.

Josie D'Aquila

Discipline: Psychology

Authors:

Abstract Name: Are Hostile Traits Associated with Health Behaviors and Outcomes in Emerging Adults?

The goal of this study is to better understand predictors of positive vs. negative health behaviors in emerging adults. Specifically, this study examines the role of hostility, anger, and aggression (physical, and verbal) on physical, social, and mental health behaviors in emerging adults (ages 18-29). Personality plays a role in decision making, meaning that certain traits (e.g., hostility) may have specific associations with health behaviors, leading to potential future health outcomes throughout the lifespan. Factors during emerging adulthood may contribute to health disparities later in life, making it important to understand health during this time. This project has been approved by the Salisbury University IRB, and the data will be collected and analyzed in January. Survey materials have been entered into Qualtrics, and participants will be gathered using the online platform Prolific to create a sample that is well representative of the population of emerging adults. Data will be downloaded from the Qualtrics website into SPSS where it will be analyzed using correlation, regression, and ANOVA. I hypothesize that emerging adults who show greater hostility will

experience a greater frequency of negative health behaviors. Since emerging adulthood is a time of exploration, if hostile traits are found to lead to certain unhealthy behaviors, interventions may be implemented during this time to put a person on a path to prevent negative health outcomes later in life. If the results are consistent with hypotheses, a manuscript will be prepared and submitted to a peer-reviewed journal for publication. Overall, this research looks to broaden the literature involving how hostility, anger, and aggression relates to health during emerging adulthood.

Abram Darby

Discipline: Psychology

Authors:

#1 Adi Wiesel

#2 Douglas Kenrick

#3 John Wagner

Abstract Name: Social Motives and Leadership Preferences: How Views on Childcare are Associated with Preferred Traits in Political Leaders

Voter preferences in elections around the globe have suggested a recent trend toward dominant male political leaders, such as Donald Trump and Viktor Orbán. Prior research on leadership preferences has suggested that certain individual differences, such as a person's chronic concerns about safety, are associated with a greater preference for such dominant male leaders. The current project is interested in investigating the individual differences that are associated with people instead preferring more prestigious (or skill-based) female leaders over dominant male ones. Some of our pilot work using survey data and archival data from the 2016 American National Election Studies suggested that participants with more chronic concerns for their children's welfare were more likely to prefer prestigious female leaders over dominant male ones, including in terms of rating preferences of imaginary candidates, and in terms of a greater likelihood of voting for Hillary Clinton (a prestigious female candidate from the Democratic party) over Donald Trump (a dominant male candidate from the Republican), even when participants' political party was statistically controlled for. However, given that there is an association between childcare issues and specific political parties, we are currently following up on this study using an original, online survey study in which adult participants rate their congressional preferences for male dominant leaders (who are Democrats) and female prestigious leaders (who are Republicans) from recent congressional races. We will also measure participants' motives, including their childcare motivation, and expect that our regression analyses will show that participants with higher levels of childcare motives will significantly prefer prestigious female leaders over dominant male ones.

Kaelonnah Darlich

Discipline: Biology

Authors:

#1 Danilo Ferreira Borges dos Santos

#2 Mônica Kersch-Becker

Abstract Name: The Effects of Heat Waves on Monarch Butterflies: Responses in Development, Reproduction, and Mate Selection

Insects are essential to ecosystems, however more frequent heat waves can threaten their survival. Thermally

sensitive species like the monarch butterfly (*Danaus plexippus*), whose migration relies on temperature and host plant condition, are especially vulnerable. Despite this, the transgenerational effects of repeated heat wave exposure remain poorly understood, especially how thermal stress during different life stages and plant exposure affect fitness in *D. plexippus*. This study investigates the effects of heat waves through two experiments: Legacy and Fertility. We hypothesize heat waves will negatively affect development, behavior, and reproductive output. For both experiments, control groups maintained at 30 ± 0.5 °C, heat wave treatment of 37 ± 1 °C for four hours/day over three consecutive days. In the Legacy Experiment, eight treatment groups of ($n = 100$) caterpillars were reared on either control or heat-stressed common milkweed (*Asclepias syriaca*) and were either exposed (or not) to heat during 1st, 3rd, or 5th instar. We measured development time, consumption, larval and adult morphology, survival, and reproductive output. The Fertility experiment assessed the effects of direct adult heat stress on reproduction and behavior in *D. plexippus*. All combinations of stressed and control pairings were tested ($n = 10$ per pair type) to measure heat and sex-specific stress impacts on egg production, hatching success, behavior, and survivorship. The subsequent Choice experiment tested mate preference by offering individuals a choice between heat-stressed and control partners. Heat-stressed milkweed significantly lowered survivorship ($p = 0.036$; $p = 0.0468$), host-plant stress had stronger negative impacts than direct larval heating. Early-instar heat exposure reduced adult wing size, and mate-choice trials showed a trend toward preferring control partners ($\chi^2 = 3.6$, $p = 0.058$), indicating behavioral sensitivity to prior stress. Our findings will inform predictions about insect responses to climate extremes and enhance our understanding of how thermal legacies shape population dynamics and migratory success.

Saumik Das

Discipline: Health and Human Development

Authors:

#1 Saumik Das

#2 Mia Kim

#3 Meghna Manjith

#4 Pranav Potluri

Abstract Name: Addressing Perinatal Health Disparities for Immigrant and Refugee Populations in Baltimore

Immigrant and refugee women in Baltimore face persistent disparities in access to perinatal healthcare due to interacting structural, cultural, and policy-related barriers. This study examines the underlying drivers of these inequities and explores how financial strain, language barriers, limited health literacy, fear of deportation, and unfamiliarity with the United States medical system collectively undermine maternal and infant health outcomes. Using a qualitative, community-informed approach, the research draws on expert interviews with clinicians, policy analysts, and maternal health scholars, in addition to field observations from work with local refugee support organizations. Relevant policy documents and literature were also reviewed to contextualize current challenges in perinatal care access. The thematic analysis revealed that mistrust of healthcare institutions, cultural incongruence between patients and providers, and chronic stress related to immigration contribute to delayed or inconsistent engagement with essential perinatal services. Community organizations serve as critical support structures, yet their efforts are often hindered by unstable funding and restrictive policies. The findings highlight the need for interventions that prioritize the experiences and needs of immigrant communities. Potential strategies include the creation of culturally specific maternity hubs, improved multilingual access to Medicaid enrollment, expanded access to professional interpretation services, and comprehensive cultural competency training for healthcare providers. Additional solutions such as the expansion of telehealth prenatal visits, flexible clinic hours, and collaboration with trusted community institutions may further reduce logistical and cultural barriers to care. This study underscores the importance of community-centered and culturally responsive approaches to advancing equitable perinatal health outcomes in Baltimore.

Bahniman Das

Discipline: Computer Science

Authors:

Abstract Name: Reducing Hallucinations in Large Language Models Through Retrieval-Augmented Generation

Models with large language capabilities, such as GPT-3.5 and LLaMA-2, can create seamless and cohesive contextual text, but tend to create 'hallucinations', which are potentially damaging to the context of the text as they consist of potentially believable falsities. This severely impacts the realms of education, science, and medicine. This study attempts to answer the following questions. To what degree do large language models create fictional text, and does retrieval-augmented generation (RAG) have the potential to ground evidence and thereby reduce the hallucinations? This project uses the publicly available benchmarks SQuAD v2 with unanswerable questions and TruthfulQA, which assesses the limits of addressing the false. It assesses factual accuracy, precise match of response to the questions asked, and the hallucinations of the different models. The baseline analysis is to assess the regular generative performance and for the integration of the RAG system, which has a dense document retriever that is built on Wikipedia, which is used to augment contextualized evidence to be provided before responding to each of the questions. Before using the system, it has been reported that on a baseline of 20 to 30% hallucinations were present, especially for questions that were vague or misleading, but using retrieval-based grounding, the rate of hallucinations dropped significantly. In addition to the numerical figures, our qualitative analysis suggests that retrieval enhances the reasoning along with the transparency, while also lessening the overconfident language present in wrong answers. This study aims to create a reproducible structure to assess and lessen the factual inaccuracy of generative AI systems. This work shows, with some evidence, that combining retrieval and detection systems that external grounding improves the ability to stay on the truth.

Gabriella Daskalova

Discipline: Chemistry

Authors:

#1 Jose Juncosa

Melina Duong

Abstract Name: Synthesis of Potentially Selective 5-HT_{2A} Serotonin Receptor Agonists with a Forced Active Conformation

This proposal outlines work toward the synthesis of two potential serotonin 5-HT_{2A} receptor agonists based on the established molecule (2S,6S)-2-(4-bromo-2,5-dimethoxybenzyl)-6-(2-methoxyphenyl)piperidine (compound 3). A synthetic pathway has been developed based on work conducted in previous semesters for these molecules, which aim to improve the potency of their predecessor in the desired receptor while maintaining selectivity over the 5-HT_{2C} receptor. The addition of a methyl group to the central ring on compound 3 is hypothesized to favor the active conformation of the molecule, effectively increasing potency. This new agonist will give us a better understanding of the structure and function of the 5-HT_{2A} receptor and will give us further insight into its involvement in certain neurological conditions as well as its potential applications in the medicinal field. In the past, moderate amounts of tert-butyl (trans)-2-(2,5-dimethoxybenzyl)-6-(2-methoxyphenyl)-4-oxopiperidine-1-carboxylate (compound 10) were synthesized with great effort; thus, we have tested the proposed reactions on an analog of compound 10. By optimizing these reactions first, we will make it more likely that the reactions on the actual compound 10 will succeed, allowing us to ultimately synthesize desired compound 3.

Tvisha Datta

Discipline: Engineering

Authors:

#1 Tvisha Datta

Abstract Name: Using Nature-inspired Sustainable Design via Biomimicry of the Peregrine Falcon to Improve the Development of Japan's F-X Fighter Jet

Modern fighter jets face a persistent challenge when it comes to improving aerodynamic efficiency without having to sacrifice high-speed performance or long-term sustainability. These aircraft rely heavily on high thrust and agility, and in doing so, they consume large amounts of fuel due to aerodynamic drag and limited energy efficiency. As a result of these constraints, advanced military defense development projects, such as Japan's Mitsubishi F-X fighter jet program, have been delayed, highlighting the need for more sustainable solutions. Biologically inspired designs, also known as biomimicry, have emerged as a promising alternative. The peregrine falcon, the fastest bird in the world, exhibits extraordinary flight capabilities that include steep dives that exceed 320 km/h, precise maneuvering, and stability under harsh conditions. In this paper, a comprehensive literature review was conducted to explore how the peregrine falcon could inform next-generation fighter jet design and aerodynamics. By using a comparative analysis of both biological and engineering studies, this paper investigated the four key aspects of the falcon's morphology, which include tapered wing structures, microstructured feathers, joint flexibility, and dynamic tail control. This paper ultimately examines how these traits can be applied to aircraft systems. The findings suggested that these natural mechanisms exhibited by the peregrine falcon (*Falcon peregrinus*) may parallel emerging morphing-wing technologies that are aimed towards enhancing lift-to-drag ratios and conserving fuel. Incorporating these biomimetic adaptations into aircraft systems, such as the Mitsubishi F-X, could significantly reduce operational energy demands, improve fuel efficiency, and enhance maneuverability and stability at high speeds.

Trinity David

Discipline: Psychology

Authors:

#1 Trinity David

#2 Aaliyah Saunders

#3 Brittany Miller- Roenigk

#4 Paris Wheeler

Abstract Name: Anticipated Barriers to Implementation of the Adapted Intervention: Participant Perspectives

Stimulant and opioid overdose rates are rising sharply in Black communities, yet culturally adapted harm-reduction resources remain limited. THRIVE (Culturally AdapTed Harm Reduction Intervention: Community Engaged InterVention for Black Adults that MisusE Opioids and Stimulants), a pilot mixed-methods study conducted by the University of Cincinnati and the University of Kentucky, aimed to expand awareness of harm-reduction tools such as naloxone and fentanyl test strips. The purpose of this analysis is to explore participants' perceptions of the potential challenges associated with implementing the adapted intervention. This study included two aims: Aim 1 refined the intervention manual, while Aim 2 piloted the adapted intervention with 57 Black adults aged 18–65 in Louisville and Cincinnati via in-person focus groups of 8–10

participants. Groups assessed feasibility, utility, barriers, and community needs, with data analyzed using thematic analysis. Preliminary analysis of focus group data revealed several perceived challenges to implementing the adapted intervention across Cincinnati communities. Preliminary findings showed that some of the key findings included ensuring cultural relevance, improving distribution of information, and overcoming individualized stigma and fear surrounding addiction disclosure. While some concerns were consistent across focus groups, others reflected unique concerns regarding neighborhood visibility and distribution, differing levels of trust from community members, relevance of the distributed information, and individualized barriers. Participants identified a range of potential challenges that could hinder the successful implementation of the adapted intervention. However, perceptions of challenges were not consistent across all focus groups; some expressed optimism about community receptiveness. Future work should investigate the extent to which prioritizing the community's perspectives regarding the intervention can impact community engagement with the intervention.

Cameron Davila

Discipline: Sociology

Authors:

#1 Cameron Davila

#2 Susan E. Mannon

Abstract Name: From Surveillance Capitalism to the Surveillance Classroom: Artificial Intelligence, Oppressive Scaffolding, and the Crisis in Learning Today

This paper examines how Artificial Intelligence (AI) erodes trust and reproduces inequalities in education. Drawing on the notion of surveillance capitalism and hostile scaffolding, it argues that AI is reconstructing the modern classroom as a site of extraction, surveillance, and suspicion. Both students and teachers are reshaped into managed subjects instead of partners in learning. Zuboff (2019) uses the term surveillance capitalism to capture how technology companies collect and monetize user data to predict and shape consumer behavior. Such technologies have gradually crept into classrooms and, with the rise of AI, now seem a permanent fixture in today's learning environments. Scholars emphasize the resulting harms for students – from invading their privacy to robbing their attention spans. One harm that has been less well studied is the effect AI has on teacher-student relations. In this paper, I introduce the idea of oppressive scaffolding to explore this harmful effect. Broadly speaking, scaffolding describes how environments can support learning, allowing us to think in more efficient ways (Sterelny 2010). Timms and Spurrett (2023) introduce the idea of hostile scaffolding to show how environments can also be built to manipulate and control (e.g., casinos). Likewise, Spurrett (2025) refers to oppressive technologies (e.g., high-heeled shoes) that are produced by and contribute to some injustice. I introduce the term oppressive scaffolding to describe a learning environment structured by companies and managed by teachers in ways that are harmful for learning. In today's classroom, students are nudged to use AI and teachers are nudged to root it out. On the surface, AI detection is about maintaining the integrity of the educational institution. In practice, it is a form of surveillance that destroys the collaboration and trust so central to learning. Whether intentional or not, teachers end up controlling students rather than liberating minds.

Annelies Davis

Discipline: Gender, Ethnicity, Diversity, or Cultural Studies

Authors:

#1 Annelies Davis

Abstract Name: What is Inevitable and What is Malleable?: Fatalism and Pessimism in Protestors' Visions of the Future

Social mobilizations mirror the broader cultural and political shifts of their respective eras. Contemporary protest movements are fit to new ideological landscapes of increasingly pessimistic or catastrophic narratives about the future. Climate change, democratic backsliding, rising authoritarianism, and global disinformation have all contributed to an atmosphere where the future appears precarious, foreclosed, and removed from agency. Quantitative social-science scholarship tends to conceptualizes pessimism and fatalism as stable individual traits; in contrast, interpretive scholarship highlights the effect of environment, system, and collective on ideas of the future. This study draws on and extends this idea of "future visions", which reframes fatalism/pessimism as a cluster of both affective and practical orientations that define what kinds of futures protesters see as imaginable or possible. To investigate these questions, the project will form an analysis of protest materials drawn from three different contexts and temporalities: Vietnam-era antiwar mobilizations, contemporary Palestinian protests, and both historical/current climate movements. The research will analyze how imagined futures are present in protest discourse by collecting archives of signs, chants, manifestos, and posters. Through qualitative coding of narrative structure, temporal framing, and repeated symbols, the project will identify patterns and factors within future visions. The research clarifies the role of imagined futures in shaping protest cultures, ultimately arguing that they operate not simply as barriers to action but as meaningful components of collective resistance.

Wesley Davis

Discipline: Computer Science

Authors:

#1 Cyrus Brooks

#2 Jerrod Clark

#3 Wesley Davis

#4 Demorris Williams

Cyrus Brooks

Abstract Name: Smart Eye Security: Real-Time AI-Powered Threat Detection for Enhanced Surveillance Systems

Traditional surveillance systems rely heavily on sustained human attention, yet maintaining vigilance over long monitoring periods is difficult and often leads to missed threats. This motivates our central research question: Can an affordable, real-time AI system reliably detect weapons and safety violations to improve situational awareness and response times? To address this challenge, we developed Smart Eye Security, an AI-enabled surveillance platform that combines computer vision, automated event processing, and real-time visualization. A major limitation in existing research is the lack of domain-specific datasets for realistic surveillance environments. To bridge this gap, we created a custom labeled dataset focused on pistols, knives, and PPE violations. This dataset enabled training a YOLOv8 object detection model tailored to indoor security scenarios. The model operates at 29.05 milliseconds per frame, supporting real-time analytics. Detected events are automatically clipped into short video segments, logged using a Python-Flask API with an average response time of 2.33 milliseconds, and displayed through a web-based dashboard. A tracking module also estimates occupancy and visualizes movement patterns. Evaluation results demonstrate strong performance, including a 98.4% confidence score for PPE detection under optimal conditions. Performance decreases at distances beyond 15 meters, in low-light environments, and in high-occlusion traffic, indicating areas for improvement. Future work includes expanding the custom dataset to capture diverse lighting and camera angles, integrating infrared imaging for low-visibility detection, and applying temporal smoothing to stabilize tracking. Overall, this project demonstrates the feasibility of deploying cost-effective, AI-driven surveillance tools in schools, businesses, and public spaces.

Jack Davis

Discipline: Engineering

Authors:

#1 Stephen Young
#2 Adam Buchalter
#3 Carter Blessing
#4 Henry Brooks
#5 Dayakar Penumadu

Abstract Name: High Energy X-ray Imaging and Machine Learning Based Image Segmentation of Basalt Minibar Reinforced Concrete

Fiber-reinforced concrete structures offer significant advantages for civil infrastructure applications by enhancing the mechanical properties of concrete, including increased strength and ductility, which enable structures to endure harsher environmental conditions. Basalt fiber minibars, a type of chopped bundled macrofiber reinforced polymer bar, have emerged as a promising environmentally friendly reinforcement material for concrete mix designs. These minibars improve mechanical behavior by transitioning failure modes in the cement based composite materials. Key parameters such as minibar orientation, volume fraction, and dispersion critically influence the mechanical performance of reinforced concrete. Additionally, factors like flowability, workability, porosity, and rheology of the concrete mix design further affect its mechanical properties. However, the structure-property relationships associated with higher volume loadings of basalt minibars, including their dispersion and orientation, remain insufficiently understood. This study employs high-resolution X-ray computed tomography (XCT), a state-of-the-art non-destructive evaluation technique, to investigate the spatial microstructural features of basalt minibar-reinforced concrete. Three cubic concrete samples were analyzed prior to mechanical testing: two samples containing different basalt minibar volume fractions and one neat concrete sample without reinforcement. Machine learning-based segmentation techniques were utilized to differentiate minibars, pores, and matrix materials within the complex geometries of the concrete samples. Quantitative analyses derived from image segmentation included measurements of minibar surface roughness, orientation, and Euler Characteristic parameters. Pore analysis encompassed evaluations of shape descriptors such as sphericity and pore diameter across the three samples. The findings provide critical insights into the structure-property relationships of basalt minibar-reinforced concrete mix designs, supporting the development of computational models aimed at optimizing durability and performance in structural applications.

Destiny Davis

Discipline: Physics and Astronomy

Authors:

#1 Ramakanta Chapai
#2 Naomi Carter
#3 Destiny Davis
Naomi Carter

Abstract Name: Quantum Oscillations Reveal Key Differences Between Scandium and Yttrium Based Bilayer Kagome Metals

Kagome-lattice materials exhibit novel electronic behaviors, including chiral magnetism, topological band structures, charge-density waves (CDWs), and superconductivity. A central question is how the presence or absence of a CDW affects the electronic structure. In this project, we investigate two isostructural bilayer Kagome compounds, ScV_6Sn_6 and YV_6Sn_6 , to understand these differences. Using quantum oscillation measurements in pulsed magnetic fields up to 91 T, we map the Fermi surface to examine how electrons move within each material. YV_6Sn_6 , which does not develop a CDW, shows a large electron pocket and a relatively heavy effective mass, suggesting a van Hove singularity near the Fermi level. In contrast, ScV_6Sn_6 exhibits clear signatures of zone folding, indicating that the CDW reconstructs its electronic bands. To further interpret these results, we compare our measurements with density functional theory (DFT) calculations. The calculated Fermi surface in the “unfolded” Brillouin zone for YV_6Sn_6 agrees well with our experimental observations, while the CDW in ScV_6Sn_6 generates a more complex, “folded” Fermi surface. Analysis of the Berry phase from the oscillation data reveals a signature of non-trivial electronic topology in these Kagome materials. These results will be discussed in the context of how CDWs and topology interact in Kagome-based quantum materials.

John Davis

Discipline: Philosophy, Ethics, and Religious Studies

Authors:

#1 John Davis

Abstract Name: Augustine's Methodological Inconsistency Against the Proportionality Objection to Hell

This paper argues that St. Augustine of Hippo provides an inadequate and methodologically inconsistent defense against the “proportionality objection” to the eternal, conscious torment (ECT) view of hell. The proportionality objection argues that since man’s crimes on earth are finite, eternal and infinite punishment in the afterlife would not be “proportional” and therefore not just. In Book XXI of his *City of God*, Augustine approaches this argument in two variants: the “duration” variant and the “effect” variant. The duration variant (DV) argues that a just punishment should be temporally proportional, or equal, to the time taken to commit a crime. The effect variant (EV) argues that a just punishment should be proportional, or equal, to a crime in its effect, or intensity. In his defense of ECT, Augustine successfully defeats the weaker, duration variant by developing a framework which utilizes moral intuition and normative justice to dispel with the claimed necessity of temporally proportional punishment. However, when Augustine turns to attack the effect variant, he abandons this intuition and normative justice framework in favor of theological dogmas, substantially weakening his argument structure and contradicting his methodology in the process. In the extension to this methodological shift, Augustine defends against the effect variant, perhaps successfully, by applying it to the case of Adam in Genesis as someone who does deserve infinite punishment, but he thereby is forced to use questionable dogmas to extrapolate Adam’s guilt onto the rest of mankind. Augustine’s dogmatic assertions leave the effect variant inadequately answered at best and dismantle his “moral intuition” methodology at worst.

Teray Davis

Discipline: Chemistry

Authors:

#1 Teray Davis

Abstract Name: This study tests methods to reduce oxylipin loss in milk fat globules by increasing tracer amounts, aiming to match bovine serum albumin delivery for improved accuracy in animal studies.

Oxylipins are important lipid molecules made from polyunsaturated fatty acids (PUFAs). They play key roles in cell function and act as precursors for many lipid mediators. However, previous research has shown that when oxylipins are delivered using milk fat globules (MFGs), about 30% of them are lost, resulting in lower concentrations compared to bovine serum albumin (BSA). This loss limits how effectively oxylipins can be delivered during animal trials. The goal of this study was to increase oxylipin recovery in MFGs so that levels match those found in BSA. To do this, we tested several treatments using different tracer concentrations with both BSA and MFGs. We first confirmed that BSA delivers oxylipins more efficiently, with about 30% higher recovery than MFGs. We then increased tracer levels in the MFG samples by 30–50% to make up for the loss that occurs in the MFG membrane. A washing treatment was also added to help prevent oxylipins from dissolving or being lost from the surface of the MFGs. Overall, this research aims to optimize oxylipin encapsulation in both BSA and MFGs to improve delivery for future animal studies. Increasing the amount of tracer used in MFGs may help achieve similar oxylipin levels between the two delivery systems.

Spencer Davis

Discipline: Interdisciplinary

Authors:

Abstract Name: Usability in the Nonprofit Sector: Improving the User Experience and Online Presence of a Rural Nonprofit

Usability of nonprofit websites is a growing problem for low-income communities. The American Community Survey (2019) reported that 14.5 million households are affected by a “digital divide” that restricts access to evolving technology. This divide harms Americans that rely on community support, as 89% of nonprofits, which offer food, clothing, shelter, and other essential services, rely on digital communication to achieve their mission (“Digital Engagement,” 2022). Nonprofits supported by grants and donations often cannot allocate funds to adequate website design, further dividing Americans who can access digital spaces. Incorporating user feedback through volunteer efforts and digital literacy could provide low-income communities relying on nonprofit services a functional layout that alleviates the digital divide. I conducted research on Circles of Jackson County, a nonprofit in western North Carolina, to identify the pain points users experienced on the website and how we can improve usability in the nonprofit sector. My presentation and research follows the Nielson Norman Group’s Design Thinking Process and includes: (1) Gathering user feedback on existing design through surveys and interviews, (2) Empathizing with users and defining user errors, (3) Performing comparative research of successful nonprofit websites, (4) Ideating solutions with user input with design applications, (5) Implementing prototypes into the website and testing with users, and (6) Reviewing user-centered design improvements. Identifying the issues with nonprofit websites lays the groundwork for what improvements must be made. Utilizing volunteers to implement a user-focused design may improve the online presence of nonprofits, expand their services to the broader community, and overcome an advancing social issue.

Riley Davis

Discipline: Engineering

Authors:

#1 Riley Davis

Abstract Name: Interconnected Signaling Loops: Growth Factor Signaling through ERK5 and ERK

Growth factor signaling in mammalian cells is initiated at the cell surface but the transduction pathway to the nucleus involves a series of intracellular molecules that relay information to one another through phosphorylation and dephosphorylation events that control interactions. These pathways are critical for cell proliferation and are the site of mutations that can lead to dysregulation in some cancers. One of the most well-studied signaling pathways is epidermal growth factor (EGF) mediated proliferation acting through a mitogen-activated kinase (MAPK) cascade with the final signaling molecule extracellular signal-regulated kinase 1/2 (ERK1/2), which can translocate into the nucleus when phosphorylated. A related but distinct alternative MAPK pathway leads to the phosphorylation of ERK5 which is also known as the BMK1 (Big Mitogen-activated Kinase 1) due to its large size. It is also able to move into the nucleus like ERK1/2 but the nuclear targets are distinct. Mathematical models of ERK1/2 based on differential equations have been previously developed but our focus was on how the presence of ERK5 and its pattern of phosphorylation would be distinct and act as a competitor or enhancer for ERK1/2. An in-depth model of the MEK5/ERK5 system has been created using ordinary differential equations which is distinct but has interdependence with the ERK1/2 pathway. Simulation testing has been completed using MATLAB with a focus on varying parameter values and specific activation and deactivation rates. Simulations suggest a unique phosphorylation profile for ERK5 that is dependent on both ERK and AKT with downstream molecule p90RSK serving as a key regulator for both MAPK pathways. Modeling and in silico studies of cell signaling pathways is one way to gain insight in how loss of regulation of cell proliferation might occur due to mutations and might suggest ways that investigators could introduce restorative measures.

Jade Davis

Discipline: Chemistry

Authors:

#1 Jade Davis

#2 Kim Ha

#3 Kristen Fuller

Abstract Name: Broadening Representation in the Chemistry Classroom

Chemistry curriculum at all levels often lack diverse representation, with most scientists featured in the textbooks being white and male. This is problematic as scientists from many racial, ethnic and racial backgrounds have contributed to advancements in science. However modern chemistry textbooks continue to perpetuate the stereotype of the white male chemist. Recent analyses of US college chemistry textbooks published between 2016-2020 revealed severe imbalances in gender and ethnic representation. One study found that male names appeared every four pages of a textbook, compared to female names appearing every 250. Additionally, only 3% of the named scientists represented in textbooks were identified as being female. Furthermore other studies have also demonstrated that a student's sense of belonging and the ability to see themselves as a scientist influences resilience and success in STEM careers. To address some of these challenges this project focused on identifying excluded chemists and linking their contribution to specific topics taught in chemistry courses. Historical research was conducted to collect information on the scientist's background, and achievements. From this research 1-2 slides summarizing the scientists' work were formulated. These slides will be a part of an open-access Google site repository of teaching materials that highlight their contributions they relate to materials being taught in class. The goal of this repository is to provide chemistry instructors with a searchable database of downloadable slides and materials on hundreds of historically excluded figures in chemistry that align to their curriculum. As this repository continues to expand, it will continue to promote inclusivity within the chemistry classroom by educating students and faculty on all the contributions of scientists in underrepresented groups.

Alexandriana Davis

Discipline: History

Authors:

#1 Alexandriana Davis

#2 Rachel Neiwert

Abstract Name: Educating to Empower, or Educating to Exclude?: A Historical Analysis of the Minnesota Governor's Interracial Commission, 1943-1956

On April 27, 1943, in the midst of World War II, Minnesota Governor Harold Stassen resigned from office. The lieutenant governor at the time, Edward J. Thye, assumed his duties and became the twenty-sixth governor of Minnesota. In this position, Governor Thye advocated for preventative action (eliminating a problem before it happens) as preferable to remedial measures (addressing a problem after it has already occurred), especially when it came to violations of civil rights. He created the Minnesota Governor's Interracial Commission to act on this, tasking the Commission with educating the state's citizens on civil rights issues. From 1943 to 1956, the Commission researched and authored reports on how minority populations in Minnesota experienced work, housing, and education. The purpose of my research is to understand how successful the Minnesota Governor's Interracial Commission was at addressing racial inequities in the state. Through close reading and analysis of the Commission's archival and public report records, we identified some major themes. The Commission brought awareness to the systemic racism entrenched in Minnesota and became a model for communities to create their own local human rights organizations. However, the lack of diverse voices on the Commission led to inaccurate accounts, improper language usage, and a lack of accountability in the pamphlets. This led to the Commission offering ineffective, vague, and detrimental recommendations for supporting minority groups in Minnesota and negatively impacting how white people viewed people of color. These findings demonstrate how Minnesota grappled with bringing about greater equity in the 1940s and 1950s and provide insight into how current inequities might have come to be.

Tatyana Davis

Discipline: Political Science

Authors:

Abstract Name: Justice in the Vally: Mapping Legal Deserts and Immigrant Barriers in California's Central Valley

Across California's Central Valley, thousands of immigrants live in legal deserts. These are regions with few or no affordable immigration attorneys. This paper analyses how geographic disparities in legal access affect immigrants' rights, and integration outcomes. Using interviews with community members and nonprofit staff, alongside analysis of public legal aid data, the study identifies causes such as attorney shortages, and funding inequalities. It then evaluates policy solutions including state-supported legal networks, virtual representation programs, and multilingual outreach.

Rachel Davison

Discipline: English and Literature

Authors:

#1 Kenneth Hawley

#2 Olga Pahom

Abstract Name: Variations in Portrayals of Superman's Humanity in Modern Live-Action Films: An Ideological Critique

Superman has dominated popular American culture for nearly one hundred years, and live-action films have reflected this fascination by continuing to interpret his character in various ways. Modern films especially have differed widely in their depiction of the characteristics of Superman's humanity as society has developed a desire for more complex heroes. This rhetorical analysis uses ideological criticism to compare the differences in portrayals of Superman in the films *Superman Returns* (2006), *Man of Steel* (2013), and *Superman* (2025), focusing on the way each film depicts Superman's humanity, as shown through his love, his physical vulnerabilities, and his mistakes. These attributes are chosen because they can be generalized to humanity as a whole and are crucial to the narratives of the three films. The specific films are chosen for this analysis because they are the three most modern films that concern themselves solely with Superman. Over the last two decades, these depictions of this idealized protagonist reflect a growing effort to emphasize Superman's humanity—depicting a caring, vulnerable, and fallible hero. This increased focus on Superman's humanity provides insight into how these filmmakers have crafted a savior figure whose humanity deepens and broadens to increase the character's popular appeal and cultural relevance in America.

Haley Dawkins

Discipline: Art History

Authors:

#1 Haley Dawkins

Abstract Name: Graphic Design as Cultural and Linguistic Activism

With more than half of the world's languages now extinct and many more disappearing every day, it is evident that traditional preservation strategies alone cannot sustain a language and its accompanying culture. This paper explores the historical connections between graphic design and language preservation. It argues that graphic design serves as both a cultural and linguistic form of activism by transforming linguistic content into engaging visual representations through infographics and typography. The role of design extends beyond mere aesthetics to influence the psychological and political aspects of representation, empowerment, and cultural pride. By making endangered languages visible, graphic design affirms their legitimacy and promotes cultural revival.

Haley Dawkins

Discipline: Art History

Authors:

#1 Haley Dawkins

Abstract Name: Designing Hate: A Brief History of Antisemitic Design

This paper examines the complex relationship between antisemitism and design, tracing its historical roots and exploring the significant role that visual culture plays in promoting antisemitic sentiment. It analyzes various antisemitic tropes, libels, and stereotypes to help readers identify and avoid antisemitic rhetoric in their work. Graphic design serves as a powerful tool that can shape public opinion and either reinforce or challenge societal prejudices. Visual imagery, ranging from ancient caricatures to modern political posters, has been a key element in the arsenal of antisemites, used to perpetuate harmful stereotypes and manipulate public perceptions of Jewish communities.

Atoishy Dayve

Discipline: Biology

Authors:

#1 Sam Dubensky

#2 Jonathan Tedesco

#3 Laura Vella

Abstract Name: Resolving Type 2-Polarized T Follicular Helper Cells in Human Peripheral Blood

CD4 T cells are an essential component of the immune system that coordinate protective responses during vaccination, infection, and other disease contexts. CD4 T cells can differentiate into subsets such as T Helper (Th) and T Follicular Helper (Tfh) with distinct functions. Th cells are grouped into Th1, Th2, and Th17 subsets based on expression of surface proteins and transcription factors. Compared to Th cells, Tfh more potently stimulates antibody production by B cells. However, recent studies demonstrate Tfh can ‘polarize’ toward Th1, Th2, and Th17, yielding Tfh1, Tfh2, and Tfh17 subsets. Tfh1 and Tfh17 surface proteins in humans are well characterized, but Tfh2 cells remain poorly defined. There is no standard set of surface markers to identify Tfh2, and their expression of common Th2 markers remains unclear. We therefore sought to evaluate whether Th2 markers such as CCR3, CCR4, CCR8, or CRTH2 are expressed in Tfh2 cells and how they correlate with GATA3, a transcription factor known to drive Th2 differentiation. By analyzing Th2 surface markers and GATA3 expression in human CD4 T cell populations using spectral flow cytometry, our goal is to better define Tfh2 identity. Defining the Tfh2 subset is critical, as targeting subsets like Tfh2 through vaccination may lead to stronger, longer-lasting protection against pathogens. Vaccine responses are one of the most effective ways we prevent infectious disease and protect vulnerable communities.

Magali De La Cruz Coronado

Discipline: Physics and Astronomy

Authors:

Abstract Name: Investigating the Possibility of Faster than the Speed of Light Travel

Can humans travel faster than light? This research explores the theoretical foundations and challenges associated with interstellar travel at speeds exceeding the speed of light. Current physical laws, particularly Einstein’s theory of general relativity, establish that nothing with mass can reach or exceed the speed of light. General relativity describes gravity as the curvature of spacetime caused by mass and energy, while quantum

mechanics explores phenomena at subatomic scales. Reconciling these two frameworks remains a major challenge in physics, yet theoretical models suggest possible avenues for faster-than-light travel. The study focuses on advanced concepts such as the Alcubierre warp drive, which proposes a “warp bubble” in which space in front of a spacecraft contracts and space behind expands, allowing effective faster-than-light travel without violating relativity. Key limitations include the need for enormous amounts of energy, exotic matter, and materials capable of withstanding extreme spacetime distortions. The work of Harold White and NASA’s Eagleworks laboratory has refined these models, proposing methods to reduce energy requirements and test spacetime curvature effects using sensitive instruments such as modified interferometers. Additional frameworks, such as the Chung-Freese metric, suggest that travel through extra dimensions may circumvent some relativistic limits. A 3D model of a warp bubble was designed and printed using TinkerCAD, providing a visual representation of the theoretical concept and aiding understanding of the associated physics. Although experimental confirmation is lacking, current research demonstrates that manipulating spacetime remains mathematically plausible and may inspire future technological innovations. While faster-than-light travel remains purely theoretical, this study highlights its potential to deepen understanding of general relativity, quantum mechanics, and their unification. It also emphasizes the importance of developing new materials, instruments, and experimental frameworks. Ultimately, studying warp drive concepts not only expands the frontiers of physics but inspire novel approaches to interstellar exploration and advanced space propulsion.

Erika De La Rosa

Discipline: Biology

Authors:

#1 Erika De La Rosa

#2 Megan Morse

#3 Starr Davis

#4 Sierra Rodriguez

#5 Sushmita Sinha

Abstract Name: Characterizing BATF3 Expression and its Impact on Human T-Cells

Basic leucine zipper transcription factor 3 (BATF3) is a member of the Activator Protein 1 (AP-1) family of transcription factors. Although first identified in human T-cells, most knowledge of BATF3 function derives from murine studies. In mice, BATF3 promotes T-cell survival, proliferation, and memory development, while its absence leads to impaired memory formation and increased apoptosis in CD8⁺ T-cells. Despite these findings, the role of BATF3 in human T-cells remains undefined. We hypothesize that BATF3 regulates proliferation and effector responses in human CD4⁺ and CD8⁺ T-cells. To test this, human T-cells were isolated from peripheral blood mononuclear cells (PBMCs) and divided into three groups: unstimulated, anti-CD3-stimulated, and anti-CD3+CD28-stimulated. Cells were stained with fluorescently conjugated anti-CD3, anti-CD4, anti-CD8, anti-BATF3, and anti-Ki-67 antibodies. Anti-CD27 and anti-CD45RO were used to assess BATF3 expression in differentiated human T-cell subpopulations. The data was acquired on CytoFLEX and analyzed using FloJo software. Our results show that BATF3 is upregulated in T-cells upon activation, with greater induction by anti-CD3+CD28 compared to anti-CD3 alone. BATF3 expression was higher in activated CD8⁺ T-cells than CD4⁺ T-cells. Interestingly, BATF3⁺ cells exhibited increased proliferation, suggesting its role in promoting T-cell proliferation. Further analysis revealed that BATF3 was predominantly upregulated in central memory (CM) CD8⁺ T-cells, indicating a functional role in memory T-cell subsets. Future studies will evaluate effector responses in BATF3⁺ vs. BATF3⁻ T-cells by measuring intracellular cytokines by flow cytometry. Our findings suggest that BATF3 expression is induced during human T-cell activation, preferentially in CD8⁺ T-cells, and is strongly associated with proliferative capacity. Enrichment of BATF3 in CM CD8⁺ T-cells highlights its potential role in memory transition and long-term immune competence. These observations extend murine findings into the human context and suggest BATF3 may act as a key regulator of proliferation and memory fate decisions in human T-cells.

Onofrio De Michele

Discipline: Anthropology and Archaeology

Authors:

#1 Onofrio De Michele

Abstract Name: Preserving the past in spite of the Present: The Politics of Muslim and Jewish Heritage in Palermo

In April 2025, Palermo opened its first present-day synagogue, 533 years after the expulsion of Sicilian Jews. Similarly, since 1990, three mosques were inaugurated, marking the rebirth of Islam in Sicily since the 13th century. These events occurred in the context of a renewed interest in Sicily's multi-religious medieval past. Between street signs in Hebrew and Arabic and Arab-Norman UNESCO tours, this history faces an unprecedented memorialization. However, commemorating the past does not necessarily translate into multireligious coexistence in the present. During my ethnographic fieldwork in Palermo, I witnessed the city wrestling with the contradictory logics of memorialization: on one hand, the historical presence of Islam and Judaism in the city is acknowledged and capitalized on through tourism; on the other, present-day Muslim and Jewish communities struggle to negotiate their place in Palermo's urban space. How do these communities navigate living in a city that commemorates their past while disavowing their existence in the present? To explore this question, I conducted 13 semi-structured interviews with community members, and participant observation at cultural events. Additionally, I investigated built environment as a site where tensions concerning memorialization critically emerge. My investigation reveals that the conversion of former churches in mosques and a synagogue highlights a competing framework of memorialization. Bound to Italy's strict preservation laws, these architectural interventions must preserve the overall built environment. Therefore, in establishing new places of worship in former churches—and thus negotiating their place in Palermo's urban landscape—the Jewish and Muslim communities must compete with the memorialization of the pre-existing architectural forms. Consequently, Jewish and Muslim heritages fail to fully (re)establish a claim over Palermo's urban landscape in the present. In an religiously and politically fraught Mediterranean, Palermo's approach to memorialization highlights the challenges of dealing with cities' plural histories in a globalized and multi-religious present.

Avery De Ruyter

Discipline: Biochemistry

Authors:

#1 Josh Teeter

#2 Felicia Hermann

Chase Nelson

Abstract Name: From Data to Drug Design: Exploring the Molecular Hardness of G Protein-Coupled Receptors Active Sites

G protein-coupled receptors (GPCR) are a diverse group of cell surface receptors that bind ligands, undergo a conformational change, and initiate an intracellular signaling cascade through binding to a G-protein. The receptor group binds to molecules of a vast chemical space and is known to have regulatory role in functions ranging from growth sensation to hormone responses. This research investigates the chemical environment and hardness of GPCR active sites through protein visualization, electronic structure calculations, and

experimental docking analysis using molecules from chemical informatics database with known inhibitory potentials. Based on the hard-soft acid-base principle, it is hypothesized that the GPCR active site is predominately soft in nature due to its location within the cell membrane; however, several critical polar residues likely optimize ligand orientation. Characterization of this chemical environment will inform future drug design and research to optimize inhibition potential of GPCR receptors.

Avery De Ruyter

Discipline: Biology

Authors:

#1 Avery De Ruyter

Abstract Name: Development and optimization of ex ovo culture methods for *Biomphalaria glabrata*

Schistosomiasis is a neglected tropical disease caused by parasitic flatworms of the genus *Schistosoma*, affecting over 250 million people worldwide each year. These parasites use freshwater snails, such as *Biomphalaria glabrata*, as intermediate hosts to complete their life cycle. There are potential gene candidates of interest that may play a role in the chemosensory attraction of the worms, allowing them to seek out the snail. Current methods for genome editing in *B. glabrata* are lacking. This research investigates the methodical development of an ex ovo culturing method for *B. glabrata* embryos and juveniles. Establishing this system is a key step toward future genome editing studies targeting candidate genes in the snail, enabling assessment of how disruption of these proteins may affect worm attraction. If transgenic snails with targeted gene knockdowns that prevent parasite-host recognition were introduced, a gene drive could spread these traits through wild populations, potentially reducing transmission and lowering the burden of schistosomiasis.

Corinne de Syon

Discipline: English and Literature

Authors:

#1 Corinne de Syon

Abstract Name: Devouring as Creative Resistance in the Autobiographies of Artist Niki de Saint Phalle

This project investigates to what extent the metaphor of devouring functions as a mode of social resistance and self-construction in the autobiographical writings of Franco-American artist Niki de Saint Phalle (1930–2002). I examine how her three memoirs—*Mon Secret* (1994), *Traces* (1999), and *Harry and Me: The Family Years* (2006)—constitute a self-theorizing project in which literal and figurative devouring articulate how illness, sexism, and art-making frame and drive her work. Although de Saint Phalle has enjoyed international acclaim and been widely studied for her shooting paintings, *Nanas*, and monumental sculptures, her life writing has received virtually no scholarly attention, leaving the textual dimension of her self-construction as a contemporary woman artist as yet untheorized. In these texts, devouring takes on multiple meanings: de Saint Phalle's body is consumed by Graves' Disease and emphysema; incestual assault and patriarchal norms threaten to devour her autonomy; and she performs a counter-devouring through the violence of her shooting paintings and the scale and exuberance of her monumental sculptures. While limitations lie in conceptualizing devouring in terms of de Saint Phalle's physical and mental illnesses, it effectively functions as a metaphor for social resistance and self-formation across her writing and art. Her autobiographies are particularly heavily imbued with images of devouring, desire, revenge, and subsequent self-creation. Visual art, the epistolary form, and co-authorship often visually overtake written narratives, further disrupting traditional

autobiography. Methodologically, this project combines on-site research at her Tarot Garden in Tuscany, close textual analysis of her life writing, and visual analysis of artworks illustrative of devouring. Drawing on aesthetic theory, philosophies of sexuality—like Jean-Luc Nancy's chapter "Devouring" in *Sexistence*—and feminist life writing studies, I show how de Saint Phalle stages devouring as an act that simultaneously generates a new artistic self and practices intersectional feminist resistance.

Luke Dean

Discipline: Biochemistry

Authors:

#1 Aida Nabila

Abstract Name: Structural Transitions in (CAG)_n DNA associated with Huntington's Disease

Trinucleotide repeats (TNRs) are repetitive three nucleotide sequences found in genes. TNRs are associated with the pathological effects of several genetic disorders such as Myotonic Dystrophy and Huntington's Disease. Expanded TNR DNA and RNA can form C-G mediated hairpins that affect structural stability. This research has explored (CAG)_n structure, a specific kind of TNR associated with Huntington's Disease, and examines environmentally induced structural changes using FRET and other spectroscopic techniques. The data has revealed that (CAG)_n DNA end-to-end distance increases with increasing temperature consistent with thermal denaturation of duplex structure. However, when the temperature is subsequently decreased, initial re-folding along the same path is then followed by a new conformational change to a state with increased end-to-end distance. The temperature at which this conformational change occurs is dependent on salt identities/concentrations. Notably, there is a release of Mg²⁺ ions from the (CAG)_n DNA at the temperature where significant structural changes occur. These results are highly suggestive of slippage, where base pairs in the DNA duplex become misaligned leading to an increased end to end distance. It has been demonstrated that (CAG)_n structure is highly sensitive to viscosity, and that the impact of viscosity is temperature dependent. Additionally, there seems to be a difference between the structure and stability of (CAG)_n with an even number of repeats and (CAG)_n with an odd number of repeats. A greater understanding of (CAG)_n structure, and the proposed slippage of base pairs within it, may offer insight into the mechanism of the disease.

Jonathan Dean

Discipline: Linguistics and World Languages

Authors:

#1 Vanina Machado

Alyssa Colmenero

Ethan Ernst

Abstract Name: Rhythm and speech rate in Ventureño Spanish: A speech production study of Mexican American heritage speakers in Southern California

The present study examines the prosodic behavior (timing, rhythm, and pitch) of heritage Spanish-English bilinguals in Ventura County, California. It focuses on rhythm and speech rate in relation to bilingual identity, age of Spanish acquisition, and potential English-to-Spanish prosodic transfer. Building on a four-person pilot study, the current project has grown the sample size to seven heritage Spanish speakers (4 women, 3 men; ages 19-27), all fluent in both Spanish and English. Participants completed speech elicitation tasks (a reading

passage, semi-spontaneous scenarios, and monologues) that were audio-recorded for acoustic analysis. Praat software was used to segment recordings and extract rhythm and timing metrics, including percentage of vocalic time (%V), consonant-vowel (CV) rate, articulation rate, and variability indices (VarcoC, VarcoV) as well as the Pairwise Variability Index (PVI). Preliminary results from the semi-spontaneous scenario task indicate that heritage speakers' Spanish exhibits English-like prosodic features: higher consonantal timing variability, faster articulation rate, and a narrower pitch range relative to typical monolingual Spanish patterns. However, participants with stronger identification with Mexican culture exhibited more Spanish-like rhythmic properties. Overall, the spontaneous Spanish speech of these bilinguals displayed a blend of English and Spanish prosodic patterns. These results support the view that heritage bilingual prosody is shaped by both linguistic structure and sociocultural identity. While task type was not a strong predictor, some patterns suggest that controlled speech may elicit more English-like timing, whereas semi-spontaneous speech retains more Spanish-like rhythmic traits. Expanding the study to twenty participants will allow for stronger statistical modeling of how gender and ethnic orientation interact in shaping prosodic outcomes. This work contributes to the growing body of research on heritage Spanish and provides insights relevant to sociophonetics, bilingualism, and heritage-language pedagogy.

archer deaton

Discipline: Art History

Authors:

Abstract Name: El Lissitzky, the Man Who Abandoned His Culture for the Future

In the early 20th century, Russia was in a state of great change both politically and culturally. The Bolshevik Revolution brought down the Czar and instated a new communist regime focused on instilling a new cultural identity based on seeking the future. One of the focuses was on art, and few men exemplify this better than El Lissitzky. El Lissitzky was a founder of Suprematism and Russian avant garde, who was tasked with spreading the new Soviet ideals throughout Europe with his art. Lissitzky was raised Jewish but chose to forfeit his cultural identity for that of Russia; this paper will examine El Lissitzky's life and work, in an effort to deem the extent that the Soviet Union had on El Lissitzky as both a man and an artist. Keywords: El Lissitzky, Suprematism, Proun

Renee DeBellis

Discipline: Criminology/Criminal Justice

Authors:

Abstract Name: Behind Bars and Beside the Crib: Exploring Prison Nursery Programs in the U.S. and Their Impacts

This paper explores the impact of two models, prison nursery programs and community-based alternatives to incarceration, on the well-being of incarcerated mothers and their children. It aims to (1) examine how these models support maternal-child bonding and reduce recidivism, and (2) consider their potential as more humane, cost-effective alternatives to traditional incarceration. Drawing on feminist legal theories, carceral studies, psychology, and maternal health research, this paper engages in a theoretical and interdisciplinary analysis informed by feminist epistemology, which understands knowledge as partial, situated, and shaped by systems of power (Naples, 2014). The data for this paper come from a content analysis of peer-reviewed studies, policy reports, and documentary media focused on the lived experiences of currently and formerly

incarcerated mothers to illuminate the human impact of these models. Findings suggest that while both models offer measurable benefits, their effectiveness is shaped by eligibility restrictions, racial and systemic disparities, and underlying ideologies of punishment and care. Moreover, analyses demonstrate that centering the rights and needs of incarcerated mothers within rehabilitative frameworks is essential to building more equitable and restorative justice systems. By expanding access to prison nursery programs and community-based alternatives to incarceration, these models can preserve families and foster sustainable reintegration.

Anderson DeChiaro

Discipline: Biology

Authors:

#1 Daniel Proud

Abstract Name: Investigating a clade of pied harvesters (Opiliones: Cosmetidae) from Costa Rica

The order Opiliones, commonly known as harvesters or daddy long legs, is one of the most ancient and diverse lineages of arachnids, with over 6,500 identified species distributed across the world. The classification of taxa for Opiliones has been problematic when based on morphological data, and recent studies have now used effective genetic data. Opiliones play a major role in earthly habitats as both roles of predator and prey. Fossil evidence found all over the world has revealed that Opiliones have an ancient lineage that goes back 400 million years, demonstrating their remarkable stasis through evolutionary time. Despite their importance to the environment and forms of diversity, the evolutionary history of most groups of Opiliones has not been well studied. For example, the family Cosmetidae is the largest family of Opiliones with 723 species distributed throughout the Americas and the Caribbean Islands. There are hundreds of undescribed cosmetid species, but describing them will require a new approach to defining and delimiting the genera in this family. In this study, we apply a phylogenomic framework based on ultraconserved elements (UCE) to investigate the evolutionary relationships of a new species of Cosmetidae from Costa Rica. UCEs are a powerful genomic tool that provide detailed insights into the study of evolutionary history and have greatly advanced phylogenetic studies across diverse taxa. By generating and analyzing UCE data from a dense taxonomic sampling of Cosmetidae from Costa Rica, we aim to reconstruct a phylogenetic tree to clarify evolutionary relationships among lineages and investigate how cosmetid harvesters have diversified and adapted across multiple different habitats in the region. In addition, this project utilizes detailed morphological work including high-resolution images, digital illustrations, and precise morphological measurements, to produce a formal species description.

Lauren DeCoste

Discipline: Psychology

Authors:

#1 Edurne Beltrán de Heredia

Abstract Name: Mental Health Disparities Among Hispanic Students in Horry County: A Policy and Public Health Perspective

Horry County's Hispanic families comprise a growing proportion of the total population, yet accessible, culturally competent pediatric health resources have remained stagnant. Hispanic children in this county face disproportionate barriers to care, including poverty, language differences, transportation challenges, limited insurance coverage, and stigma. 25.9% of Hispanic residents live below the poverty line. MRI studies show that children born into poverty have lower volumes of grey matter in frontal and parietal lobes, essential for processing information and execution, suggesting that socioeconomic disadvantage can impede cognitive development from early childhood. These social determinants of health contribute to adverse childhood experiences (ACEs) and poor health outcomes. If left unaddressed, these conditions will exacerbate gaps in health statistics, academic achievement, and behavioral health. Horry County presents a unique case study, as it contains densely populated and growing areas like Myrtle Beach and Carolina Forest, as well as smaller towns like Aynor and Loris. This geographic and socioeconomic variation contributes to uneven access to healthcare infrastructure, transportation, and school-based support. Schools are often the first point of contact for children experiencing mental or behavioral difficulties, yet a limited number of multicultural staff members can hinder effective support. This interdisciplinary project aims to analyze systemic and cultural barriers of mental health for Hispanic children in Horry County, identify available mental health resources, and propose policy- and community-based solutions to improve outcomes. This research will employ a mixed-methods approach. A literature review will be conducted with peer-reviewed studies and government data from PsycInfo, PubMed, and state health reports. Qualitative interviews will be conducted with key actors such as school counselors, local providers, policy officials, and families. The discussion will emphasize policy initiatives that expand bilingual counselor recruitment, rural mental health infrastructure, telehealth access, and school-community partnerships to promote culturally-responsive support for Hispanic children and families.

Caroline DeDecker

Discipline: Psychology

Authors:

#1 Caroline DeDecker
#2 Manasi Badrinarayanan
#3 Xavier Lucero
#4 Katie Henn
#5 Sarah Farah
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#10 E. Scott Geller
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Manasi Badrinarayanan
Xavier Lucero

Abstract Name: The Asch Conformity Study Revisited: The Role of Gender

Gender inequality is pervasive in today's society. Stereotypes affect the way women are perceived by all genders, including women themselves. This study investigates gender differences in conformity to a unanimous majority, focusing on how gender influences behavior. Prior research suggests that women conform more often than men, due to internalized sexism and gender stereotypes. This study replicates Solomon Asch's classic line-judgment conformity study with the addition of participant and confederate gender as independent variables. Specifically, we examine whether men and women conform differently as a function of the gender of the confederates who provide social pressure by unanimously agreeing on an incorrect visual discrimination. Participants (24 men, 26 women), along with a group of five male or five female confederates, are directed to pick one of three lines they believe is the same length as a reference line for 18 trials, 12 of which are critical trials when the confederates give a unanimous incorrect answer. Participants' answers are observed on these critical trials. We predict that men will conform less to women than men, while women will conform more to men than to women. Preliminary results reveal an overall conformity percentage of 36%, which is not significantly different from the conformity percentage of 32% reported by Asch. Additionally, the overall conformity percentage for male participants was 29%, which is also not significantly different from what Asch found in his sample, which was exclusively male. In other words, conformity levels have remained relatively stable over time and were not significantly different from Asch's finding in his exclusively male sample. Our study is still ongoing, with no statistically significant results available regarding the impact of gender on conformity. The eventual results will provide insight into how gender influences conformity in various group decision-making situations—from the workplace to educational settings.

Audrianna DeGregorio

Discipline: Psychology

Authors:

#1 Erin O'Mara Kunz

Abstract Name: What Are Gender Differences in Risk Aversion? Examining the Role of Gender in Final Jeopardy Wagers

This study will explore the differences in risk aversion between genders in the television show Jeopardy!. The literature suggests that men and women exhibit different behaviors toward risk aversion. Data for this study will be collected from a fan-made online source, J! Archive (<https://j-archive.com/index.php>). Using information from regular season episodes of Jeopardy! in 2024, statistical analyses will be conducted to evaluate relationships among variables such as gender, returning players, place in the competition, score before Final Jeopardy, and wager. The results will be interpreted to examine whether women are more risk averse in their wagers, if their risk aversion relates to their answer's correctness, and if more conservative bets correlate with lower overall winnings. The study will see if findings are shared by a similar study performed on Swedish Jeopardy! and explore which factors may affect risk aversion and self-confidence in wagering. The results of this study will contribute to the conversation about risk aversion in situations involving skill, and the pros and cons of risky versus conservative decisions. Additionally, it can explore how gender socialization contributes to behaviors in risk-taking and competitive environments. We hypothesize that women will bet a smaller proportion of their score on average compared to men, and women will bet a larger proportion when they are confident in their answer (when they answer correctly), than when they are not (when they answer incorrectly).

Marcel DeGuzman

Discipline: Mathematics

Authors:

#1 Marcel DeGuzman

#2 Giangvuthanh Nguyen

Abstract Name: Eigenvalue Bound Preservation: Numerical Experiments on the 2D Q-Tensor Flow

We study the evolution of nematic liquid crystals in two dimensions using the Q-tensor model, a continuum framework that describes the orientational order of rod-like molecules via symmetric, traceless matrices. Focusing on the Landau-de Gennes energy and its associated gradient flow, we consider a reduced two-dimensional formulation in which the Q-tensor is fully described by two scalar functions. This reduction simplifies the system to a nonlinear, coupled PDE for the scalars, while preserving essential physical features. A key question is whether the eigenvalues of the Q-tensor remain within the physically admissible range under this flow. Building on a theoretical result that establishes eigenvalue preservation for smooth solutions, we perform numerical simulations using a slightly modified version of the Crank-Nicolson method to verify this behavior. Our results confirm the robustness of the eigenvalue constraint across various initial configurations, providing computational support for the physical consistency of the model.

Latisha Dejon

Discipline: Psychology

Authors:

#1 Latisha Dejon

#2 Tava West

#3 Chelsea Williams

#4 Fantasy Lozada

Abstract Name: A Qualitative Approach to Understanding Racial Identity Stability and Fluidity among Biracial Young Adults

Biracial individuals are one of the fastest growing populations in the United States, and while literature is growing, there are gaps in existing research regarding this population's ethnic-racial identity processes, including racial identity stability and fluidity. The current study examined whether racial identity was stable for Biracial individuals of African descent. Participants were young adults, ages 18 to 25, who had at least 1 parent of African descent, so it included monoracial and Biracial individuals. A survey was given that included a qualitative section, which asked about individuals' racial identity stability. Using the lifespan model of ethnic-racial identity as the framework, we developed a codebook based on participants' responses to questions on their racial identity stability and fluidity, and then understanding what the individual attributed their racial stability to, which are known as "influencers of racial identity". Our results aligned with various influencers posited in the lifespan model, and included local current context (e.g., neighborhood, school), individual characteristics (e.g., phenotype), identity-relevant experiences (e.g., family rejection, racial invalidation), and developmental considerations (e.g., racial identity evolution over time). Methodological reflections reveal challenges in writing a codebook, including identifying narratives and ensuring ambiguity, relationality, and variability in context. This work expands the literature by offering an application of the lifespan model, and evaluation of racial identity specifically in Biracial individuals of African descent, a population that is largely underrepresented in racial identity research. Results also indicated that Biracial participants experienced more fluidity in their identity compared to the monoracial participants. Findings highlight the importance of research and interventions that are inclusive of the diverse experiences of monoracial and Biracial Black individuals.

Adriana Del Rio

OK - University of Central Oklahoma

Discipline: Architecture, Construction Management, and Interior Design

Authors:

Abstract Name: Meeting the Needs of Women within the Tabletop Gaming Hobby through Furniture Design

The Elytra Chair is designed for women interested in tabletop game playing. Today, women make up 39% of the tabletop game player population who contribute millions of dollars to the gaming market. Tabletop gaming encapsulates a wide range of games such as fantasy roleplaying, board games, card games, and more. These games require a lot of space such as for appropriate playing surfaces and storage for game pieces which may not be available to all players. The space requirements for tabletop gaming hobbies has a tendency to create limits for players who are unable to procure an adequate space. Thus, the Elytra Chair offers a variety of solutions for the space demands of the hobby. This includes a small retractable table within the arm of the chair that can be moved and adjusted as needed as well as a small cup within the arm that can be used to hold dice and other pieces that may be used for a game. This will allow players in the chair to use the small table during gameplay as well as the cup for temporary storage of items. Additionally, the chair is a standard width and height which allows it to be used with dining tables and desks, widening the range of use of the chair. The aesthetic design of the Elytra Chair is informed by the hard shell, segmented legs, and wings of a Goliath beetle which connects to the fantastical nature of tabletop roleplaying games such as Dungeons and Dragons or Pathfinder. Considering that the chair was designed with women in mind, the components have a smaller scale to fit a woman's smaller frame and more feminine sensibilities. Overall, the Elytra Chair uses fantasy inspired imagery to create seating that resolves the space needs for a tabletop game player.

Adriana Del Rio

Discipline: Architecture, Construction Management, and Interior Design

Authors:

Abstract Name: Improving the Quality of Life in a Senior Assisted Living Environment through Biophilic Design

Assisted living facilities have a variety of issues that interfere with the quality of life of its elderly residents. This includes crowded and loud dining rooms, lack of storage in the bedrooms, and harsh lighting from overhead lights and east facing windows. This project focuses on celebrating the experiences and hard work of older adults, enhancing their overall well-being, and creating a welcoming environment that promotes connection and comfort. A functional solution was developed through a combination of literature review, interviews with assisted living facility staff and residents, and precedent study research. Research suggests that biophilic design provides a connection to nature that promotes good mental health, creates a calm atmosphere, and provides an aesthetic quality. For these reasons, biophilic design directly informs the decisions made throughout the design process of the assisted living facility. Additionally, wayfinding takes into consideration visual, physical, and memory impairments in creating a solution that improves navigation for elderly residents. Key design solutions include providing furniture with high seat and armrests, arranging furniture to promote social interaction, incorporating high contrast molding and handrails for improved wayfinding, and using strategically placed bright colors to create distinctive focal points. The overall design incorporates a biophilic aesthetic with landscape mural wallpapers featuring harvest-inspired imagery. A

complementary palette drawn from the bright colors of Glass Gem corn, such as deep yellows, blues, greens, and oranges, adds bold contrast throughout the space. The idea is carried into the furniture through tufting that reflects linear, kernel-like patterns, providing familiar, easy-to-read visual cues and tactile texture that support comfort and orientation for older adults. Overall, the design honors hard work, gratitude, and the simple joys of life, creating an environment where seniors can find comfort in their daily living experience.

Alexia Del Vecchio

Discipline: Political Science

Authors:

#1 Alexia Del Vecchio

#2 Wouter Van Erve

Abstract Name: Title: Cognitive Biases in Jury Decision making and implications for Legal practice

This study explores how trial lawyers identify, manage, and mitigate juror biases during real trials, with a focus on cognitive biases and their influence on trial outcomes. The research aims to uncover the strategies attorneys use in jury selection, voir dire questioning, and bias mitigation techniques, as well as their perceptions of juror impartiality and the overall fairness of trials. Data will be gathered through interviews with experienced attorneys, who will share their insights on how cognitive biases such as confirmation bias, anchoring, and implicit racial biases affect juror decision-making. The study integrates concepts from psychology and law, examining how factors like the framing of evidence, the presentation style of attorneys, and juror social dynamics influence verdicts. It will address how attorneys assess potential jurors, manage challenges related to implicit biases, and adapt their strategies during trial to ensure fairer outcomes. Attorneys will also reflect on their experiences with bias reduction techniques, such as pre-trial jury instructions and the use of peremptory challenges. The research draws on existing literature, including studies by Ingriselli (2015) and Kang et al. (2012), which emphasize the importance of addressing biases early through debiasing instructions. Additionally, Kaplan and Miller (n.d.) explore how evidence reliability and courtroom behaviors shape juror verdicts, while Sommers and Norton (2008) and Curley et al. (2022) highlight how social pressures and cognitive overload during deliberations can influence decisions. Through interviews, the study will gather qualitative data on how attorneys perceive these factors and manage juror biases, ultimately offering insights into improving jury selection, trial strategies, and fairness in the courtroom.

Anthony DeLarco

Discipline: Criminology/Criminal Justice

Authors:

#1 Anthony DeLarco

Abstract Name: Effect of light variation conditions on the comparison of fired bullet evidence.

In recent years, ballistic evidence and examination has been heavily scrutinized in courts and have often been deemed inadmissible due to judges finding that the method of analysis isn't "scientific". This study examined how different light conditions, specifically light angle, affect the comparison of fired bullet evidence. The goal of this study is to find how different light angles affect ballistic identification features and whether the light angle under which fired bullet evidence is examined affects the conclusions drawn about the evidence". Using a comparison microscope, a scissor jack, and multiple different tripod heads, we were able to adjust

our light source to let us control what angle the light was shining on our samples. Digital images of our samples were then taken at different angles of light and transferred to a computer for analysis using a photo editing software that allowed us to compare images side-by-side. Preliminary results show that light angles significantly affect how examination of fired bullet evidence is conducted and how results vary because of it. Some results show that angle differences of just 3-6 degrees can completely change some of the features that would otherwise be used for an examiner to confidently give a positive result or a negative result. These results can drastically change the field of ballistic forensic science since changes of the light angle can be so minute, but still have huge impacts on an examiner's conclusion. One direction this could take in the future is to find how light angle might affect a confocal microscope and possibly find the degree of error adjusting light angles bring.

Briana DeLaughter

Discipline: Psychology

Authors:

Alexandra Jones

Hallie Boland

Abstract Name: Bedtime Procrastination, Doomscrolling, and Loneliness

Bedtime Procrastination (BP), purposefully delaying one's sleep, is a problem that many students struggle with. Prior research has shown possible correlations between BP, doomscrolling (i.e., flooding your social media with negative content for extended periods of time), and loneliness (i.e., a disconnect between one's desired amount of social connection and the actual amount of connection). Therefore, this study assessed both doomscrolling and loneliness to determine if they were predictors of BP. The data in this study were collected from five undergraduate classes: Behavior Science Statistics, Issues in Science, Concepts of Mathematics, Abnormal Psychology, and Investigating Terrorism, consisting of a total of 104 participants (75 women; 28 men; 1 "prefer not to say") of varying ages and college classification. The instruments used were the Reasons for Bedtime Procrastination Scale (RBPS), the Doomscrolling Scale (DS), and the Revised UCLA Loneliness Scale. The results of a multiple regression analysis revealed that doomscrolling scores significantly predicted bedtime procrastination scores. Loneliness scores and gender were not significant predictors of bedtime procrastination. Practical implications, limitations, and recommendations for future research were discussed.

Alvaro Delgado

Discipline: Biology

Authors:

#1 Alvaro Delgado

#2 Valentina Dargam

#3 Joshua Hutcheson

Abstract Name: Determining Circulating Levels of NT-proBNP in Mice Using Sandwich ELISA

Cardiovascular disease is the leading cause of death in patients with chronic kidney disease (CKD), so identifying early biomarkers of cardiac stress is essential for improving diagnosis and treatment. This study aims to measure changes in a common cardiovascular disease marker within a CKD mouse model induced through adenine diet supplementation. Adult male and female mice were fed either a 0.2% Adenine diet to induce CKD or a standard chow diet to serve as the healthy control for up to 12 weeks. Plasma and serum

samples were collected every 3 weeks to measure N-terminal pro-Brain Natriuretic Peptide (NTpro-BNP), a circulating biomarker of left ventricular remodeling released by cardiomyocytes. NTpro-BNP concentrations were quantified using a sandwich Enzyme-Linked Immunosorbent Assay (ELISA). Adenine-fed male mice exhibited increased NTpro-BNP levels at week 6 ($203.13 \text{ pg/mL} \pm 0.489714$), much earlier than adenine-fed females ($90.26 \text{ pg/mL} \pm 0.489714$). Adenine-fed female mice had an increase in NTpro-BNP as the weeks progressed (Week 3: $75.67 \text{ pg/mL} \pm 0.489714$, Week 6: $93.72 \text{ pg/mL} \pm 0.489714$, Week 9: $166.84 \text{ pg/mL} \pm 0.489714$, Week 12: $173.84 \text{ pg/mL} \pm 0.489714$). There are not enough male mice at later timepoints to determine a pattern due to the lack of survivability of male mice at later timepoints using the CKD model. There were no significant changes in the control group as the weeks progressed. Consistent with the previous studies by our lab identified sex-specific differences in cardiac function and electrophysiology in adenine-induced CKD mice. These findings suggest that adenine-induced CKD promotes cardiac stress, and disease progression differs between sexes.

Gianna DeLisio

Discipline: Chemistry

Authors:

#1 William Alexander

Abstract Name: Investigation of the Lewis Basicity of Small Organics Interacting with Uranium Hexafluoride

Utilizing computational chemistry, we aim to expand the understanding of how organic functional groups interact with uranium hexafluoride (UF₆). This fundamental knowledge may guide future strategies for repurposing the United States' surplus of 700,000 tons of depleted UF₆ created from uranium enrichment. By quantifying how functional groups distort and bind to UF₆, we seek to characterize which functional groups most effectively bind to UF₆ to form an adduct. A series of functional groups were screened to determine which led to the greatest disruption of the octahedral geometry of UF₆. Functional groups containing only nitrogen heteroatoms exhibited higher intermolecular binding energies (IBE) with UF₆ compared to groups containing nitrogen and oxygen, or oxygen alone. These results indicate that UF₆ has a stronger preference for coordination with nitrogen lone pairs than with oxygen lone pairs. Furthermore, increasing angular deviation of the UF₆ octahedral geometry correlated with higher IBE values, indicating the formation of stronger adducts. Additionally, early results reveal that IBE values for UF₆ adducts align with trends observed in the BF₃-affinity scale, a widely used proxy for the Lewis basicity of organic functional groups. This correlation suggests that UF₆ and BF₃ may exhibit similar binding behaviors despite the different molecular geometries of the two Lewis acids. Understanding these parallels can help establish predictive models for UF₆ adduct formation and guide the identification of functional groups for these strong interactions. Our ongoing work continues to probe these relationships to advance the understanding of Lewis basicity and potential reactivity within UF₆ chemistry, while further exploring the parallels between UF₆ and BF₃.

Ashlyn Dellemann

Discipline: Sociology

Authors:

#1 Tina Lee

#2 Courtney Juelich

Abstract Name: Issues with Rental Housing Quality in Dunn County

In Dunn County, 33% of the population are renters. This study aims to look at what Dunn County renters' current issues are, if these issues are across the board or specific to certain landlords/rental companies, if safety is a concern of renters, and how renters feel about their landlords versus how landlords perceive themselves. To identify trends and potential persistent issues, a survey of University of Wisconsin Stout students (who make up a large percentage of renters in the county), interviews with landlords, and 10 years of previous housing quality complaints in Dunn County were leveraged. Surveys indicated that UW-Stout students' largest issue was landlords and rental companies not fixing things in a timely manner. 33% of students from the survey reported issues with landlords and rental companies not responding to complaints, and 54% reported that it takes "a few days" to fix an issue. However, 46% reported that it takes around "a few hours" to reply. Further, 52% of the respondents from the survey reported issues with mold, 42% reported utility issues, 33% reported issues with bugs, and 21% reported issues with the return of their security deposits. No matter the landlord/ rental company many renters faced similar issues and came to the same consensus that they believed their landlord or rental company just didn't care. In contrast, in the interviews with landlords, they perceived themselves as being very reliable, easy to communicate with, and respectable. This is a very different view than that held by student tenants, and the two different perspectives added to my understanding of how miscommunication and lack of knowledge can cause issues to get out of hand fast. If a community wants to better address rental conditions holistically, they will first need to get landlords and renters to agree on a singular experience.

Lanna Dellick

Discipline: Psychology

Authors:

#1 Lanna Dellick

#2 Deanne Buffalari

Abstract Name: Effects of Estrogen and Acetylcholine Depletion on Spatial Memory: Assessing E/P Therapy in a Rat Model of Female Aging

Aging in women is often accompanied by decreases in circulating estrogen and acetylcholine levels caused by menopause and Alzheimer's disease respectively. Both of these declines have been linked to impairments in memory recall and decreased overall cognitive functioning. Previous research has investigated the memory impairments caused by estrogen and acetylcholine depletion, however little is known about whether hormone replacement therapy via estrogen and progesterone (E/P) injections is a viable treatment to overcome these impairments. This project investigates the effects of estrogen and acetylcholine loss on spatial memory, and evaluates the potential of E/P therapy as a treatment for spatial memory impairment. Sixteen female Long-Evans rats were trained on a radial arm maze (RAM) to establish baseline spatial memory performance. All rats then underwent ovariectomy surgery (Ovx) to induce estrogen depletion, followed by one week of recovery. The rats were then divided into four groups ($n = 4$): (1) OvX-only with no E/P treatment, (2) OvX-only with E/P treatment, (3) OvX + scopolamine-induced acetylcholine depletion with no E/P treatment, and (4) OvX + scopolamine-induced acetylcholine depletion with E/P treatment. Spatial memory recall was reassessed using the RAM, with the same arms baited as in the original pretest. Working and reference memory errors were recorded in a standardized format, allowing for the comparison of errors made between each of the four testing conditions; with more errors indicating further impaired spatial memory. By comparing performance across groups, this study examines how estrogen and acetylcholine depletion interact to influence spatial memory, and whether E/P therapy can reduce memory impairments associated with female neuroendocrine aging.

Kieran DeLoatch

Discipline: Biology

Authors:

#1 Tarun Bhatia

#2 Rehana Leak

Abstract Name: Glial Expression of Neuronal Marker MAP2 in Vitro and in Vivo

Microtubule-associated protein 2 (MAP2) plays a role in neuronal microtubule assembly. Although MAP2 expression was reported in injured astrocytes decades ago, this protein is widely used today as a neuron-specific marker. Here we report MAP2 expression in rat primary astrocyte cultures, using two independent antibodies. We also confirmed prior reports of in vivo MAP2 expression in murine GFAP⁺ astrocytes. Astrocytes expressed a low-molecular mass isoform of MAP2 but not the neuron marker NeuN. Control primary cultures containing neurons expressed two isoforms of MAP2 and abundant NeuN. Treating astrocyte cultures with paraquat and hydrogen peroxide or increasing the passages number did not increase MAP2. The proteasome inhibitor MG132 affected neither MAP2 nor GFAP expression in primary astrocyte cultures. Thus, additional MAP2 may not be expressed in cultured astrocytes, as they have already undergone intense gliosis. These findings have significant implications for the common use of MAP2 as a marker of neurons.

Annsley DeMent

Discipline: Health and Human Development

Authors:

#1 Cameron Sheeler

#2 Amy Soulis

Abstract Name: The Identification of a Safer Alternative to BPA using a Zebrafish Model

Bisphenol compounds, such as bisphenol-A (BPA), are linked to negative health outcomes like diabetes, obesity, and hormone-dependent cancers. BPA and BPA analogs like bisphenol-B (BPB) and bisphenol-C (BPC) are found in products such as plastics, thermal receipts, and food packaging. BPA, an endocrine disruptor, binds to and activates estrogen receptors. Previous studies have identified bisguaiacol-F (BGF) as a potential replacement for BPA due to lack of estrogenic activity. Our research uses a zebrafish model to determine the effects of BPA, BPB, BPC, and BGF on development and seeks to determine if BGF is a safer alternative. Our acute toxicity experiments have identified BPC as the most toxic with BGF being the least toxic at 96 hours post fertilization. The LC₅₀ values for the compounds are as follows: BPC ($16.0 \pm 1.1 \mu\text{M}^*$), BPB ($24.0 \pm 2.6 \mu\text{M}^*$), BPA ($35.3 \pm 1.3 \mu\text{M}^*$), and BGF ($82.3 \pm 0.8 \mu\text{M}^*$) (mean $\pm$ SEM, of at least three independent experiments, *p < 0.05). Ongoing studies include effect on expression levels of known estrogen-responsive genes such as vtg1, vtg3, and cyp19a1b and the expression levels of estrogen receptors ER α , ER β 1, and ER β 2. RNA-seq will establish a transcriptional profile of these of each compounds at 24, 48, and 72 hours post fertilization. Genes with altered expression levels identified from RNA-seq will be confirmed and quantified using real-time quantitative polymerase chain reaction (qPCR). Genes of interest will be classified according to their function. Our studies using a zebrafish model will further understanding of the health risks posed by potential environmental toxins.

Maci DeMott

GA - Kennesaw State University

Discipline: Psychology

Authors:

#1 Maci DeMott

#2 Artemas Souder

#3 Yian Xu

#4 Ordene Edwards

Abstract Name: The Influence of Social Essentialism on Reader Identity Development and Comprehension

Reading comprehension is critical for college students' success, which can be influenced by their reader identity and reading motivation. Social contexts can shape reader identity, and social essentialism may predict it. Social essentialism relates to a belief system that maintains social groups have inherent, fixed properties. Although evidence exists that essentialist beliefs influence sociocultural identity, little is known about its effect on reader identity. Moreover, despite overwhelming evidence of the influence of social factors on motivation, the literature is scant about the role of social essentialism in college students' reading motivation. Given the impact of comprehension on postsecondary achievement, it is crucial for educators to identify the social predictors of reader identity and reading motivation and understand how reader identity and reading motivation influence comprehension. As such, the present study asked: (1) How do students' social essentialist beliefs influence students' reader identity and motivation? We also replicated prior studies to explore two additional questions: (2) How are students' reading motivation and reader identity predicted by other social factors (3) How are students' reader identity and reading motivation related to their reading comprehension? Undergraduate students (N = 132) attending a public university in the Southeastern USA completed a survey online and were assessed on their social essentialist beliefs, reader identity, and reading comprehension. We found that stronger essentialist beliefs on cohesiveness and naturalness were positively associated with reader self-efficacy and utility value. However, the naturalness dimension was positively correlated with reader identity, metacognitive self-regulation, and motivation. Cohesiveness beliefs were positively related to students only reading for academic purposes. Interestingly, a multiple linear regression revealed that family was the only significant predictor for reader identity and motivation. Finally, the students' reader identity and motivation were associated with greater reading comprehension. Implications include insight for educators and families to develop adaptive reader identity.

Abigail Den Bleyker

Discipline: Education

Authors:

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#2 Delaney Ingbretson

Delaney Ingbretson

Abstract Name: Reframing Pre-Service Teachers' Beliefs: Investigating Post-Intervention Discussions on Implicit Biases

This study examines whether counter storytelling can reduce implicit racial bias among pre-service teachers. Prior research shows that implicit attitudes influence teachers' expectations, disciplinary decisions, and interpretations of student behavior. These patterns contribute to racial disparities in education. Because teachers play a central role in shaping students' academic and social outcomes, understanding whether bias can shift during teacher preparation is important. Guided by Critical Race Theory (CRT), this project investigates whether exposure to counter stories, which are narratives from people of color that challenge dominant racial assumptions, can influence subconscious beliefs. This project used a quasi experimental design. Ninety-five first-year education majors at a liberal arts university completed the Race Implicit Association Test (RA-IAT) before and after an instructional intervention based on the novel *Caste*. Fifty-nine

students participated in the counter storytelling intervention. Thirty-six students served as a control group. ANCOVA results showed that although both groups demonstrated implicit pro-White bias, students who engaged with counter stories showed a trend toward reduced bias after the intervention. Qualitative data from focus groups added depth to these findings. Participants described encountering perspectives they had never heard before and noticing how racial narratives become normalized in society. Many reflected on their own assumptions and explained that unlearning bias requires active work rather than a colorblind approach. Taken together, the quantitative and qualitative findings suggest that counter storytelling can help pre-service teachers begin to challenge biased thinking. Although these results are preliminary, they point to the value of including narrative-based racial equity coursework in teacher education programs. Future cycles of data collection will strengthen understanding of how counter stories shape implicit attitudes and how this learning might influence classroom practice. Overall, this study highlights the potential for teachers to reduce bias by listening to voices that are often overlooked.

Jordan Dent

Discipline: Education

Authors:

#1 Rachel Siefring

Abstract Name: Social Pathways to Belonging: Investigating Involvement, Friendships, and Campus Connection

Despite research identifying sense of belonging as a key predictor of persistence, engagement, and well-being in higher education, less is known about how close friendships developed on campus shape belonging within institutional environments. While campus involvement is assumed to strengthen belonging, this outcome may vary based on the students' friendships, depth of involvement experiences, and the broader institutional context. Furthermore, the relationships among these variables may differ at larger universities, where students may struggle to build meaningful friendships despite high campus involvement. This raises the question: if involvement supports belonging, where does this relationship falter with actively involved students? To address this gap, this study asks: To what extent do extracurricular involvement, campus friendships, and leadership involvement predict students' sense of belonging, and do campus friendships mediate the relationship between involvement and belonging? This project uses secondary data from an institutional survey administered to a random sample of students at a large, public research institution in Spring 2025. In this study, involvement is defined as participation in campus events and student organizations; friendships are measured by the number of close friends on campus; and belonging is measured using a multiple-choice scale reflecting students' perceived connection to the institution and its community. Demographic characteristics (gender, race/ethnicity, first-generation status, student level, housing) and extraversion will serve as controls. To examine the research questions, hierarchical multiple regression will be used to analyze the predictive contributions of involvement, friendships, and leadership. A mediation analysis will then test whether the number of close friendships mediates the relationship between involvement and belonging. By investigating these relationships, the study aims to offer insights into how students' social networks may shape their sense of connection at the university, while also informing strategies to foster stronger community and support student well-being.

Michael Derderian

Discipline: Engineering

Authors:

#1 Leitao Chen

Abstract Name: Extending the Essentially Entropic Lattice Boltzmann Method to Three-Dimensional Turbulent Flows

The Essentially Entropic Lattice Boltzmann Method (EELBM) has demonstrated strong numerical stability and accuracy for two-dimensional simulations, particularly at higher resolutions where the entropic formulation introduces only minimal stabilizing turbulent viscosity and eventually converges to the Lattice Bhatnagar–Gross–Krook (LBGK) formulation. This built-in stabilization can be interpreted as an implicit large-eddy simulation (LES) model, allowing EELBM to capture complex turbulent behavior without requiring explicit subgrid-scale closures. While these advantages have been thoroughly validated in 2D, understanding how the entropic constraint regulates dissipation in three dimensions is essential for assessing EELBM's suitability for practical, turbulence-dominated applications. This work focuses on the development and evaluation of a three-dimensional EELBM solver based on the D3Q27 lattice and assesses its performance on representative turbulent flow configurations. The study considers flows in which inherently three-dimensional structures and vortex dynamics play a central role, including the cubic lid-driven cavity and flow over bluff-body geometries. Simulations will be conducted across a range of Reynolds numbers, Mach numbers, and grid resolutions to evaluate numerical stability, accuracy, and the effectiveness of the entropic stabilization mechanism. A central component of this investigation is quantifying the stabilizing viscosity produced by the entropic condition and determining how this effective turbulent viscosity scales with resolution and local flow gradients. Understanding this behavior is critical for predicting the degree of under-resolution the model can accommodate and for informing prospective users about the method's implicit turbulence-modeling characteristics. Successfully demonstrating stable and accurate performance in three dimensions would significantly expand the applicability of EELBM and establish it as a robust, entropy-driven alternative to traditional LES approaches for complex turbulent flows.

Radhi Desai

Discipline: Nursing and Public Health

Authors:

#1 Dina Garcia

Hannah Mansuri

Abstract Name: Quantitative Assessment of Wellness Among Caregivers of Children with IDD's Using the Five Factor Wellness Inventory

An estimated 13.6 million children in the United States live with special health care needs, including intellectual and developmental disabilities (IDDs). IDDs can affect behavior and cognition, limiting children's ability to perform daily activities such as managing oral hygiene. Consequently, caregivers play a central role in supporting oral health for children with IDDs. However, little is known about how caregiver wellness shapes oral health caregiving. This study is part of a larger mixed-methods project examining how caregiver wellness influences oral health caregiving for children with IDDs. The present analysis reports the quantitative component, which assessed caregiver wellness using the Five Factor Wellness Inventory (FF-WEL). The FF-WEL is a strength-based, multidimensional instrument with 91 scored items covering five domains: creative self, coping self, social self, essential self, and physical self. Responses yielded overall and subdomain wellness scores, and descriptive analyses examined scores by sociodemographic and caregiving characteristics. Thirteen caregivers enrolled, all identifying as women. On average, participants had served as caregivers for 9.5 years (range: 2–17), and most (69%) cared for a child with Down syndrome. Total wellness scores ranged from 61.26 to 82.97 (median: 73.9). Social self had the highest subscale scores (range: 71.8–100; median: 87.5), while physical self scored lowest (range: 57.5–92.5; median: 67.5). These quantitative findings offer an initial snapshot of wellness among caregivers of children with IDDs, highlighting strengths in social well-being and potential needs in physical wellness. Results can inform targeted supports and interventions to bolster caregiver holistic wellness, which may in turn improve oral health caregiving and

child outcomes. These results may inform national practice and policy as outlined in the Blueprint for Change Framework.

Samantha DeSantis

Discipline: Psychology

Authors:

#1 Samantha DeSantis

#2 Christina Zahorik

#3 Elena Popovich

Abstract Name: From Past Burdens to Finding Peace Through Spirituality

Regret is an emotion that arises when individuals reflect on past decisions and recognize that different choices could have led to better outcomes (Beike et al., 2009; Kahneman & Tversky, 1982; Roeser & Summerville, 2007). Although previous research has explored cognitive and emotional mechanisms underlying regret, less attention has been given to how spirituality influences the experience and interpretation of regret. Spiritual beliefs may serve as a framework for meaning-making and forgiveness or, conversely, heighten guilt and self-blame (Pargament et al., 2011; Yamada et al., 2020). The present study aims to examine how positive and negative religious coping styles relate to the intensity of regret experienced after decisions that fail either by action or inaction. Approximately forty undergraduate participants will complete the Brief RCOPE, read scenarios depicting regrettable action or inaction, and rate anticipated regret. This will allow us to examine how positive and negative spiritual coping influence regret using a 7-point scale. It is hypothesized that positive religious coping will be associated with lower levels of regret through self-forgiveness and meaning-making, whereas negative religious coping will be associated with higher regret intensity, particularly for decisions involving moral conflict. It is anticipated that participants with higher levels of religiosity will report stronger regret, consistent with heightened moral sensitivity. However, among those engaging in positive religious coping, this relationship is expected to weaken, reflecting the protective role of forgiveness and acceptance. Conversely, individuals high in negative religious coping (e.g., perceiving punishment from God) are expected to report greater regret intensity, particularly for moral violations stemming from action. These expected findings will extend research on the intersection of emotion and spirituality by clarifying how faith-based coping frameworks influence counterfactual reasoning and self-evaluation. Understanding these dynamics may guide interventions that incorporate spiritual coping to promote emotional resilience, self-compassion, and adaptive growth following regret.

Samantha DeSantis

Discipline: Psychology

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#2 Ipek Uzumcu

Abstract Name: Finding Life Satisfaction Through a Week of Gratitude

Although many people dedicate time to achieving their goals, a deep sense of life satisfaction often remains elusive even after success. Gratitude journaling, the practice of noting things you are thankful for each day, is a simple and effective way one can try to enhance their well-being. Focusing on gratitude may help gently shift one's perspective, ease emotional burdens, and help life feel more fulfilling. The purpose of this

proposed study is to examine the impact of daily gratitude journaling on life satisfaction. Research has found that practicing gratitude promotes a positive outlook on life, further improving one's well-being (Chauhan et al., 2025). Therefore, we expect that practicing gratitude, even for just a week, can improve one's outlook on life and in turn, their perceived life satisfaction. To test this, participants will complete the Satisfaction with Life Scale (SWLS) (Diener et al., 1985) to measure their baseline of life satisfaction. Then, over a seven-day period, participants will practice gratitude journaling, writing down three things they are grateful for each day, and will conclude by completing the SWLS again to assess any changes in life satisfaction. It is hypothesized that participants will perceive higher life satisfaction after the gratitude journaling period than at baseline. These findings would be consistent with previous research showing that gratitude journaling can help reduce stress and negative emotions (Fekete & Deichert, 2022), and that practicing gratitude can elevate one's well-being by supporting better mental health (Chauhan et al., 2025). The proposed study aims to add to the growing evidence that gratitude journaling can help improve perceived life satisfaction. This could be especially beneficial for individuals looking to improve their life satisfaction through mindfulness-based practices like gratitude, as well as for those hoping to improve their well-being over a short period of time.

Zemichael Desta

Discipline: Computer Science

Authors:

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#2 Rushit Dave

#3 Mansi Bhavsar

Abstract Name: Typing Patterns Never Lie: Robust Behavioral Biometrics with Hybrid Ensembles

Mobile devices have become indispensable; existing authentication methods such as PINs and passwords verify users only once at login, leaving devices exposed afterward. Continuous Authentication (CA) mitigates this risk by continuously verifying user identity during interaction. Among CA techniques, touch-based behavioral biometrics are particularly promising because they require no special hardware and can unobtrusively capture unique user patterns. This paper proposes a hybrid one-class ensemble framework for robust continuous authentication using large-scale mobile typing data from over 30,000 users. Our approach combines One-Class Support Vector Machine (OC-SVM) and Isolation Forest (IF) anomaly detectors through score-level fusion, reinforced with Hard Negative Mining (HNM) and cross-shard impostor simulation to ensure generalization against unseen attackers. Using a 12-feature standardized set capturing timing, rhythm, and error dynamics, our system achieves an average AUC of 0.97 and EER of 2.9%, with over 90% of users below 5% EER. These results demonstrate that ensemble-based one-class modeling with hard negative refinement can deliver exceptionally reliable continuous authentication without requiring labeled impostor data.

Ruhani Deswal

Discipline: English and Literature

Authors:

Abstract Name: Lewy Body Dementia in King Lear

Lewy Body Dementia involves cognitive impairment, irrational behavior, hysteria, and confusion. These

symptoms are clearly evident in King Lear through his behavior and others' responses to his actions. Although diagnosing a fictional character doesn't fully account for a disease's complexity, King Lear's diagnosis helps readers gain a deeper literary understanding and empathy for dementia patients overall. It examines the symptoms of cognitive decline, including delirium, psychosis, and depression, emphasizing the importance of distinguishing these symptoms from normal aging. Modern clinical descriptions of dementia, particularly Lewy Body Dementia, provide a framework for identifying key behavioral and cognitive characteristics, which can then be compared to King Lear's actions and interactions throughout the play. At the same time, this analysis acknowledges ethical and methodological concerns regarding the application of medical diagnoses to fictional characters, addressing counterarguments about the limitations of assigning clinical labels to literary figures. By combining textual evidence from the play with established medical knowledge, King Lear can be validly diagnosed with Lewy Body Dementia and his diagnosis can be used to improve understanding and empathy towards dementia patients overall.

Rose Detore

Discipline: Mathematics

Authors:

Abstract Name: General Position Colorings and Graph Powers

In mathematics, a graph G (sometimes called a network in other fields) is a set of vertices (or nodes) that are connected by edges. When two vertices are connected by an edge, we say that these vertices are adjacent to one another. In mathematics and computer science, as well as in many other areas of inquiry, both practical and theoretical problems can often be modeled using graphs. In this project, we study a way of selecting special sets of vertices in a graph so that no shortest path of a given length in the graph contains more than a predetermined number of vertices. We also study how to color the vertices of a graph so that each color class satisfies this same restriction. These two ideas lead to two numerical measures of a graph: (1) the k -general d -position number, which records the largest possible size of such a restricted set, and (2) the k -general d -position chromatic number, which records the smallest number of colors needed to produce a coloring in which every color class satisfies the restriction. We establish several basic relationships between these two measures and explore how they change when we take powers of a graph, a standard operation that connects vertices that are within a fixed distance of each other. For graphs that come from powering a path, we give exact formulas for both measures. For cycle graphs, we obtain an exact formula for the k -general d -position chromatic number. We determine an upper bound for the k -general d -position number of any graph power in terms of the original graph, and a similar lower bound for the k -general d -position chromatic number.

Julia Devine

Discipline: Economics

Authors:

Abstract Name: Occupational Teleworkability and Long-Term Post-Pandemic Labor Market Disruptions

Using National Longitudinal Survey of Youth 1997 (NLSY97) data, I study whether pre-pandemic occupational teleworkability is related to long-term post-pandemic labor market disruptions, as measured by changes in earnings, labor force participation, and hours worked. Past research has shown that those who had occupational teleworkability during the pandemic fared better than those who didn't, but has not looked at the long-term implications of occupational teleworkability on long-term labor market disruptions from the

pandemic. Past research has also used mostly cross-sectional studies; using longitudinal data on individuals to track changes over time for each individual allows me better control for individual heterogeneity than cross-sectional studies. Multiple models will regress teleworkability in 2019, sex, race, ethnicity, education level in 2019, census regions in 2019, industry in 2019, and marriage status in 2019 on the difference in income between 2018 and 2020/2022, the difference in hours worked between 2019 and 2020/2021/2022, whether a person who worked in 2019 stopped working in 2020/2021, and whether a person changed occupation between 2019 and 2020/2021. I expect to see that having an occupation with low teleworkability will lead to a decrease in income differences and an increase in the likelihood that participants drop out of the labor force. I expect to see no effect on the difference in hours worked and the likelihood that participants change occupations. Preliminary results show that pre-pandemic teleworkability has a negative effect on the income difference between 2018 and 2020, and whether a participant stopped working between 2019 and 2020.

David deVyver

Discipline: Economics

Authors:

#1 Nathaniel Throckmorton

Abstract Name: Downward Nominal Wage Rigidity: An Application Analysis

In Real Business Cycle models, there are sometimes different approaches to imposing constraints. Downward Nominal Wage Rigidity (DNWR) is a popular constraint used to amplify business cycle downturns, which has been introduced in an ad-hoc manner instead of being explicitly included in the household's wage-setting problem. In the ad-hoc model, the household solves its wage-setting problem, and then DNWR is ex-post imposed on the resulting equilibrium wage in a simple labor market. In this paper, we modify a simple New Keynesian model such that the household has wage-setting power and refuse to accept a wage below a certain threshold. We include the DNWR constraint in the formulation of the household's optimization problem, and they choose their current wage to be weakly greater than or equal to their previous wage. This naturally introduces the constraint into the model as the household's first-order equilibrium conditions account for the DNWR constraint. Using MATLAB, we obtain a global nonlinear solution nonlinear to both models. Then we will compare our model to the ad-hoc model by looking at business cycle moments, impulse response functions, and zero-lower bound episodes to determine if the ad-hoc model is consistent with the dynamics of our model. Our hypothesis is that our model may have meaningful differences from the ad-hoc model due to the underlying difference in how the DNWR constraint is imposed.

Kayla Dew

Discipline: Education

Authors:

#1 Andrew Kim

#2 Charen Glasgow

Abstract Name: Finding Access Through Silence: How Assistive Technologies Shape Learning for Deaf and Hard of Hearing Students

Deaf and hard-of-hearing students often face challenges in higher education due to communication barriers, especially in environments not designed to support their needs. Clear and direct communication is critical for processing and understanding content, and hearing loss complicates this. This study evaluates how accessible

accommodations and assistive technologies, such as captioning, Roger Pens, and word-dictation tools offered at Georgia State University Perimeter College (GSUPC), support or limit students' learning in classroom settings while considering both environmental and instructional factors. The primary assumption of this study is that the effectiveness of assistive technologies relies on their ability to support the cognitive processes critical for understanding and retaining educational material. These tools are intended to bridge the gap between spoken information and accessible content that students can engage with and use for learning. The study also assumes that academic success depends on the availability, usability, and implementation of these tools in classroom environments. Cognitivism serves as the theoretical framework, focusing on the mental processes involved in understanding and organizing information and providing a lens for interpreting how hearing-related assistive technologies support comprehension in academic settings. The purpose of this study is to evaluate how well assistive-technology accommodations at GSUPC support the academic participation and learning needs of students with hearing disabilities. Using a mixed-methods approach, the study analyzes institutional documents, counselor insights, and interviews with TRIO and Access and Accommodations Center counselors. A literature review is also included to compare GSUPC's practices with broader research on assistive technologies. Expected findings suggest that while these technologies provide meaningful support, their effectiveness is influenced by classroom variability, instructional choices, and environmental factors. Insights from this study may inform improvements to assistive-technology implementation at GSUPC and similar institutions.

Haley DeWitt

Discipline: Biology

Authors:

#1 Kaitlyn Kinslow

#2 Andrew Velkey

Zoey Thayer

Abstract Name: Principles of Undergraduate Laboratory Management within a Team-Science Model: The FishLab at CNU.

This project highlights the role of the undergraduate laboratory manager within a team-science research model and demonstrates how this largely under-researched position, fundamentally different from professional lab management in research-intensive settings, prepares students for future careers in research, healthcare, and scientific leadership. In this context, team science refers to a collaborative approach in which undergraduate researchers contribute to multiple concurrent projects, coordinate shared workflows, and participate in collective decision-making within an interdisciplinary research group. The FishLab at Christopher Newport University consists of students with diverse academic backgrounds who collectively work across several behavioral neuroscience projects, including studies on zebrafish choice behavior, fluoxetine-induced impulsivity in *Betta splendens*, the effects of a synthetic alarm substance on social preferences as well as shoaling responses in zebrafish, and the development of a remote-sensing, fish-operated land vehicle. This breadth of research underscores the need for structured and cohesive management. The undergraduate student serving as the laboratory manager supports this structure by organizing schedules, matching new researchers to teams, tracking attendance and training progress, and fulfilling responsibilities essential to lab operations. The manager meets weekly with the principal investigator to review project progress, identify growth opportunities, onboard new recruits, and recognize students demonstrating strong work ethic and emerging leadership potential. Weekly lab meetings led by the manager provide updates on active projects, manuscripts, presentations, and lab events, and include professional development instruction designed to prepare students for graduate and professional programs through training in interview preparation, presentation skills, academic development, and research writing. Unlike professional laboratory managers whose work centers on administrative oversight, technical operations, and maintaining continuity in large, highly-funded labs, undergraduate laboratory managers operate within a peer-based framework emphasizing collaborative coordination, communication bridging, and

mentorship. This model strengthens laboratory productivity while equipping student managers with transferable skills in teamwork, communication, and organizational leadership.

Labindra Dhami

Discipline: Business

Authors:

#1 Devin Lunt

#2 Philip Krummrich

Abstract Name: Bold Flavor, Bolder Strategy: Were They Enough to Make Doritos' "Ultrasound" Super Bowl Advertisement Memorable?

Every year, the Super Bowl brings together more than a 100 million people: not just for the game, but for the commercials that've become just as famous as the touchdowns. If you can remember, one of the most unforgettable of these ads came from Doritos in 2016. Their "Ultrasound" commercial, a fan-made entry from the company's Crash the Super Bowl campaign, sparked laughter, debate, and millions of views. What made this 30 second ad so powerful and what does it reveal about how modern brands connect with audiences? From this presentation, we're going to explore how there's more to Doritos' success than just a combination of bold flavor and bolder strategy. Furthermore, we're going to take a close look at how Doritos' "Ultrasound" ad used market segmentation, targeting, and positioning strategies to reach its audience, and how humor and emotional storytelling played a key role in its success. By the end of this presentation, we'll realize how a simple, outrageous idea (an unborn baby reacting to Doritos) managed to blend shock value with relatability, reaching both young adults and parents in a way that felt fresh, bold, and completely unforgettable. What truly sets this ad apart is its origin. It wasn't created by a professional marketing agency but came from a fan. Doritos' decision to open its Super Bowl campaign to the public showed a new kind of marketing power: something that was authentic and driven by the audience's creativity. The ad quickly went viral and earned the top three spot in USA Today's Ad Meter for 2016. What this reveals is user-generated content being able to disrupt traditional marketing. This ad reveals that sometimes a simple looking idea that is both bold and funny is able to connect people to a brand more deeply than a polished studio production.

Vineet Dhillon

Discipline: Biology

Authors:

#1 Indu Sharma

#2 Grace Busch

Abstract Name: Culture-Verified Functional Heterogeneity in Bloom-Associated Marine Bacteria

Marine algal blooms release significant quantities of β -glucans such as laminarin, creating carbon pools that are processed by heterotrophic bacteria. This study aimed to isolate, culture, and identify these polysaccharide-degrading bacteria from the 2025 Cocolithophore bloom near the Gulf of Maine. Seawater collected from 40°54.207' N, 65°56.711' at station 2 cast 42 with a depth of 50m was enriched in a laminarin-containing medium. After 4 days, a high turbidity in the culture media was observed, indicating successful microbial growth. Two distinct microbe colonies, 03VD25 and 04VD25, were isolated and streaked to obtain pure cultures. The isolates were identified using 16S rDNA gene amplification followed by sequencing. Through BLAST nucleotide analysis, 03VD25 and 04VD25 were identified as *Shewanella inventionis* and

Pseudoalteromonas sp., respectively. Growth assays demonstrated that *Pseudoalteromonas* grew in a medium containing laminarin as the sole carbon source, whereas *Shewanella* (03VD25) showed no detectable growth under the same conditions. These results suggest a potential “cheater dynamic” between the two microbes cultured in this study, where *Shewanella* *inventionis* is the non-degrader, cross-feeding on laminarin hydrolyzed into smaller oligosaccharides/monosaccharides by primary degraders such as *Pseudoalteromonas*. Additionally, EcoPlate metabolic profiling revealed *Pseudoalteromonas* is capable of processing pyruvic acid methyl ester, Tween 40, Tween 80, α -cyclodextrin, D-mannitol, and glycyl-L-glutamic acid, suggesting they have the genomic capacity to utilize a diverse set of substrates. Together, these findings highlight community-level interactions in bloom-associated bacteria,- reinforcing the need for culture-based verification when evaluating their traits.

Namrata Dhobekar

Discipline: Architecture, Construction Management, and Interior Design

Authors:

#1 Namrata Dhobekar

#2 Suzanne Frasier

Abstract Name: Joinery & Scale: Case Study of a Beginning Interior Design Studio

This project introduces the first version of an interior design studio course curriculum offered to second-year design students who are taking their first interior design-focused studio course. The interior design studio course curriculum consists of five project assignments of ever-increasing scale with the added element of mechanical joinery -- unusual for an interior design class. Coursework focuses on a single joinery-based design assignment where students are expected to work on a single type of mechanical joinery, such as nailing, stitching, pinning, lashing, etc., and use them in five different design projects with increasing spatial scales that range from a volleyball-sized artifact scale to a metropolitan scale. The focus of this inquiry is each student's commitment to one joinery typology of their choice throughout the entire 15-week semester. Students are expected to use a mechanical joinery method to study different possibilities that present themselves via the ever-increasing scale of each bi-weekly assignment. Through this study, we aim to understand how this project framework promotes design exploration via a required focus on joinery in different spatial scales; how this project's framework promotes design thinking via the required translation of the same joinery and design concepts from small-scale to large-scale design projects; how does this project's framework promote design thinking via the joinery method's influences, direction, and/or focus of the design thinking and/or spatial design decisions; how does this project's framework promote design thinking by compelling students to work beyond their familiar comfort zone while considering the different properties being considered for implementing mechanical joinery. So that we can develop a framework for interior design studios that focuses on joinery-based spatial innovation and structural reasoning, through a single joinery-based curriculum assignment.

Brice Di Carlo

Discipline: Chemistry

Authors:

#1 Kelling Donald

Abstract Name: Implications on the Bending of Cyclopentadienyl Ligands in Half-Sandwich Complexes

Metallocenes and sandwich compounds in general are well-known structural motifs in organometallic chemistry. Over seven decades since the clarification of the structure of ferrocene, showing that the cyclopentadienyl rings are co-planar (a 'linear' sandwich structures), such systems and variants, including half-sandwich, ansa-sandwich, and bent sandwich structures, involving metals beyond the d-block continue to attract wide interest. We have investigated the bending in less or previously unstudied half-sandwich, C₅H₅-M-X, compounds of group 1, 2, and the cation of the group 3 lanthanide complex. We examine, at the MP2 and wB97X-D levels, the influence of methylation on the bending tendencies in these compounds and explore the evolution of bending from the simple binary and ternary metal dihalides to the corresponding half-sandwich to the metallocene systems going down those groups. A key goal of our work is to assess the relevance and application of competing theoretical frameworks for explaining the bending in the simple dihalides to the more complicated (half-)sandwich systems. We report structural and other features of the group 1 and 2 half-sandwich systems, which exhibit little to no bending while most complexes containing group 3 centers experienced significant bending. C₅H₅-Sc-F and C₅H₅-Y-F are found to be linear, but all of the other C₅H₅-M-X complexes show significant bending. Exploring more derivatives of these structures, and assessing the relevance of pseudo-Jahn teller arguments to bending in sandwich structures, is the next phase of our investigation.

David Diabene

Discipline: Engineering

Authors:

#1 Matthew McDonald

Abstract Name: Six-Axis Robotic Automation for Optimizing Crystallization Processes

Chemical automation focuses predominantly on handling liquids, but many chemical processes involve solids, either added to solution or produced by reactions. Crystallization seeks to create high purity solids from a solution, and is critical to pharmaceutical, agrochemical, materials, and food manufacturing. This research focuses on a 6-axis robotic arm used to handle solids and optimize crystallization processes through a Python-based API. Crystallization is a nonlinear chemical unit operation as slight changes in temperature, concentration, or seeding can significantly alter experimental results. Seeding is used industrially to improve purity and yield by suppressing uncontrolled nucleation and promoting uniform crystal growth. This process eliminates the need for random molecular collisions for spontaneous nucleation and instead provides a controlled reaction, giving new crystals a pre-formed surface to grow on. Rapid precipitation and control of the process is key in crystallization laboratories, but this process cannot be automatically optimized using existing systems. The 6-axis robotic arm with a 600-gram payload and 0.5mm repeatability allows for an automated optimization process where testing different seeding variables is possible. Initial findings include integration of various crystallization apparatuses using Python, including automated weighing of solids. Future research aims at detecting and changing temperature, seed loading, and agitation, and filtering crystal slurries all through a Python API. This can streamline process optimization for food and pharmaceutical processes by eliminating routine tasks such as handling solids, preparing seed crystals, and monitoring cooling cycles, allowing researchers to concentrate on analyzing crystal morphology and other higher-level analytical work.

Thierno Diallo

Discipline: Environmental Science and Sustainability

Authors:

Abstract Name: Assessment of Heavy Metal and Black Carbon Concentration Change Before and After Congestion Pricing Implementation in Manhattan, New York

This study examines the impact of congestion pricing on air quality in Chinatown, Manhattan, by measuring changes in PM_{2.5}, black carbon, and heavy metals. Air samples were collected 10 days before and after the implementation of congestion pricing, using Teflon filters and an aethalometer. Heavy metals were quantified using ICP-MS following microwave acid digestion. Results indicate variations in pollutant concentrations correlating with reduced traffic. The study offers insights into how urban policy can influence environmental health.

Sira Diame

Discipline: Sociology

Authors:

#1 Sira Diame

#2 Kyle Maksuta

Abstract Name: Where You Live, How You Learn: A Socioeconomic Analysis Across Kentucky Public High Schools

Debates over the future of public education increasingly position privatization as a remedy for perceived shortcomings in public schools. Proponents often highlight the advantages of private institutions, yet these schools frequently serve specialized, socially and financially advantaged populations already positioned for higher achievement. In contrast, public schools remain tightly bound to the socioeconomic and spatial conditions of the communities in which they operate. Even with strong teachers and supportive staff, school performance is shaped by broader structural forces, some communities are simply better resourced to produce positive educational outcomes than others. Using statewide data from Kentucky, this study evaluates how community-level socioeconomic, demographic, and structural characteristics influence public high school performance across the Commonwealth. Drawing on data from the Kentucky Department of Education (KDE), the National Center for Education Statistics (NCES), and the U.S. Census, we analyze all public schools offering a Grades 9–12 curriculum from 2021/2022 through 2023/2024. Measures of academic performance, school funding, and community characteristics serve as outcomes and predictors. Independent variables include racial composition, proportions of English learners and special education students, median household income, poverty rates, and rural–urban classification. Preliminary findings reveal significant disparities both across and within districts. By exploring the community-level factors that shape school quality, this project aims to provide policymakers, educators, and local leaders with actionable, data-driven insights into educational inequality.

Zachary Diamond

Discipline: Environmental Science and Sustainability

Authors:

#1 Kelsey Bitting

Abstract Name: Evaluating the Influence of Soil Amendments on Soil Health Indicators in a Turfgrass Lawn.

Turfgrass systems cover over 40 million acres in the United States, presenting a substantial opportunity to enhance soil health and improve carbon sequestration through sustainable management practices. This study evaluates how three non-synthetic alternative soil amendments—biochar, spent coffee grounds, and basalt rock dust—influence soil organic carbon (SOC), pH, cation exchange capacity (CEC), and Humic Matter in turfgrass systems. Thirty-five one-square-meter plots were established, and five plots each were treated with each amendment at two application rates, with amendments reapplied quarterly to capture seasonal variability. The remaining five plots were reserved for a control condition. Soil samples were collected at each sampling period for loss-on-ignition analysis, along with repeated pH measurements. At the end of the study, soil samples were analyzed by the North Carolina Agricultural Extension Office for CEC and Humic Matter. One-way ANOVA revealed a significant amendment effect on SOC ($p = 0.0054$), with coffee grounds at the high rate producing the greatest SOC increase and significantly exceeding basalt at the high rate, which had the least impact. However, the overall effect size was small ($\omega^2 \approx 0.03$), consistent with modest treatment differences. A two-way ANOVA showed significant effects of amendment/rate ($p = 0.0037$) and sampling date ($p = 0.0057$), with SOC increasing from October to February before declining toward late summer, while treatment rankings remained stable (interaction $p = 0.516$). Biochar plots exhibited the highest humic matter and slightly elevated CEC, suggesting enhanced long-term carbon stabilization. Coffee grounds produced strong short-term carbon increases but may have the potential to decompose quickly, whereas basalt showed minimal immediate change but provided mild pH buffering. Across all treatments, pH remained near neutral (6.0–7.0), indicating that amendments did not disrupt soil acidity. This study demonstrates that alternative amendments can enhance turfgrass soil health, though their benefits vary with amendment type, rate, and seasonal conditions.

Valeria Diaz Moreno

Discipline: Physics and Astronomy

Authors:

#1 Maxim Vavilov

Abstract Name: CNOT gates in a linearly coupled multi-fluxonium chain

High-fidelity two-qubit gates have been demonstrated in systems of two fluxonium qubits, yet scalable quantum processors require maintaining low errors in substantially larger architectures. We investigate a linear chain of four inductively coupled fluxonium qubits and analyze how additional spectator qubits influence the performance of a CNOT gate. We find that spectator-induced errors are strongly suppressed when the spectator frequencies are sufficiently detuned from those of the gate qubits. We identify favorable frequency configurations for the four-qubit chain that yield CNOT gate errors below 10^{-4} for gate times under 100 ns. Exploiting the symmetry of the nearest-neighbor coupling, we further show how these favorable configurations can be extended to longer fluxonium chains, facilitating scalable low-error quantum processors.

Emma Dickinson

Discipline: Biology

Authors:

#1 Matthew Persons

#2 Elise Schaeffer

Abstract Name: Ixodes scapularis Larval Tick Attachment to Different Fabric Types

Ticks are blood-sucking parasites that serve as vectors for several diseases, posing significant threats to human health and agriculture. Despite the threats posed by deer ticks (*Ixodes scapularis* Say, 1821), tactile factors influencing larval tick attachment behavior remain poorly understood. Tick adherence to different fabric types has important implications for both population estimates using drag field sampling and guidelines for clothing recommendations to reduce tick transfer during field exposure. Fabrics used in clothing manufacturing are made of weave patterns and compositions that are not well-represented by traditional drag-cloth materials but may lead to more accurate population estimates. On a damp soil substrate, we exposed groups of 20 larval *I. scapularis* to nine types of fabric (denim, canvas, white nylon-spandex knit, black nylon-spandex knit, twill, rayon-spandex knit, brushed polyester, fur, flannel) for 40 seconds to determine the average number of ticks recovered ($N=271$, $n=30$ per fabric, 5,400 ticks). We found that fabric type had a significant effect on the number of recovered larval deer ticks. Twill showed the lowest collection rates, with an average of 2.93 ± 1.76 SD ticks recovered per exposure. Fur collected significantly more ticks than each of the other fabrics with an average of 11.48 ± 2.93 SD ticks recovered per fabric exposure. Black nylon-spandex knit collected significantly fewer ticks than white nylon-spandex knit, suggesting that brightness or color contrast may mediate attachment choice. Our findings may better inform how clothing choices impact larval tick exposure risk and the role of fabric material in tick drag field surveys affects population estimates.

Nicole Dignonno

Discipline: Social Work and Human Services

Authors:

#1 Sairam Parthasarathy

#2 Kristina Rico

#3 Natalie Provencio Dean

#4 Christopher Morton

Abstract Name: Linking Social Care with Healthcare Systems to Address Social Determinants of Health

Approximately, 1 in 5 Arizona residents speak Spanish at home, language barriers contribute to persisting limitations in healthcare, which could be mitigated by integrating social care into patient care. The Biopsychosocial Model of Healthcare is a conceptual framework that explains how healthcare is influenced by biological, psychological, and social factors. With this encompassing the mechanisms by which patients develop health conditions and their broader implications for treatment outcomes. Physicians are trained to address biological and psychological components of health, while community health workers (CHWs) are professionals who are trained to directly engage with members of the community to connect them to healthcare services and resources. Many of the CHWs implemented in clinics are bilingual, which helps to reduce the prominent Social Determinant of Health (SDOH) in Arizona. Language Concordant Care refers to the delivery of healthcare in a patient's primary language to assure effective communication between the patient and clinician. Language Concordant Care has been shown to improve patient outcomes and reduce confusion when educating patients. Since CHWs are mostly bilingual, they aim to reduce the communication barrier that has been implemented. The Arizona Community Education Alliance (AZCEAL) study aims to reinforce the necessity of CHWs as a part of a healthcare team and to give implementation strategies for CHWs by providing a model for the necessary infrastructure to utilize CHWs in clinics. AZCEAL aims to understand how implementation of social care, through the use of CHWs, better addresses SDOHs in high-risk populations to improve patient outcomes within clinical practices. Preliminary research on language concordance from this study has shown that bilingual participants have primarily chosen to speak in English, when given the option for either English or Spanish. Further exploration is taking place to identify potential reasons this is the case in order to improve clinical practices and outcomes.

Alexis Dillahunt

Discipline: Chemistry

Authors:

#1 RaJade Berry-James

#2 Milea Dillahunt

Abstract Name: Promoting Early Literacy: Engaging Communities to Empower Young Learners

Reading is a fundamental component of academic achievement, establishing a strong foundation for future learning outcomes. This poster examines the crucial relationship between early reading and student success, supported by a review of existing literature and firsthand studies. Research consistently shows that children who engage in reading before age five are more likely to excel in elementary and secondary education, demonstrating enhanced vocabulary, comprehension, and overall academic performance. A critical aspect of promoting early literacy lies in effective community engagement to bypass economic barriers. Collaborative partnerships between schools, libraries, and community organizations can play a transformative role by providing resources, such as reading programs, workshops, and access to diverse reading materials for families. Innovative initiatives, such as "Reading Buddies" programs and community literacy fairs, actively engage children and their families, helping to reduce barriers to reading access and fostering a culture of literacy within the community. The central research question guiding this investigation is: "How can community engagement strategies be used to enhance early literacy outcomes among young learners and their families?" Empowering families through targeted workshops focused on effective reading strategies and literacy development is essential for encouraging their involvement in their children's education. Additionally, involving families and community members in the planning and evaluation of literacy programs ensures that these initiatives are culturally relevant and responsive to community needs. Such collective efforts contribute to creating a literacy-rich environment that values reading, ultimately leading to increased school readiness and improved long-term educational outcomes. In summary, this research highlights the crucial role that community engagement and early literacy interventions play in shaping educational policies and practices that foster student success with an emphasis on the black community. Fostering community engagement in early literacy initiatives is crucial for inspiring young learners and creating equitable educational opportunities that contribute to lifelong success.

Laura Dillard

Discipline: Gender, Ethnicity, Diversity, or Cultural Studies

Authors:

Abstract Name: Transforming Narratives: Empowering Students Through Stereotype Awareness in Children's Literature

Children's literature profoundly shapes young readers' understanding of societal norms, yet it often perpetuates biases, such as racial, disability, and gender stereotypes. This poster presentation aims to empower educators and students by fostering awareness of these biases and advocating for transformative narratives that promote inclusivity and authenticity. Through a critical examination of existing literature, we will explore how gender stereotypes are deeply embedded in children's stories and illustrations, reinforcing outdated notions of identity. We will showcase compelling examples that reveal the critical shortcomings in the representation of Black experiences (Vickery & Rodríguez, 2021) and the inadequate portrayal of individuals with disabilities (Kaplan et al., 2022). By shedding light on how these narratives influence young minds, we highlight the need for educational reform. The visual elements of this poster will present interactive components, facilitating dialogue among attendees. Participants will engage with thought-provoking questions and activities designed to highlight cultural and social influences that shape children's perceptions

of gender roles (Saygan & Uludagli, 2020). These interactions will illuminate the impact of peer influence during adolescence, as well as the ways societal expectations can limit emotional expression and leadership potential (Brendler, 2014). Additionally, we will address recent trends in the banning of literature that features nonconforming gender identities, emphasizing the importance of inclusive storytelling in fostering critical awareness. Attendees will leave equipped with practical strategies to integrate inclusive literature into their educational practices, advocating for narratives that empower all children. By transforming the narratives presented in children's literature, this presentation strives to inspire educators and scholars to challenge stereotypes, ultimately creating a richer, more equitable literary landscape that empowers students to embrace diversity and overcome bias.

Ava Dillon

Discipline: Chemistry

Authors:

#1 Thomas Nalli

Abstract Name: Synthesis of trans-4-Bromo-2-Heptene

trans-4-Bromo-2-heptene (1) is a simple compound that, despite two reports to the contrary, has never been synthesized in pure form. Nevertheless, it could be a useful starting material for organic synthesis. The compound presents a significant synthetic challenge due to a propensity to undergo allylic rearrangement to form a mixture of allylic bromides. Therefore, the goal of this research was to synthesize 1 with a multistep synthesis. Step 1 was to produce hept-2-yn-4-ol (2) via a Grignard synthesis by combining butanal and propynyl magnesium bromide with the triple bond acting as a masking group for the alkene. The alcohol was then converted to 4-bromo-2-heptyne (3) using triphenylphosphine, bromine, and imidazole. The most critical step of selectively reducing the triple bond to the desired double bond was attempted using both H₂ and palladium on polyethylene imine catalyst and a monohydroboration method via disiamylborane and protonolysis with acetic acid. Finally, because the reduction should produce the cis alkene, the last step will be isomerization, to produce 1.

Elizabeth Dimitrova

Discipline: Social Work and Human Services

Authors:

#1 Maria Wilcoxson

Abstract Name: Assessing Gaps in Shelter-Based Services for Homeless Individuals in Multnomah County

This project examined the range of services offered across overnight homeless shelters within a single county and identified where gaps in service provision limit accessibility for people experiencing homelessness. While homelessness in the Portland metro area has been widely documented, less attention has been given to the consistency, scope, and distribution of services across individual shelters. Understanding this variation is essential for improving equitable access to resources and reducing the burden on individuals who must navigate multiple organizations to meet basic needs. Shelters were reviewed using organizational websites, resource databases, and supplementary public materials. Services were categorized according to ten core needs: housing, food access, clothing, hygiene care, education, advocacy, childcare, transportation, translation, and healthcare. Each shelter was assessed for the presence and type of support offered. The analysis consisted of descriptive comparisons of service availability and overall shelter formats, including

operators and populations served. Data was collected from 50 overnight shelters. Housing, food access, and hygiene care were offered by over 90% of shelters. Clothing, advocacy, and healthcare were each available at 70%. Education, childcare, transportation, and translation services were far less common, with availability ranging from 12% to 34%. Within each category, substantial variation emerged in service types, highlighting both commonly provided support and rare resources. Even in broadly covered areas, such as food access, advocacy, and healthcare, many specific services were uncommon, indicating gaps that limit overall efficacy. Multi-site organizations tended to offer more standardized and comprehensive service profiles, while independent shelters showed greater variability. These patterns suggest structural barriers within the local homeless services. While immediate needs were reliably met, specialized or resource-intensive services were offered at far fewer sites. Strengthening collaboration and expanding co-located, integrated services may improve accessibility and outcomes for people experiencing homelessness.

Li Peng DiMuzio

Discipline: Psychology

Authors:

#1 David Rakison

Abstract Name: Is the Enemy of my Enemy my Friend?: How 3 to 6 year old Children Learn Transitivity in Social Relationships

Second order correlation learning (SOCL) is the ability to infer the relationship of two objects, features, or events (A and C) based on previously learned first-order correlations (A and B, B and C). In this study, I will present social relationships as SOCs to examine if and when children can use transitivity to learn about these relationships. Only a small number of studies have been conducted to test whether children 7 years of age and older can understand transitivity in non-social contexts. This study will be an extension of a previous study done in 1999 except it will test considerably younger children- those between 3 and 6 years of age- to determine if they too can learn transitivity, particularly when it comes to negative relationships among first order correlations. Similar to the 1999 study method, children will be shown a series of cartoon vignettes that depict different social relationships, both positive and negative. In a series of test trials, participants will see different combinations of social relationships of friends, non-friends, and enemies (A-B and B-C). Part of the extension is the manipulation of directional orientation that children are facing in the vignettes. This involves children making eye contact with each other or looking at various things on the walls instead. Thus, on top of the social relationship combinations, there will also be manipulation with children facing toward or away from each other. Participants will be asked to determine the relationship between the various characters for each scenario. This research will provide us insight into whether or not preschool aged children can learn transitivity and, if they can, around what age they start to understand it.

Victoria Dinh

Discipline: Biology

Authors:

#1 John Griffis

Abstract Name: Comparison Of Macroinvertebrate Colonization In Different Types Of Leaf Packs Within Different Velocities To Determine Stream Quality

Stream quality can be determined through sampling of macroinvertebrates. For this study, leaf packs were

used to determine stream quality. Each of the leaf packs were split into pairs containing combinations of sycamore/pin oak/maple (*Plantanus occidentalis*/*Quercus palustris*/*Acer* sp.) and black oak/white oak/elm (*Quercus velutina*/ *Q.alba*/ *Ulmus* sp.) leaves. The hypothesis was differences in leaf type and velocities yield differences in macroinvertebrate diversity and stream quality determination. If the sycamore/pin oak/maple leaves were in high velocities, there would be a difference in macroinvertebrate colonization and stream quality determination compared to the other leaf packs and velocities. Three leaf pack pairs were made and placed at different rates of velocities (fast, slow, and 0). Analysis of the sycamore/pin oak/elm fast velocity combined with the white oak/black oak/elm 0 velocity leaf pack had significant differences, mainly in EPT/Non EPT, pollution intolerant/pollution tolerant, and Shannon Diversity Index values compared to other leaf pack combinations ($p < 0.001$). The Macroinvertebrate Biotic Index for stream quality determination of the sycamore/pin oak/maple fast velocity combination with the white oak/black oak/elm 0, sycamore/pin oak/maple slow, and sycamore/pin oak/elm 0 velocity leaf packs were rated to be “fair” (5.01-5.70) compared to the other leaf packs which were considered “poor” (5.71-6.25). The sycamore leaves had high levels of colonization compared to oak leaves, yielding dominance of Hydropsychid caddisflies. Velocity showed differences in colonization between the different leaf packs, and in combination comparisons between the leaf packs, particularly regarding abundance. Riparian tree species impact macroinvertebrate colonization and stream quality determinations.

Mamoudou Diomande

Discipline: Social Work and Human Services

Authors:

Abstract Name: Unpacking the Influence: Parental Engagement and Social Studies Success for Black Students

This study examines the association between parental engagement and Social Studies GPA among Black high school students, drawing on Pierre Bourdieu’s concept of cultural capital as the guiding lens. Prior research consistently finds that parental involvement supports Black students’ academic success, yet these benefits and the challenges students face are shaped by gendered racial dynamics, including disproportionate disciplinary actions targeting Black male students. Using data from the High School Longitudinal Study of 2009 (HSL:09), this project focuses on African American respondents and investigates whether parental attendance at school events is linked to academic performance in Social Studies. An independent samples t-test compared GPAs between students whose parents attended school events and those whose parents did not. Results show that students with engaged parents earn significantly higher Social Studies GPAs than their peers without such engagement. These findings suggest that parental engagement may operate as a channel through which cultural capital is transmitted, underscoring the importance of family-school connections in addressing educational disparities among Black students.

Claudia Disbrow

Discipline: Exercise Science and Nutrition

Authors:

Abstract Name: Benefits and Barriers of Pulmonary Rehabilitation in Rural COPD Patients: A Prospective Evaluation at a Hospital System in Southwest Virginia

Pulmonary rehabilitation (PR) improves exercise capacity, dyspnea, and quality of life for patients with

chronic respiratory disease, yet completion rates remain substantially lower than those observed in cardiac rehabilitation (CR). Rural populations may experience amplified barriers, particularly transportation limitations and exacerbation-related interruptions that diminish program adherence and attenuate functional gains. This study will evaluate outcomes and barriers among pulmonary rehabilitation participants at a hospital system located in southwest Virginia, with a specific focus on the effects of disease exacerbations and geographic access. We will enroll 50 adult PR patients who complete at least one billable session and follow them through an 8–12-week program. Functional and psychosocial outcomes including six-minute walk distance, dyspnea, health-related quality of life, and depressive symptoms (PHQ-9) will be assessed at baseline and program completion. Clinical covariates (FEV1, supplemental oxygen, comorbidity burden, and exacerbation events during the program) will be recorded. To contextualize relative benefit, a secondary analysis will compare completion rates and functional gains with a matched cardiac rehabilitation cohort. A geospatial analysis will quantify travel burden using road-network distance from patient residence to the rehabilitation facility. We will model the association between distance and completion using nonlinear regression to identify a potential threshold at which the probability of program noncompletion increases significantly. Qualitative surveys will further capture patient-reported barriers, including transportation, exacerbations, financial limitations, and scheduling constraints. We expect PR completers to demonstrate improvements in functional capacity and symptoms; however, exacerbations and greater travel distance are anticipated to be strong predictors of interrupted participation and noncompletion. Identifying a distance threshold and characterizing interruption patterns will provide actionable targets for program redesign, including tele-PR expansion, transportation support, and flexible scheduling to improve PR accessibility and outcomes in rural populations.

Ciara Dixon

Discipline: Psychology

Authors:

#1 Jerome Short

Abstract Name: The Relationships Between Young Adults' Bodily Pain, Distress, Protective Factors, and Life Satisfaction

Young adults' somatic symptoms may manifest as mental stress, headaches, or chronic pain (i.e., back or joint pain). Often these conditions lead to academic stress, anxiety, depression, and lower life satisfaction. Many studies suggest social support and sleep quality have a bidirectional link with negative psychological factors (i.e., anxiety and depression) and pain or somatic symptoms. However, little research examines these variables (along with hope and gratitude) as predictors of life satisfaction or somatic symptoms. Additionally, there is a lack of research and understanding of these factors within a young adult population. This study of 216 college students will analyze the associations between these variables via Pearson correlation analyses and hierarchical multiple regression analyses cross-sectionally and longitudinally. This study will contribute to the understanding of somatic symptoms and pain experiences within a college population when accounting for protective factors such as social support, hope, gratitude, and sleep satisfaction.

Daniela Djeukeng

Discipline: Psychology

Authors:

#1 Miles Gomes

#2 Fantasy Lozada

Abstract Name: Association Between Emotion and Afro-cultural Beliefs in African American College Students

Value emotion beliefs refer to attitudes about the value of experiencing certain emotions. Past research suggests that emotion beliefs are associated with important emotion-related skills (e.g., ability to regulate and cope with emotions). However, it has focused less on African American individuals, families, and culture, limiting our ability to apply emotion research to African Americans. This poster investigates the potential associations between three value emotion beliefs (emotions just are, negative emotions are good, and positive emotions are good), and Afro-cultural beliefs (nationalism, primacy of social existence-based communalism, and group duty-based communalism, as outlined by Boykin & Toms' Triple Quandary Theory) in African American college students ($N = 169$). I hypothesized that having greater Afro-cultural beliefs would be associated with greater beliefs that emotions just are (neutral) and greater belief that positive and negative emotions are good. Data was collected from participants ($M_{age} = 20.62$, $SD = 3.92$) who were enrolled in the African American Beliefs and Emotions Study. They completed a set of questionnaires including their demographics, emotion beliefs, and Afro-cultural beliefs through an online survey. We found positive, significant associations between the primacy of social existence-based communalism belief, and the beliefs that emotions just are (neutral; $\beta = 0.16$) and positive emotions are good ($\beta = 0.24$). Also, there was a positive, significant association between the group duty-based communalism belief and the beliefs that emotions just are (neutral; $\beta = 0.14$) and negative emotions are good ($\beta = 0.16$). Findings contribute to knowledge investigating the relationship between African American cultural values and the emotion beliefs of African American youth. This knowledge can help inform emotion interventions for African Americans, and could contribute to healthy development/maintenance of emotion-related skills.

Om Dobariya

Discipline: Computer Science

Authors:

#1 Om Dobariya

#2 Akhil Kumar

Abstract Name: Mind Your Tone: Investigating How Prompt Politeness Affects LLM Accuracy

The wording of natural language prompts has been shown to influence the performance of large language models (LLMs), yet the role of politeness and tone remains underexplored. In this study, we investigate how varying levels of prompt politeness affect model accuracy on multiple-choice questions. We created a dataset of 50 base questions spanning mathematics, science, and history, each rewritten into five tone variants—Very Polite, Polite, Neutral, Rude, and Very Rude—yielding 250 unique prompts. Using ChatGPT-4o, we evaluated responses across these conditions and applied paired sample t-tests to assess statistical significance. Contrary to expectations, impolite prompts consistently outperformed polite ones, with accuracy ranging from 80.8% for Very Polite prompts to 84.8% for Very Rude prompts. These findings differ from earlier studies that associated rudeness with poorer outcomes, suggesting that newer LLMs may respond differently

to tonal variation. Our results highlight the importance of studying pragmatic aspects of prompting and raise broader questions about the social dimensions of human–AI interaction.

Alexis Dobberstein

Discipline: Psychology

Authors:

#1 David Szwed

Abstract Name: Whose Abuse is More Influential?: A Longitudinal Analysis of Mothers' vs. Fathers' Psychological Maltreatment in Adolescence on Adult Externalizing Behavior

Introduction: Psychological maltreatment, defined as emotional neglect and emotional abuse, is often overlooked in research because of its lower report rate. However, studies show that abuse or neglect in childhood roughly doubles one's chance of engaging in crime (Tekin & Currie, 2006). Therefore, the present study examines parental psychological maltreatment in adolescence and externalizing behavior in early adulthood. More specifically, this research aims to compare gender specific links between same-gender and opposite-gender parent-child dyads, as well as the mediating effects of time spent with deviant peers. Method: Data were collected from a sample of 184 ethnically and socioeconomically diverse participants (86 males, 98 females; 58% Caucasian, 29% African American, 13% mixed or other; median income in 1999 = \$40,000-59,999). The study included participants at ages 15-17, 22, and 25-26. Participants' externalizing symptoms were assessed at baseline and outcome ages with a questionnaire completed by their close peer. At ages 15-17, individual parents' use of emotional abuse and neglect tactics was assessed. At age 22, participants' time spent with deviant peers was measured. Results: Data collection is complete, and analyses have begun. Correlation analyses will examine relationships between parental psychological maltreatment in adolescence and externalizing behavior in early adulthood. A series of hierarchical linear regressions with interactions will be run to test the relationships more rigorously, specifically regarding gender specific links between same-gender and opposite-gender parent-child dyads. Further, we will conduct a test for the mediation of effects by time spent with deviant peers. Discussion: Same-gender vs. opposite-gender parental influence data contribute to developmental research regarding when a parent's abuse may be more damaging. Further, understanding predictors of deviant friendships and the consequences that come from having deviant peers may help predict criminal behavior.

Emilia Dobek

Discipline: Political Science

Authors:

Abstract Name: An Analytic Comparative Framework on the Role of Space Diplomacy in Global Swing States

In a geopolitical environment where the space domain is becoming an increasingly impactful tool of diplomacy, it has become a strategic field of competition for global influence between the United States and the People's Republic of China. Six global swing states, which include Brazil, India, Indonesia, Saudi Arabia, South Africa, and Turkey, have a multi-aligned foreign policy creating concurrent relationships between the US and PRC, which exert a disproportionate impact on the future of the international order. This paper seeks to develop a comparative means of analysis across military, civilian, and commercial efforts between the US

and PRC in critical sectors comprised of norms, satellite cooperations, data-sharing initiatives, and launch services within these nations.

Alexander Doblara@my.erau.edu

Discipline: Economics

Authors:

#1 Alexander Dobler

Abstract Name: Cognitive Risk Under Economic Pressure: A Comparative Simulation of Decision Decay, Stress Oscillation, and Financial Constraints in Repeated Blackjack Play

Abstract: This project builds BJ21, a simulation framework designed to study how cognitive limits and financial pressure interact during repeated decision-making. The model tracks three internal stress variables: (decision-unit decay (DU), mental-workload oscillation (MWU), and variance shifts tied to fatigue) and connects them with external constraints such as salary, living-cost burden, interest cycles, and borrowing limits. Two configurations were tested. Version 3.1 focuses only on cognitive behavior, running twelve monthly decision cycles across three agent types (Pilot, AP_Pro, AP_Rookie). Version 3.2 adds 2024 U.S. economic benchmarks: median rent, role-based income, average credit-card debt, and “comfortable-living” thresholds. This turns the system into a combined cognitive-economic environment. Across twenty Monte Carlo runs (ten per version), Version 3.1 showed stable patterns: steady bankroll growth, low borrowing, and mild variance. Version 3.2 produced a completely different profile. Large debt escalation (\$100k–\$164k by month twelve) even when expected value was positive. This shows that economic pressure amplifies cognitive decay more strongly than cognitive decay shapes financial outcomes. The main result is a “lose-while-winning” pattern: agents perform well in the decision process but still collapse financially due to compounding obligations. The model has applications in aviation human-factors research, gambling behavior, and stress-performance analysis. Future work includes extending the simulation to multi-agent competitive environments such as poker.

Jaeden Doctolero

Discipline: Nursing and Public Health

Authors:

#1 Lisa Benson-DeVries

Abstract Name: Pain, Function, and Fracture Severity in Vertebral Compression Injuries: A Retrospective Chart Review

Background/Purpose Vertebral compression fractures (VCFs) from osteoporosis and minor trauma are increasing at alarming rates in elderly populations and are frequently underdiagnosed due to the commonality of back pain in this group. The study’s aim is to explore associations between vertebral fracture level and (1) pain scores at presentation, (2) functional impairment, and (3) improvement in function at one month and one year. Methods This retrospective chart review will include patients seen for VCFs at Bergen Mercy Medical Center from January 1, 2024, to December 31, 2024. Inclusion criteria will include patients with T5-L5 VCF with 15% or more height loss identified on radiographs, CT scans, or MRIs. Exclusion criteria include three or more acute compression fractures, and high velocity trauma. Key data abstracted will include patient demographics, fracture level, pain scores, function levels, and follow-up functional level at one month and one year. Descriptive statistics will be used to characterize the cohort, and ANOVA will be used to assess

the relationship between fracture level, pain severity, impact on function, and time points during recovery. Results Data collection and analysis are in progress. Results will be available and presented at the time of the conference. Conclusions The findings of this study will help us better understand if fracture level is associated with pain intensity, loss of function, and the recovery process providing valuable insight into the development of care protocols for patients with VCFs.

Rahela Dolha

Discipline: Chemistry

Authors:

#1 Rahela Dolha

#2 Mubarak Mujawar

Abstract Name: Enhancing Electrochemical Active Surface Area Using Biodegradable Nanofibers For Sweat-Sensing Application

Single-use biosensors have long been researched and developed. Their design allows for portable, rapid medical testing in a small, cost-effective device. Many also utilize sweat-sensing for noninvasive monitoring of biomarkers. An issue, however, arises as the small structure of these biosensors is attributed to significantly decreased sensitivity and signal amplification. Enhancing the sensitivity and amplification of these sensors would enable wider development and distribution, improving access to medical monitoring equipment for underserved populations that lack access due to financial, geographical, social, or physical constraints. This project focuses on the development of biodegradable nanofibers to be used for increasing biosensor sensitivity in sweat-sensing applications. The fibers are formed through electrospraying, an electrical process involving the polarization of a spraying needle and a collector plate that spins the solution to form solid fibers, and will be composed of nanocellulose, chitosan, and polyvinyl alcohol. Nanocellulose and chitosan allow for increased sensor amplification, and PVA provides structure and stability to the fibers. The biodegradable nature of this sensor allows for environmentally conscious disposable of single-use sweat sensors, and the nanofiber matrix provides additional amplification and increased electrochemically reactive surface area for increased sensitivity. Initial research has produced visible fiber formations. Additional testing and process optimization is ongoing to produce consistent diameter fibers in the nano-scale leading to a significant increase in surface area.

Sarah Dollak

Discipline: Interdisciplinary

Authors:

#1 Kelly Sultzbach

Abstract Name: Rights of Nature: Examining Nature's Rights in Law and Literature to Promote Legal Representation of the Natural World

Rights of Nature play a key role in the legal systems that protect our present and future living world through their effect on the regulation of air, water, the climate, and the communities these impact. To show how Rights of Nature apply to future environmental policy, examining legal frameworks and environmental literature through an Indigenous lens is essential to navigate their role within society. Robin Wall Kimmerer's chapter "Grammar of Animacy" in her book *Braiding Sweetgrass* illustrates the central idea that nature is animate. The grammar of animacy is language that allows for the expression of something with feelings and

agency of its own, as Kimmerer shows by calling a tree a ‘who’ instead of an ‘it’. Some countries even think animate nature deserves legal recognition. The success of Rights of Nature in legal frameworks is contrasted between the United Nations “Global Pact for the Environment” and Ecuador’s constitution. Literature plays a vital role in shaping public perceptions and policy regarding nature’s rights. Analysis of the rich narratives in poetry from contemporary Indigenous author Joy Harjo alongside the Enclosure Movement author John Clare’s “Swordy Well”, exemplify a cultural foundation for these legal shifts. The implications of nature’s animacy are explored by combining comparative legal analysis and close literary reading. This research highlights the importance of integrating Indigenous voices and shaping future environmental policies to foster a deeper, more holistic connection with the natural world which challenges conventional Western views and emphasizes a kinship with nature.

Srija Doma

Discipline: Health and Human Development

Authors:

#1 John Wright

#2 Denise Fraga

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#6 John Grimm

#7 Aarti Sarwal

Abstract Name: A Systematic Framework for Transcranial B-Mode Ultrasound in Axial and Coronal Neuroimaging

Ultrasonography (US) is a commonly used imaging technique due to its non-invasiveness, extensive range of applications, and low cost. Intracranial imaging is an emerging use of ultrasonography, particularly for patients with suspected brain injury, and is performed using different planes to create a detailed image of the brain anatomy. However, intracranial imaging has been largely limited to axial (horizontal) imaging in adults, restricting its exploration across different imaging planes and age groups. This limitation reduces the accessibility of intracranial ultrasounds in populations in which utilizing CT or MRI scans may be unsafe or infeasible. To expand the framework to span a broader patient population, we have utilized B-mode ultrasound, a type of 2D imaging, to incorporate coronal (vertical) planes, frontal windows, and pediatric patients. In our study, images were collected from three prospective studies, which enrolled both children and adults with intact skulls, to evaluate the accuracy of B-mode cranial ultrasound in diagnosing intracranial pathology. The images were analyzed by investigators and compared with CT and MRI scans to identify anatomical and pathological features. Based on our findings, we propose a systematic method for obtaining transcranial imaging from frontal and temporal windows in both axial and coronal planes, utilizing established anatomical landmarks as internal controls to evaluate the quality of the scans. Pathologies can be identified and analyzed at reference planes to demonstrate the reliability of this approach. This framework provides a reference for working with transcranial ultrasound in both children and adults, and may promote future studies investigating the use of cranial ultrasound in detecting intracranial pathology. By establishing standard procedures, we highlight the potential of B-mode ultrasound as a practical and accessible tool for neuroimaging in intensive and emergency care, pre-hospital diagnosis, and resource-limited settings.

Miranda Dominguez

Discipline: Economics

Authors:

Abstract Name: Increased Policy of Privatized Education in the U.S. and Public School Segregation

The modern school voucher system was introduced to the United States in response to *Brown V. Board of Education* and continues to grow today. Whereas school vouchers emerged in the 1950s to reallocate public school funding to all-white private schools, vouchers today have expanded this funding to many private institutions, including religious programs. This project seeks to analyze whether the school voucher system has impacted school segregation between public and private schools within the past twenty years considering the increased privatization of education and the rise of Christian nationalism. Past research has suggested that these vouchers may have prolonged school segregation into the twenty-first century as private schools maintain the jurisdiction to practice selective admissions processes, exempt from certain federal regulations and Title IX discrimination practices that are required of public institutions. However, this implication of school segregation must be re-examined under the lens of the unprecedented increase of these voucher policies, both in quantity and funding, in recent years. In addition to a literature review of the school voucher system, this research will be composed of an analysis of public surveys measuring American religious values and a data set compiling the racial composition of students in American public schools by grade level from 2008 to 2023. This research will then conduct a regression analysis to determine the effects of both Christian nationalism and school vouchers on racial segregation in private and public schools. I hypothesize that there will be an increased composition of students of color in the public school system as both the use of school vouchers and Christian nationalism rises over time, whereas private schools may simultaneously see a decline in the enrollment of students of color.

Ashley Dominguez

Discipline: Psychology

Authors:

#1 Olivia Linkous

#2 Michael Southam-Gerow

Abstract Name: Protective Factors and Ultimate Outcomes amongst Racial-Ethnic Minoritized Youth in Functional Family Therapy

Functional family therapy (FFT) is a short-term evidence-based family therapy program intended for youth ages 11 to 18 years old with clinically significant behavioral problems. FFT uses a family- and strengths-based approach to address these challenges and is culturally responsive because it is tailored to each family's needs. Previously, FFT has been effective in serving racial-ethnic minoritized populations, including Black and Latine families. Past literature has shown that familial protective factors play a crucial role in reducing at-risk behaviors and cultivating positive growth (i.e., community involvement). However, research has yet to examine changes in protective factors before and after completion of an evidence-based program such as FFT. The current study addresses this gap by examining changes in the number of protective factors and positive outcomes for racial-ethnic minoritized youth in FFT programming. Study hypotheses include: 1) Protective factors will increase from pre-intervention to post-intervention among racial-ethnic minoritized families in FFT programming. 2) As the number of protective factors increases, ultimate outcomes will improve for racial-ethnic minoritized youth. 3) Finally, there will be racial differences in protective factors and ultimate outcomes when comparing white and racial-ethnic families. Data from families ($N \approx 670$) were aggregated as part of a larger statewide evaluation of FFT in Virginia. A paired t-test will examine how protective factors change across treatment for racial-ethnic minoritized youth participating in FFT programming. A regression analysis will be conducted, predicting ultimate outcomes (e.g., youth remaining in the community) and protective factors (e.g., caregiver love and support) among racial-ethnic minoritized families. Additionally, youth racial identity will be included in the regression analysis to explore racial

differences. Findings from this study clarify the influence of protective factors on the promotion of positive outcomes for youth. Results may provide insight into how protective factors influence the outcomes of racial-ethnic minoritized families who received FFT.

Jauelin Dominguez-Perez

Discipline: Chemistry

Authors:

#1 Jill Keith

#2 Michael McNeil

Abstract Name: Dose-Dependent Viability Effects of an Heterocyclic Small Molecule CNS Probe in Murine Neuronal Cells

Heterocyclic small molecules (HSMs) are shown to enhance cell media. For example, B-27 is a common formulation in tissue culture experiments and includes several heterocyclic compounds. We evaluated the effects of an HSM on the viability of N18 murine neuronal cells under xeno-free conditions. Cells were treated with 10, 50, or 100 μ M of the HSM, and viability was measured at 24 h, 48 h, and 7 days using the XTT assay relative to untreated and serum-free controls. At 24 h, 10 μ M the HSM produced slightly higher viability than higher doses. By 48 h and 7 days, all concentrations reduced viability, with 50 and 100 μ M producing the greatest toxicity. These results suggest minimal short-term effects at low doses, but substantial dose- and time-dependent cytotoxicity with prolonged exposure. Ongoing work will assess lower concentration ranges, alternative culture conditions, and compound stability.

Luna Dominic

Discipline: Economics

Authors:

Abstract Name: The Resale Advantage: Assessing Fairness in Online Ticket Purchase

The ticket purchasing experience has evolved from a simple transaction into a high-stakes digital race. With demand for concert tickets, sporting events, and entertainment increasing, some ticket platforms have attempted to make purchases more accessible by adding exclusive access codes and pre-sale benefits. But, there still appears to be a gap between these efforts and the perception of fair access for the general public. Specifically, I suspected that the effectiveness of online ticketing systems at ensuring fair access for the general public varies depending on the purchase channel used. To formally test the hypothesis of an accessibility gap, I constructed a survey of 15 questions and collected the data through RepData, yielding 413 responses from US citizens 18 and over. My results indicate that secondary marketplaces (resale platforms such as StubHub, VividSeats, or SeatGeek) are most effective at ensuring fair access to tickets for the general public. Furthermore, my results showed that primary platforms (such as Ticketmaster) were most likely to limit consumer access. These results prompt further investigation into how the structures of primary and secondary systems differently shape accessibility and fairness in the ticketing market.

Amoya Donaldson

Discipline: Biology

Authors:

#1 Amoya Donaldson

#2 Marijke Davis

#3 Ramirrah Reid

#4 Eric Lewallen

#5 Indu Sharma

Marijke Davis

Ramirrah Reid

Abstract Name: Draft Genome Assembly of Antarctic Microbe *Nocardioides* spp.

Members of the genus *Nocardioides* are Gram-positive, aerobic actinobacteria characterized by high GC content and broad ecological distribution across soil, aquatic systems, and extreme environments. While most documented strains are reported from the U.S. and China, the Branchwater Metagenome Query data indicate that *Nocardioides* species also occur in additional global regions. The isolates in this study originated from seawater ice cores collected near McMurdo Sound, Antarctica. The enrichment culture was serially diluted, plated onto seawater complete media, and pure cultures were obtained from select colonies. Genomic DNA was extracted using the Zymo Quick-DNA (Fungal/Bacterial) Mini Prep Kit. Libraries were prepared using the Nextera XT kit (Illumina). Genome assemblies generated using the HU Genome Assembly Pipeline, consisting of the following programs: FASTQ, Trimmomatic, SPAdes, QUAST, and Prokka. Phylogenomic was conducted using GToTree and visualized using Interactive Tree of Life (iTOL). The phylogenomic tree placed our isolates in the same clade as *N. seonyuensis*. Anvi'o was used for comparative genomics. The results revealed 10 unique gene clusters present only in the isolates and absent from all reference genomes, although these clusters currently lack functional annotation. In addition to this, the CAZyme profile from dbCAN3 further supports ecological specialization: the genome encodes 76 glycosyl hydrolases and 8 carbohydrate esterases, along with 23 carbohydrate-binding modules, suggesting an expanded capacity to degrade complex polysaccharides present in marine Antarctic ecosystems. Average Nucleotide Identity (ANI) value comparisons generated by pyANI showed that the isolates are 100% identical to one another, but share <86% ANI with all other available *Nocardioides* genomes. Because the accepted species boundary is 95% ANI, the 3 draft isolates meet genomic criteria for classification as a novel species of *Nocardioides*.

Qingwen Dong

Discipline:

Authors:

#1 Qingwen Dong

Abstract Name: Cultivating Scholars: Mentorship Transforms Adult Learners into Researchers

Adult learners returning to higher education bring determination and resilience but face unique challenges balancing coursework with full-time jobs, families, and community responsibilities. Their academic journeys often unfold during late nights and weekends, demanding extraordinary persistence. Yet, when paired with dedicated mentorship, these learners can achieve transformative outcomes as researchers and scholars. This presentation highlights the story of three working adult learners in an organizational leadership program who exemplify this potential. Despite their demanding schedules, these students collaborated closely with their mentor to apply for and successfully receive grant funding to conduct a qualitative multi-case study examining effective leadership in promoting diversity, equity, inclusion, and accessibility (DEIA) in higher education. Their research synthesized interviews with faculty, staff, and administrators at a private university, producing actionable insights on inclusive leadership, authentic role modeling, and structural reforms that

advance equity. By completing this project before graduation, they not only met rigorous academic standards but also contributed meaningfully to the broader conversation on leadership and diversity in higher education. The success of this project underscores the vital role of mentorship in cultivating scholars across diverse student populations. Through encouragement, structure, and motivation, mentors help adult learners aim higher than coursework completion alone—guiding them toward ambitious scholarly goals. This case demonstrates how mentorship can elevate students beyond traditional expectations, positioning them to secure resources, engage in original research, and disseminate findings that shape practice. By sharing this experience, the presentation will illustrate how mentorship transforms adult learners into confident scholars who achieve academic excellence while addressing real-world challenges. It affirms that cultivating research success is not limited to traditional undergraduates: with the right guidance, adult learners, too, can flourish as researchers, contribute to their fields, and model resilience and leadership for future generations.

Jack Donner

Discipline: Biology

Authors:

#1 Jack Donner

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#4 Elizabeth Malaugh

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Bhuvana Lavu

Abstract Name: Does modulation of the S1P-S1PR2 signaling axis confer cytoprotective effects in a cellular model of NPC1?

Niemann-Pick type C (NPC) disease is a progressive neurodegenerative disorder caused by defects in the lysosomal trafficking proteins NPC1 (95%) and NPC2 (5%), required for cholesterol and sphingolipid transport. Defective trafficking leads to the accumulation of cholesterol and sphingolipids in endosomes and lysosomes, disruption of endocytic transport, and impaired autophagy. While cholesterol trafficking has been extensively studied, dysregulated sphingolipid metabolism is also central to NPC pathogenesis. Sphingosine-1-phosphate (S1P) is a bioactive lipid that binds G protein–coupled S1P receptors (S1PRs) and functions as an extracellular and intracellular signaling molecule regulating vascular development, endothelial barrier function, and cell survival. Multiple NPC1 mutant cell models exhibit decreased S1P levels due to impaired sphingosine kinase 1 (Sphk1) activity in endocytic vesicles. S1PR1 and S1PR2 are members of a five-receptor S1PR family and function inversely: S1PR1 activates the proliferative ERK/AKT pathway, while S1PR2 activates the Rho/ROCK pathway to modulate diverse cellular outcomes. JTE-013, a selective S1PR2 antagonist, has been shown to reduce cell death in various disease states. We hypothesize that inhibiting S1PR2 with JTE-013 will reduce Rho/ROCK signaling and enhance S1PR1-mediated mitogenic responses to S1P, representing a potential therapeutic strategy for NPC. NPC-deficient cells will be treated with JTE-013 at varying concentrations with or without exogenous S1P for 24–48 hours. Activation of MAPK, Rho/ROCK, and apoptotic pathways will be assessed by immunoblotting, and cell survival will be measured using CCK-8. We expect decreased ROCK activation, increased MAPK activation (pERK/pAKT), and reduced cell death in JTE-013–treated NPC-deficient cells.

Kelly Donovan

Discipline: Mathematics

Authors:

Abstract Name: Novel Deep-Sea Coral Imputation Technique: Filling in Missing Data to Further Coral Conservation

Missing data, i.e., data values that are not stored for a variable, occur in different forms in all fields of data, including ecological datasets. Missing data can lead to a lack of statistical power and produce biased results. Statistical and data science methods are heavily utilized to mitigate issues with missing data, with many of these methods falling with the classification of imputation techniques. This research investigates missing data issues with the National Oceanic and Atmospheric Administration's (NOAA) deep-sea coral and sponge dataset. Deep-sea corals are slow-growing, fragile, and stationary animals that are currently being destroyed due to increased amounts of bottom-trawling, oil drilling, and ocean acidification. With the prevalence of missing data in the dataset, we propose a novel imputation technique that incorporates biological information of the corals. This new imputation method could also be applied to other slow growing organisms. Because deep-sea corals are slow-growing and stationary animals, we can claim with a degree of certainty that they were present in years prior to observed records at their respective locations. The main idea of the imputation method is to take the average size of a coral species divided by its average growth rate to calculate a 'backfill range' for a recorded coral at a certain location and time. For example, a coral observation recorded in 2010, with a backfill amount of 10 years, would have imputed values for that location from 2000 to 2009. Using NOAA's data, we applied our method to *Desmophyllum* spp. corals. Our results show that approximately 9% of data values were original and 91% of values were backfilled for *Desmophyllum* spp. Our technique will create more robust data sets that will allow the scientific community to have an increased understanding of deep-sea coral biodiversity, thus furthering coral conservation tactics.

Katherine Dookhan

Discipline: Nursing and Public Health

Authors:

#1 Tricia Gangoo-Dookhan

#2 Susana Mendiola-Quadreny

Zachariah Dookhan

Darcy Tocci

Abstract Name: Neuropharmacological and Regulatory Drivers of Tianeptine Misuse in the US: A Growing Public Health Concern

Tianeptine is an atypical antidepressant that houses a unique set of neuropharmacological aspects, most notably its mu-opioid receptor activity, which allows for both its positive therapeutic effects for treating patients with depression, but also its high potential for misuse and abuse. Although this drug is not approved by the FDA, Tianeptine has made itself accessible in the US through online and retail sales due to its marketing as a dietary supplement. Most recently we have seen an uptake in the reports of dependence, misuse, and even overdose of this drug; creating a growing public health concern. Our literature review aims to analyze the underlying unique neuropharmacological mechanisms, population patterns of use, and the regulatory influences that are contributing to the concerning usage. Through a systematic review utilizing Covidence software, we can analyze studies describing Tianeptine's mechanism of action and epidemiologic data encompassing poison control reports, surveillance data, and any existing regulatory frameworks. Our findings highlight how the intersection of neuropharmacological susceptibility and underwhelming regulatory oversight has contributed to and enabled the misuse of this substance. By integrating neuropharmacologic, epidemiologic, and differing policy perspectives, this review will strengthen evidence-based regulation and provide empowerment for pharmacists and healthcare providers to first recognize the growing misuse of Tianeptine. It will also support them in advocating on behalf of their patients and communities through

compassionate care while setting a precedent for regulatory authorities to take informed action in addressing this growing issue.

Carissa Doolin

Discipline: Art History

Authors:

Abstract Name: Making Her Blush: The role of queer women's literature, fashion subcultures, and theatrical pastimes in the creation of François Boucher's erotic paintings.

Throughout the centuries François Boucher has been captured within a polarizing tension; characterized as an emasculated symbol of debauchery and women's immorality by his contemporaries like Diderot, then later portrayed as a voyeuristic pillar of traditional heteropatriarchy by scholars like Erica Rand. Only within recent years has this contradiction been examined, primarily through the gender focused work of Dr. Melissa Hyde. The nuanced nature of Boucher's intimate depictions of women requires the specific consideration of women's influence, particularly of those inclined to engage in homosexual relationships. Does the gendered depiction of intimacy between women serve as a reinforcement of hetero-supremacy or have queer women left traces of themselves betwixt the mutual gaze of Diana and Callisto? Close looking and research into French eighteenth-century women's pastimes illustrate the definite influence of queer women on the creation of Boucher's erotic paintings. Throughout the rococo homosexual women immortalized themselves not only as the subjects of the rococo but also as intended viewers. The coquette-reform literature and theater of eighteenth-century women as well as their coquette fashion and artistic patronage reveal an apparent consumer base. Those who are often relegated to invisibility beyond the margins of history enjoyed rich lives full of coquette-reform literature, cross-dressing theater, and visits to the Salon. This unusual historic moment was facilitated by the same increase in social mobility that birthed the aristocrat coquette, Madame de Pompadour. Through the application of queer, feminist, and social historical methodologies my work demonstrates the historical presence of queer women within the art of François Boucher.

Stone Doppke

Discipline: English and Literature

Authors:

#1 Stone Doppke

Abstract Name: The Chase for Control in a Capitalist System that Distorts Moral Purpose: An Analysis of Ambition in Danielle Evans's The Office of Historical Corrections

A common Marxist criticism of capitalist society is that it conditions individuals to measure their worth based on where they stand in a social hierarchy rather than through real moral fulfillment. Within these systems, even pursuits such as understanding history, which should spread awareness about the corruption occurring within the hierarchy, can be commodified and used to reinforce the very structure it is meant to challenge. This dynamic is explored in Danielle Evans's The Office of Historical Corrections, a novella from 2020 that examines how institutions can shape our identity and purpose. The novella follows Cassie, a former history professor who now works for the Institute of Public History, a fictional government agency established in order to address growing concerns about pervasive misinformation about the historical record. Cassie's job leads her across the United States correcting historical inaccuracies in public displays. This mission initially seems to promote progressive goals regarding the pursuit of truth. Despite this, many details in the story

indicate that Cassie's intentions with IPH are not entirely selfless; Cassie's actions often feel like attempts to assert her own authority over others. The novella also introduces the Free Americans, a white supremacist group which heavily resists the work done by IPH. The leader of this group is Chase Hall. Despite his and Cassie's opposing moral views, the two mirror one major theme; they both transform their insecurities into power, Cassie through authority, and Chase through extremist ideals. Their parallels show how capitalist systems are capable of distorting moral purpose and turning ambition into a struggle for control.

Sean Dore

Discipline: English and Literature

Authors:

Abstract Name: How a "Real Man" Feels: Identifying the Appeal of Conservative Rhetoric Based on Interviews with Gen Z Men

Gen Z is widely viewed as the most progressive generation, yet the 2024 election revealed a surprising divide: while most young voters supported Harris/Walz, white Gen Z men without college degrees backed Trump at strikingly high rates. Psychologists note these men are still forming masculine identities and are heavily influenced by media figures. Economic anxiety, pressure to fulfill traditional provider roles, and appeals to jobs and lower taxes made Conservatism especially compelling to them. Because of this relatively recent phenomenon, qualitative research on this population in either popular or scholarly media is scant. This project sought to understand young men who have aligned themselves with conservative tenets with the goal of offering preliminary conclusions about what may be driving its unprecedented rise among Gen Z men. This project presents findings from nine qualitative interviews with Gen Z men (ages 19-22) who identify as conservative in order to develop an enriched understanding of the meteoric rise in popularity of Trumpism and Conservatism within this group. The nine interviews—each lasting between 30 and 60 minutes and conducted by a male undergraduate peer—worked to create an open environment for participants to elicit the narrative of how their beliefs developed over time. Using grounded theory, we analyzed the transcripts to identify four emergent themes: (1) finding inspiration, where men discuss what drew them to conservatism, (2) zones of belonging, where men explain how they find their place in conservatism (3) evolving personas, where they describe the evolution of their conservative identity and (4) understanding current issues, where they apply their conservative identities to current events and political issues in their daily lives. Together, these data offer a richer, more nuanced picture of the forces shaping the popularity of Conservatism and Trumpism among Gen Z men.

Elana Doren

Discipline: Economics

Authors:

Abstract Name: Free and Fare: How Commute Burdens Further Displacement and Reinforce Social Inequities

As gentrification and rising rents push low-income New Yorkers farther from job centers, the gap in commute time and distance has deepened. In a nation defined by widening wealth inequality, it is difficult to imagine how a public transportation system – especially in the country's economic epicenter – can meet needs while serving as both a public benefit corporation and a for-profit. Understanding who funds and orchestrates the city's transit system reveals what political interests are embedded in its design. While public transportation

should bridge economic and social mobility gaps for New Yorkers, decades of underfunding and misguided priorities have left the system increasingly inaccessible. This paper challenges the political claim that the systemic pushout of New Yorkers is unrelated to transit policy. Using IPUMS USA data on commute burdens by class, gender, race, and immigration status, alongside transit budget allocation between 2014 and 2023, it identifies four central trends; (1) commute times increased for black and brown commuters across the board; (2) non-white and immigrant commuters in poverty consistently face longer commute times; (3) transit spending prioritizes large capital projects and policing over accessibility and material needs; (4) these patterns persist across two democratic mayoral administrations, revealing how the logic of capital prevails over nominally progressive governance. An increasingly mismanaged transportation system reinforces racialized and class-based displacement. The paper concludes by defining the need for free public transportation while also considering the potential economic and housing implications of this shift in a system designed to displace in the name of profit.

Tress Dorfler

Discipline: Geography/Geology

Authors:

#1 Pete Puleo

#2 John Ejnik

Abstract Name: Assessing Current Heavy Metal Concentration in Surface Sediments of Three Lakes in Northeastern Illinois

Heavy metal pollution in Midwestern lake surface sediments presents a threat to human and ecosystem health. The concentrations of heavy metals in many lakes, in particular smaller lakes, are often unmonitored in surface sediments. Unknown concentrations of heavy metals in surface sediments can make it difficult to assess human exposure to these toxic chemicals which lead to various cancers, organ damage, impaired reproductive systems, and/or worsened development. Our goal is to assess how concentrations of lead, zinc, and arsenic vary across Banana Lake, Willow Lake, and Lucy Lake surface sediments in Lake County, Illinois due to differing sources of pollution in each watershed. The concentrations of lead, zinc, and arsenic in lake surface sediments are dependent on the variable land covers and management practices, so Banana Lake, Willow Lake, and Lucy Lake in Lake County, Illinois were chosen for their varying types of watershed land cover, differing management, and contrasting exposure to heavy metals. The sediment samples were collected in the field using an Ekman dredge and dried in an oven at 105°C for 28 hours. To extract zinc, lead, and arsenic, we added nitric acid and hydrogen peroxide to the samples, and placed them in a microwave digester for 15 minutes at 200°C. We then used ICP-OES to quickly assess quantities of heavy metals in the samples. We hypothesize that each site will yield different quantities of zinc, lead, and arsenic because of differing point and non-point sources of heavy metal pollution in their watersheds. Depending on our findings, we'll be able to evaluate the need for further data collection and specific lake management plans. Quantifying heavy metal pollution in lake sediments can inform better prevention and recovery efforts that can minimize threats to human and ecosystem health.

Anujin Dorjderem

Discipline: Psychology

Authors:

#1 Anujin Dorjderem

#2 Craig Dearfield

Abstract Name: Differences in Acculturative Stress Between Larger Population and Smaller Population Asian-American Subgroups

Much of the research examining acculturative stress among Asian-Americans focuses on subgroups with the largest representation in the United States (e.g. Chinese, Vietnamese, Filipino). This means that smaller subgroups may be underrepresented in the data and therefore, underrepresented in findings and discussions of this type of stress. It is important to gather data on these smaller subgroups because they may not have the same access to peers of similar ethnic backgrounds through sources of culture, such as ethnic communities and enclaves. The current study will use the National Latino and Asian American Study (NLAAS) to test for differences in stress across subgroups within the “Asian-American” category, focusing on differences by country of origin and the relative size of peer group subpopulations. The study will also control for other individual characteristics and mental health conditions. Results are expected to describe differences between country of origin subgroups of Asian Americans and provide insight into how social support and access to different levels of social connections of a similar background and country of origin impact mental health outcomes.

Manas Doshi

Other/Institution Not Found

Discipline: Engineering

Authors:

#1 Aswin Chidambaram Kumar

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#3 David Warsinger

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Abstract Name: Non-Powered Dams Conversion for Electricity Generation

Energy generation infrastructure cannot scale as rapidly as global power demand increases due to artificial intelligence and data centers. There exists untapped hydropower potential of an estimated 80,000 non-powered dams (NPD, dams without electricity generation) in the United States. Through the 2026 Hydropower Collegiate Competition (HCC), the project aims to explore conversion techniques for existing non-powered dams for electricity generation while minimizing environmental impacts and benefiting the local community. The retrofit would non-destructively add to existing infrastructure and create additional opportunities for local communities, such as controlled irrigation. Timed water releases for downstream irrigation canals while simultaneously generating power will enhance agricultural productivity and drought resilience. Based on an in-depth study of a chosen site, the project intends to create a framework for future conversion of NPDs. The site selection will factor in risk mitigation, sustainability goals, economic projections, and co-development opportunities, such as controlled irrigation release and tourism. Based on prior explorations of multistorey reservoirs and turbine designs, the project will build and test a scaled prototype to operate in conditions found at the selected site. The built model aims to reduce transition costs, minimize environmental repercussions, and benefit surrounding communities. The findings should inform future decisions on upgrading existing non-powered dam infrastructure rather than creating new reservoirs to sustainably address growing energy needs.

Natalie Doty

Discipline: Biology

Authors:

#1 Joshua Corrett-Bennett

Abstract Name: The effects of propylparaben on limb regeneration and digit formation in *Ambystoma mexicanum*

Developmental biology and the ability to regenerate limbs has interested the scientific community for years. Studying developmental capabilities in mammals, fish, and amphibians has become a high priority in biological research and the medical community. The purpose of this project is to observe the effects of an antimicrobial/antifungal chemical called propylparaben (PPB) on the stages of wound healing and limb regeneration in the model organism *Ambystoma mexicanum* (Mexican axolotl). The wound healing and limb regeneration process of the Mexican axolotl relies heavily on hormonal, cell, and nerve signaling to regenerate a fully functional limb. Prior studies with PPB in mammals have shown a correlation between increase concentrations and a reduced rate of development due to its ability to reduce hormonal signaling. High and low concentrations of PPB dissolved in ethanol were subcutaneously injected into axolotls following amputation of the right hind limb distal to the body and before the joint. Photographs were taken every 4 days for a total of 48 days to observe wound healing, limb regeneration, and digit formation processes. We hypothesized that a higher concentration of PPB would produce a more significant decrease in the rate of limb regeneration and digit formation. We did observe a significant decrease in the rate of limb regeneration and length following exposure to high concentrations of PPB, but only during the period between 16-24 days. We also observed the formation of extra digits in groups that were exposed to both high and low concentrations of PPB.

Samantha Doud

Discipline: Biochemistry

Authors:

#1 James Hougland

Abstract Name: Expression and Purification of Hsp40 Homolog Ydj1 to Explore Non-Canonical Protein Prenylation

Ydj1 is a heat-shock protein present in yeast that aids in allowing yeast to grow under high temperatures. To perform its job as a co-chaperone to Type I Hsp40, it must undergo the process of prenylation at its "CaaX" box sequence. However, Ydj1 does not follow the traditional prenylation pathway and instead undergoes a shunt pathway. Studies have shown that any post translational modifications past this shunt pathway inhibit the ability of Ydj1 to function. However, there is still a lot of mystery surrounding Ydj1 and what exactly its boundaries are for prenylation and the ability to function. This project worked to express the Ydj1 protein in bacteria as well as began work to purify the protein. Samples from each attempt were analyzed using Coomassie Blue stain gels and western blots. At the end of the project, it was found that Ydj1 is better expressed when grown in IPTG, under a low IPTG concentration and a low temperature, rather than auto-induction media. Only one attempt of purification was able to be completed and presented issues with being able to have the protein stable and soluble enough to be worked with.

Jessica Dougherty

OK - University of Central Oklahoma

Discipline: History

Authors:

#1 Katrina Lacher

Abstract Name: Remember Their Names: Media Coverage of Serial Murders from Jack the Ripper to the 21st Century

This paper analyzes the sensationalism of the infamous Jack the Ripper case in 1888 in Whitechapel, England, and how aspects of it have carried on to affect societal interest in killers over their victims in cases today. It argues for the realization and recognition of victims over their killers and aims to bring more attention to how the development of media has made it easier to warp information and influence public opinion while burying important stories and testimonies. Utilizing primary sources including recorded evidence and reports from the case, newspapers, and political cartoons, and secondary sources on the sociocultural environment of Victorian England from Martha Vicinus' edited work *Suffer and be Still* and Cameron A. Mitchell's *The Language of Murder*, the research reveals many similarities to modern events in regards to how many killers and their cases are treated by the public. These resources combine various different perspectives of the case including class, gender, and racial views based on the emerging working-poor women and high levels of immigration at the time. The paper brings in famous contemporary cases as well, noting comparable social attitudes towards them and the emerging pop-culture references that appear as a result. This paper points out the blatant sensationalism of real killers in media and urges readers to be mindful of the stories and families of victims. It discusses the differences in portrayals of the same cases throughout news sources and reminds readers that sensationalism is not always appropriate, but can always be taken too far.

Sofia Douglas

Discipline: Chemistry

Authors:

Abstract Name: Improving Forensic Identification of Cathinone Isomers Using Multi-Energy Ionization.

Structural isomers of cathinone related compounds are difficult to differentiate using traditional analytical methods such as gas chromatography–mass spectrometry (GC-MS) because their mass spectra show only subtle differences. This research aims to enhance GC-MS discrimination by utilizing the data collected at varying ionization energies used in the electron impact ionization (EI). Preliminary studies conducted using Direct Analysis in Real-Time (DART) mass spectrometry (MS) database available freely (NIST) to compare the spectral differences between spectra collected with orifice 1 voltages of +30 V, +60 V, and +90 V. Our hypothesis is that fragmentation patterns correlate with ionization energy and these differences can be used to distinguish positional isomers effectively. DART mass spectral data were obtained and interpreted through NIST software for positional isomers of cathinones including chloromethcathinone (CMC), chloroethcathinone (CEC), and methylethcathinone (MEC). Mass spectral data of three isomers from each cathinone representing isomers differ by the chlorine atom's position on the phenyl ring (e.g.: 2-CMC, 3-CMC, and 4-CMC) were selected for analysis. Three dimensional visualizations of fragmentation patterns across different energies revealed clear fragmentation differences between isomers, for example: 2-CMC displayed major distinctions from the other two isomers, while 3-CMC and 4-CMC showed subtle but reproducible differences in both abundance patterns and energetics. These findings demonstrate that expanding GC-MS data into three dimensions can enhance the discrimination between closely related isomers. The next phase of this research will involve collecting a complete energy profile for all three cathinone isomers using smaller EI energy increments (10, 20, 30 eV, etc.). The long-term goal is to develop a

searchable database of 3D GC-MS models, enabling analysts to compare unknown samples against a robust spectral library.

Mary Dowd

Discipline: Engineering

Authors:
#1 Emma Wells

Abstract Name: Organizing for Safe Water Services

Over two decades after E. coli contamination in Walkerton caused seven deaths and spurred comprehensive regulatory reform, Ontario water utilities continue navigating complex risk management challenges. The province implemented strict water quality testing requirements and mandated a 21-element drinking water quality management standard for proactive risk management. Still, we do not know which combinations of factors, including regulatory compliance, organizational culture, resource availability, or operational processes, actually drive effective risk management. This study examines risk management performance across five Ontario drinking water utilities operating under the province's unique regulatory framework. We analyzed annual water quality data including chlorine residuals, turbidity measurements, microbiological test results, trihalomethane levels, and reported incidents from 2019 to 2024, along with in-depth interviews with utility operators. To examine past isolated factors, we employed fuzzy-set Qualitative Comparative Analysis (QCA) to understand how multiple conditions interact to produce effective risk management. Our analysis explores the interplay of government regulations, utility resources, organizational culture and norms, existing infrastructure and technology, and utility processes within Ontario's regulatory context. Through thorough double-coding of interview transcripts in NVivo and fuzzy-set calibration, we identify which combinations of these factors consistently contribute to effective risk management. We measure effectiveness through sustained water quality performance and incident prevention. This research provides Ontario drinking water utilities with insights into risk management practices tailored to their specific regulatory environment. By uncovering how various factors combine to support or hinder risk management effectiveness, our findings offer pathways for utilities to strengthen their practices while working within Ontario's regulatory framework and their environmental constraints.

Emma Dowdy

Discipline: Psychology

Authors:
#1 Christina Wheeler
#2 Craig McDonald

Abstract Name: The Effect of Carrier Tone Frequency on Sensorimotor Synchronization to Binaural Beats: A Behavioral Measure of Perception

The perception of binaural beats (BB) has been shown to be heavily influenced by the frequency of both the carrier tone and beat itself; however, no prior research has examined how carrier tone frequency influences the perceptibility of BB in a sensorimotor task. Studies on sensorimotor synchronization have demonstrated that individuals are capable of synchronizing their motor activity to a variety of different rhythms, with the greatest accuracy occurring at low frequency auditory rhythms between 1 and 2 Hz. This accuracy suggests that sensorimotor synchronization to BB can serve as an accurate reflection of active perception. The present

study investigates how carrier tone frequency influences sensorimotor synchronization to BB, employing synchronization performance as an index of BB perception. Participants were randomly assigned to one of four carrier tone conditions (100, 200, 300, or 400 Hz) and presented with 11 different delta-range BB (0.5 Hz - 3Hz), each repeated once. Across 22 trials, participants performed a sensorimotor synchronization finger-tapping task in which each 90-second trial consisted of three phases: a listening phase, a tapping-with-audio phase, and a continuation phase without audio. We expect to observe that the synchronization error rate to delta BB is lowest in lower frequency carrier tone conditions, and error rate increases as carrier tone frequency increases. Because BB have been shown to influence different cognitive tasks, such as sleep and relaxation through entrainment, and these findings are dependent upon the frequency of the BB, understanding the carrier tone conditions at which delta wave BB are best perceived may be helpful in ascertaining the conditions at which entrainment is most effective.

Taylor Doyle

Discipline: Gender, Ethnicity, Diversity, or Cultural Studies

Authors:

Abstract Name: Clean Curriculum: Menstrual Hygiene Education in Bangladesh's Secondary Schools

Current Bangladeshi efforts include policies and curriculum for secondary schools regarding menstrual hygiene management education. This project will research the impact of menstrual hygiene management education on teenage girls in Bangladesh from 2005 to 2025. The project will expand on research arguing the importance of educating girls to reduce absenteeism rates and on the effectiveness of government policies. Thematic coding will draw on selected codes inspired by the United Nations' guidance on menstrual health education. Coding will analyze Bangladesh's National Education Policies from 2005 to 2025 in five-year increments. Findings may reveal that Bangladesh's education policies do not provide adequate support to teenage girls. The project will provide the water, sanitation, and hygiene (WASH) organization with the resources to advise the Ministry of Education on developing a menstrual hygiene management curriculum tailored to Bangladeshi girls.

Kallie Doyle

Discipline: Psychology

Authors:

#1 Maria Carlo

#2 Carla Zayas-Santiago

Abstract Name: What Forms of Inferential Language Characterize Teacher and EL Student Language Produced During One-on-One Instructional Conversations During Synchronous Remote Instruction?

Understanding inferential language is a critical component of English Learners' academic language development and overall school success. This study aims to describe the forms of inferential language that characterize teacher and student talk during one-on-one instructional conversations. Transcripts were drawn from synchronous remote lessons with ten 4th-grade Spanish-speaking English Learners and their bilingual instructors. Using meaning codes from the Systematic Assessment of Book Reading (Pentimonti et al., 2012, 2021), we will analyze six episodes of unscripted conversation embedded within each scripted lesson. Teachers were trained to sustain back-and-forth exchanges and to use questions strategically to provide upward and downward scaffolding. Each teacher and student utterance (approximately 106 per transcript)

will be coded for utterance type, including comment, question, directive, and cloze prompt. All questions will be categorized by question type, including wh-basic, why, how, auxiliary-fronted, and yes/no. Utterances will also be coded for the presence of inferential language features such as sequence or temporal markers, comparison and contrast, cognitive terms, feelings and emotions terms, desires/preferences, judgment/perspective, cause-and-effect relationships, and predictions or forecasts. We will generate descriptive data quantifying and characterizing the inferential language produced by teachers and students, and we will examine how teachers' inferential language use varies by question type. These analyses will serve as a pilot for a larger study designed to model how teachers' deployment of inferential language and scaffolding strategies predicts students' production of inferential language during instructional conversations.

Olivia Drew

Discipline: Health and Human Development

Authors:

#1 Olivia Drew

#2 Kierstyn Napier-Dovorany

Abstract Name: Obstacle Negotiation is affected by Poor Stereopsis in Amblyopia - Case Study

Amblyopia is the most common cause of vision impairment in a single eye, affecting over 100 million people worldwide. Because of the condition's impact on overall binocular vision, untreated cases of amblyopia can result in decreased stereopsis and reduced visual acuity in the affected eye. A previous study found that participants with reduced stereopsis due to amblyopia exhibited similar gait changes to visually normal participants when crossing an obstacle, though those with reduced stereopsis were more cautious for taller obstacles. However, this study examined younger adults, and analyses of gait behaviors in older adults with amblyopia have yet to be studied. Vision and gait were compared between 15 controls (67-88 yr) and one older adult with amblyopia (81 yr). Adults walked along a 6-meter walkway stepping over a single obstacle approximately 4 meters from the start. Gait was measured using motion capture (13 cameras sampling at 120 Hz, Oqus 3-Series, Qualisys AB, Inc., Göthenberg, Sweden). Mean and 95% confidence intervals for vision and gait factors were calculated for the control group using RStudio (RStudio, Boston, MA), and the amblyopia patient's data was compared to the confidence intervals. The amblyopia patient differed from the controls in the following demographic features and visual functions: height, binocular and monocular visual acuity, binocular contrast sensitivity, and stereopsis. Gait analyses of the amblyopia patient showed faster obstacle crossing speed, shorter step and stride lengths, and farther trail foot positioning just prior to crossing the obstacle. These findings indicate that amblyopia in the older participant may lead to inaccurate obstacle distance perception due to impaired stereopsis and altered gait, thereby increasing their susceptibility to falls and injury. Characterizing gait behaviors in people with amblyopia of all ages highlight the need for further investigations into mobility consequences of reduced stereopsis to inform fall-prevention strategies.

Olivia Drew

Discipline: Health and Human Development

Authors:

#1 Kierstyn Napier-Dovorany

Abstract Name: Evaluating Navigational Patterns of Individuals with Reduced Central Visual Acuity during Gait

Age-related macular degeneration (AMD) is the leading cause of visual impairment in older adults, affecting 1 out of 10 people aged 80 and older with an expected increase in these numbers in future generations. AMD targets the central 15-20 degrees of the visual field (frequently in both eyes), creating a central scotoma that afflicts the fovea. With tasks including walking, running and other mobile activities, individuals with central/peripheral field loss experience a multitude of challenges and hesitations in daily occurrences. Visual information is a vital asset in determining future foot placements, as there is a minimal time span between established fixation points and determined footholds for support. Although many walking trials and gaze experiments have been conducted on patients with peripheral visual hindrances, gaze patterns for walking/moving/mobility/gait of those with central scotomas are yet to be understood. In this research, we investigate gaze patterns of those with normal vision and central vision loss with the use of a wireless eye tracking device as they complete walking trials with varying obstacles. Results from the eye tracking heat maps in both conditions of participants that individuals with central vision loss (CVL) focus their gaze more on the unfamiliar obstacle on the path rather than the end of the walkway. We also observed that individuals with CVL or peripheral vision loss (PVL) fixated on a larger area of the environment than those with normal visual acuity. This form of navigational strategizing may pose an increased risk of falls and injuries as those with CVL already experience mobility and depth-perception issues.

Nathaniel Drewes

Discipline: Social Work and Human Services

Authors:

#1 Nathaniel Drewes

#2 Alex Wagaman

Abstract Name: What Makes a Home: Transgender Youth and Young Adult Perceptions of Housing Models

Despite increased research literature regarding the overrepresentation of transgender and gender non-conforming (TGNC) youth and young adults (YYA) within the homeless population, studies on tailored housing models to address this disparity remain limited. And within existing literature, even scarcer consideration is given to perspectives from TGNC YYA themselves on what housing and supports that fit their needs should look like. Meanwhile, outside of the scope of academia, grassroots housing initiatives led by and for TGNC folks are finding innovative ways to tackle homelessness in their communities. The goal of this exploratory study is to bridge the gap between literature, community, and young people by investigating what a “home” truly means for TGNC YYA who have experienced homelessness, and whether elements of community-led housing models resonate with that vision. Data will be collected through a focus group with six TGNC YYA, ages 18 to 25, who have experienced housing instability. Participants will be asked questions related to their firsthand accounts, visions of “home”, and thoughts on presented community-based housing models. The transcripts of the focus group dialogue will then be analyzed using thematic analysis, in order to interpret overarching themes between participant perspectives. These themes will inform a case study analysis of the community-based programs, conducted by the researcher using key informant interviews and document analysis. Findings will provide valuable input on how TGNC YYA conceptualize their housing needs and what factors from existing models would best align with them, informing future researchers’ ability to establish affirming, effective housing interventions that build on community designed models.

Sara Driscoll

Discipline: Political Science

Authors:

#1 Kevin Donnelly

Abstract Name: Why Some May Not “Just Believe Science”: A Rhetorical Examination of Disparities in Public Health Distrust within the Framework of Health Equity

Contemporary outbreaks of previously eradicated disease have left American health officials in the predicament of convincing distrusting communities to opt in to vaccination programs responsible for reducing the prevalence of these diseases. Though distrusters are frequently written off as outlandish conspiracy theorists, there are nuances that confound this belief, especially when considering groups long disenfranchised by the United States. Historical medical abuses including Tuskegee Syphilis Experiment and the research conducted on women such as Henrietta Lacks have set the tone for an impeding of trust that is further supported by modern-day neglect reflected by infant mortality and cancer morbidity rates. To address this neglect, communication from health officials is an important strategy to repair broken trust. Effective communication begins with listening; therefore, this project employs a content analysis to examine rhetoric used by the Black community to better understand which pressure points health officials must address to regain trust. Historical African-American newspapers are examined alongside mainstream-media publications, utilizing both perspective coding and a keyword occurrence analysis. A statistically significant difference is found between each sample's mean number of negatively, but not positively coded articles. Statistically significant correlations between keywords include the relationship between references to Tuskegee with distrust and healthcare experimentation that is unique to the conversations occurring in African-American newspapers. These results suggest that public health communicators can seek to build transparency and trust by addressing concerns of constituents continually in their practice, rather than shutting critique out of their dialogue.

Ananya Drishti

Discipline: Health and Human Development

Authors:

#1 Mahfuza Farooque

Abstract Name: Video-Based Micro-Assessments for Early Detection of Cognitive Changes Using Automated Question Generation

Early identification of cognitive decline is often limited by clinic-based assessments that occur infrequently and capture only brief snapshots of a person's cognitive functioning. In contrast, digital environments allow continuous, low-burden measurement of everyday behavior. This project explores whether short-form video interactions—paired with automatically generated comprehension tasks—can serve as noninvasive indicators of cognitive states in adults. As undergraduate researchers, we developed an automated pipeline that extracts transcripts from online videos, generates multiple-choice comprehension questions at different points in the video (approximately 30%, 70%, and 100%), and synchronises the timing of these questions with participants' viewing behavior. We also implemented logging tools that record passive engagement signals such as watch duration, pausing, skipping, replaying, and the time required to complete each question set. These data streams allow us to study how attentional patterns and working-memory processes unfold in real time. Linguistic features from each transcript guide the difficulty and structure of the comprehension items, while participant performance on timed questions provides a lightweight measure of attention and information retention. Based on prior findings in digital-behaviour research, we hypothesise that individuals with early cognitive vulnerabilities may exhibit slower completion times, less consistent accuracy, and more erratic viewing behaviour. We also expect that analyzing repeated sessions over time will offer more reliable insight into cognitive patterns than single-session measurements. This project aims to evaluate the feasibility of using short, automated, and ecologically valid video-based micro-assessments to monitor cognitive functioning outside laboratory settings. Our goal is to determine whether these digital traces can support scalable, continuous tracking of cognitive states while reducing participant burden. The tools and datasets

developed in this work also lay the foundation for future, more detailed investigations into digital markers of cognitive health.

Madyn Dron

Discipline: Business

Authors:

Abstract Name: Modern Day Marketing: Marketing Experts' Choices on the Over Sexualization of Women

It was in the early 1900s that businesses used creativity in their targeting marketing communications en masse, as they discovered that brands could command higher prices than unmarked commodities as long as consumers perceived the brand to solve problems that they were either already aware of or were generated by these marketing communications. Women in sexualized contexts comprised a notable proportion of the creativity in these ads, and while it has changed forms across the decades, these images are still just as present in the marketing communications that reach consumers today. Although experts acknowledge that women are routinely subjugated in and by these images, the underlying question remains: why do sexualized images of women to sell products persist? This study examines the intersection between the over sexualization of women in advertising and the ethical or moral decision making of marketing professionals who continue to uphold these industry traditions. Building on existing multi-disciplinary research, individual interviews with marketing experts were collected and analyzed to understand why marketing teams veer away from their moral compass on this issue. The findings in this study point to insufficient education in university marketing departments perpetuate a cycle of anti-intellectual business demand and hypernormalization of the sexual objectification of women among consumers. These results are discussed, including implications for and guidance on more socially responsible marketing strategies. Keywords: women, media, marketing strategies, sexual imagery, mental health effects, ethical marketing strategies

Cassandra Drumheiser

Discipline: Psychology

Authors:

#1 Elizabeth Dalton

Abstract Name: Chronic and Acute Academic Stress as Predictors of Anxiety and Depression: The Mediating Role of Academic Rumination

This research explores how chronic and acute academic stress contribute to anxiety and depression among college students, and whether academic rumination helps explain these relationships. Many students experience ongoing academic pressure as well as short, intense stressors like exams or deadlines. However, few studies examine both types of stress together or consider how repetitive negative thinking about schoolwork might worsen their effects. Understanding these connections is especially important as more students report struggling with stress-related mental health concerns. Many of these individuals are also seeking clearer explanations for why certain academic environments feel more overwhelming than others. The study will use validated surveys to measure chronic stress, acute academic stress, academic rumination, and symptoms of anxiety and depression among undergraduate students at a small liberal arts college. Students will also provide basic demographic information so that any group differences can be explored. These differences will then be interpreted within the context of the campus environment. Data will be collected from 100 undergraduate students through an online survey and analyzed using correlations and

mediation analyses to see whether rumination helps explain how stress leads to mental health symptoms. It is expected that both chronic and acute academic stress will be linked to higher levels of anxiety and depression. Students who ruminate more about academic problems are also expected to show stronger associations between stress and these outcomes. These findings will be discussed in the context of understanding why some students struggle more than others. They will also highlight how cognitive factors like rumination may shape emotional well-being and academic functioning across different stages of the college experience.

Isaac Drummond

Discipline: Biology

Authors:

#1 Steve Owens

#2 Scott Starr

Abstract Name: The Impact of Hurricane Helene on Southwestern Virginia and North Carolina's Coldwater Fisheries

In the fall of 2024, Hurricane Helene brought record rainfall and flooding to southwestern Virginia and western North Carolina, raising immediate questions about how extreme hydrological events affected the cold-water fisheries of the Southern Appalachians. Salmonid species such as brook, brown, and rainbow trout are highly sensitive to disturbance, and previous literature indicates that storm impacts are often system-specific. However, little research has examined the effects of major flooding events on cold-water fisheries in this region. This project investigates Hurricane Helene's role in altering stream morphology, habitat availability, and salmonid population dynamics across three major river basins: the Holston, Watauga, and French Broad systems. Utilizing pre-storm ecological and hydrological data, the study combines USGS hydrographs, fisheries survey records, and GIS spatial analysis to compare conditions and population trends before and after Hurricane Helene's flooding. GIS analysis includes changes in floodplain disturbance across cold-water fisheries and watersheds, the flood susceptibility of hydrological regions, and the extent of disturbance along the storm's projected path. Outputs will be paired with fisheries population metrics to identify watersheds experiencing the greatest habitat disruption and shifts in density, distribution, biomass, and stocking influence. Statistical analyses, including paired comparisons and correlation models, will be used to determine the significance of change among salmonid populations. Preliminary expectations include substantial shifts in stream morphology, riparian damage, and reduced habitat suitability in heavily affected areas. These effects will likely cause short-term population declines, particularly in brook trout, due to their high environmental sensitivity. Results will be discussed in terms of ecological resilience, regional management implications, climate-driven hydrological extremes, and the broader consequences of mass disturbance events on Southern Appalachian cold-water fisheries. Ultimately, this project aims to provide a system-specific assessment of Hurricane Helene's ecological impacts and generate feasible strategies to support sensitive salmonid populations in southwestern Virginia and North Carolina.

Alexandria DuBuclet

Discipline: Biology

Authors:

#1 David Epps

#2 Kamaria Early

#3 Amir Wimbush

#4 Ya'Mar McCoy

#5 Anne Wiley

Abstract Name: Skewed Sex Ratios in a Maryland Population of Painted Turtle

Male-skewed sex ratios reduce population-level reproductive capacity and can therefore pose a threat to animal populations. In freshwater turtles, male-skewed sex ratios are relatively common and can potentially be driven by female-biased road mortality during the nesting season. However, sexes can also differ in their season-specific activity levels, obscuring true patterns in turtle population sex ratios. Here, we conducted a study to determine the influence of road activity and season on measured sex ratios of painted turtles (*Chrysemys picta picta*) at the Patuxent Research Refuge and Bowie State University. We predicted that the male bias in sex ratio would increase with road density and in the summer. To test our predictions, we examined variation in sex ratio using historical as well as contemporary data over several sites, seasons (spring, summer, fall), and years (2000-2025). Surprisingly, we found no clear association between sex ratios and road usage or season. We also found remarkable consistency in the male-skewed sex ratio through two decades. We conclude that other mechanisms, such as predation of females during nesting, may drive the male bias of local painted turtles. We suggest continued study and monitoring to further understand the sex ratio bias and its consequences for long-term stability in freshwater turtles populations.

Kobie Dudley

Discipline: Psychology

Authors:

#1 Zahra Khalaf

Abstract Name: The Integration of Artificial Intelligence in Healthcare: Opportunities and Concerns

Introduction: Artificial Intelligence (AI) is a rapidly evolving technology being used across myriad industries. As its capabilities expand, AI continues to reshape the way information is processed, decisions are supported, and services are delivered. Methods: Using a review of 14 scholarly articles, this paper examines the research of AI thus far within the healthcare field by addressing two questions: (1) How is the implementation of Artificial Intelligence in the healthcare field perceived by both professionals and consumers? and (2) How is Artificial Intelligence already being used in the healthcare field by professionals? Results: Findings show that the overall perception of AI's emerging role in healthcare has been more optimistic, as it is viewed as a tool that will enhance the field. However, concerns remain—especially during early stages of implementation—regarding algorithmic bias, privacy vulnerabilities, overreliance by professionals, and the loss of a “human touch” in care. AI implementation thus far is being used more as a support tool rather than an independent decision-maker. Its applications include administrative and operational tasks such as scheduling and resource management, diagnostic support, and clinical decision support systems (CDSS). Conclusion: Together, these findings highlight the potential impact that AI can have on the healthcare field, as well as important considerations that must be continuously evaluated as this technology becomes more prevalent in the industry.

Nick Duellman

Discipline: Biology

Authors:

#1 Nicholas Duellman

Abstract Name: DEVELOPMENT OF ENVIRONMENTAL DNA TOOLKIT FOR DETECTION OF FRESHWATER MUSSELS (BIVALVIA:UNIONIDA) IN APPOMATTOX RIVER BASIN

Freshwater mussels are a keystone species providing crucial ecosystem services and river composition resiliency. Despite this, they remain one of the most imperiled groups globally. Traditional field sampling can often be laborious and ineffective in surveying rare species' distributions. Anecdotal evidence suggests the presence of freshwater mussels within the Appomattox river; the specifics of population sizes and suitable habitat remains an open question. Environmental DNA (eDNA) usage in conservation ecology has exploded in use within the past two decades, being far less invasive and cost-demanding than traditional methods. In an effort to detect presence of mussels in the Appomattox River basin and narrow the search space for traditional field sampling and thus the associated cost, an eDNA barcoding pipeline of the 16S mitochondrial ribosomal subunit was developed to target 16 extant mussel species in the Appomattox, but broadly the James River watershed. In collaboration with the U.S. Fish and Wildlife Service, we graciously received 130 freshwater mussel mitochondrial genomes to assist in the development of a 16S mitochondrial barcode. We will continue this work to procure the necessary consensus primers of the 16S mitochondrial genome and bioinformatic pipeline to assess the Appomattox River basin for presence of freshwater mussels. From our current understanding, this is the first usage of eDNA in the Appomattox River basin to detect freshwater mussel species presence.

Amelia Duenas

Discipline: Economics

Authors:

#1 Ha Bui

Abstract Name: Sports Betting Legalization in the US: Substitution and Market Expansion Effects

My research reexamines the common assumption in the literature that the legalization of sports betting causes a strong substitution away from state lottery revenues. Using a staggered Difference-in-Difference (DiD) model with Callaway and Sant'Anna's estimator, I analyze panel data from US states between 2012 and 2024. I find that while lottery revenues initially decline following legalization, a result consistent with previous substitution effect research, the magnitude of such effect weakens significantly once broader gambling market dynamics are considered. Models that control for gambling market indicators, such as sectoral employment and real GDP, reveal that sports betting also contributes to overall industry expansion, meaning that the resulting losses in other gambling forms are considerably smaller than previously suggested. Overall, these results challenge the conventional static market view that overstates substitution effects and portrays sports betting as detrimental to other gambling activities, particularly state lotteries.

Megan Duffy

Discipline: Interdisciplinary

Authors:

#1 Ashton Weber

#2 Keith McGregor

Abstract Name: Alpha Neurofeedback Training to Improve Visual Attention and Processing Speed in Younger Adults

Alpha neurofeedback training has been proposed as a method to enhance cognitive performance by increasing brain inhibition. While our long-term goal is to apply this technique to older adults, this study first examines whether younger adults can learn to modulate alpha power and whether such modulation influences visual attention and processing speed. Twenty younger adults were assigned to either an alpha neurofeedback training group (n = 10) or a control group (n = 10). During training sessions, participants in the neurofeedback group received real-time visual feedback of their EEG activity. All participants completed a cognitive test battery before and after the training period, including the Useful Field of View (UFOV), Digit Span, Symbol Digit Substitution Test (SDMT), Benton Judgment of Line Orientation, and selected conditions from the DKEFS Trails and Color Word Interference (CWI) tests. No significant differences were found in scores for UFOV, Digit Span, and Benton Judgement of Line Orientation assessments. Both groups showed significant pre-to-post improvements on the SDMT, DKEFS CWI, and DKEFS Trails assessments ($p < .05$). However, Group x Time interactions did not reach significance for any measures, suggesting both the neurofeedback and control groups improved at similar rates. Overall, changes in cognitive performance did not differ significantly between groups. Comparable improvements across groups suggest ceiling effects typical of younger adults. These findings provide a foundation for future research investigating whether alpha neurofeedback can enhance cognitive outcomes in older adults, where greater benefits may be observed.

Jonathan Duke

Discipline: Chemistry

Authors:

#1 Jonathan Duke

#2 Rangika Rangika Hikkaduwa Koralege

Abstract Name: Synthesis and Characterization of L-asparaginase and glucose oxidase encapsulated PLL-g-PEG Nanoparticles for Therapeutic Delivery.

Smart drug delivery systems (SDDS) have emerged as a promising strategy for cancer therapy. In SDDS, advanced methods are used to deliver active drug molecules to selectively accumulate in the disease tissue for a prolonged time. These methods utilize highly controllable drug release mechanisms to enhance their therapeutic effects and to reduce related side effects. Furthermore, these drug delivery systems allow for the simultaneous delivery of drugs and/or genes (co-delivery), allowing for synergistic effects and enhanced anti-tumor activity. Nanoparticles (NPs) have broad applications in drug delivery. Their potential to shield healthy tissues from cytotoxic chemotherapies represents a significant advancement in targeted payload delivery. Our research focuses on co-encapsulating L-asparaginase (L-ASNase) and glucose oxidase (GOx) in poly(L-lysine)-graft-poly(ethylene glycol) (PLL-g-PEG) NPs. L-ASNase is a therapeutic enzyme which can destroy asparagine-dependent tumors by degrading circulating L-asparagine and destroying malignant cells. GOx is considered an attractive glucose depletion strategy and has been extensively used in cancer starvation therapy. In addition, GOx catalyzed glucose oxidation exerts a variety of effects on the tumor environment, such as enhancing hypoxia and increasing acidity. Protein immobilization was achieved using various crosslinkers (DTSSP and DSS), enabling controlled release under specific conditions. Dynamic light scattering (DLS) analysis of NPs revealed a hydrodynamic diameter of ~80 nm and a polydispersity index (PDI) of 0.153. SDS-PAGE data confirmed the successful encapsulation of both L-ASNase and GOx within NP complexes, although encapsulation was partial. In vitro protein release studies were conducted by exposing the NPs to dithiothreitol (DTT) for 2, 5, and 9 days, followed by SDS-PAGE gel electrophoresis. Electron microscopy imaging showed spherical NP morphologies. Our ongoing studies focus on obtaining quantitative protein release data from NPs by encapsulating fluorescently labeled proteins.

Ashmey Dumervil

Discipline: Health and Human Development

Authors:

#1 Sarah Wolf

Abstract Name: Bridging the Gap: Evaluating the Integration of Mobile Health Units into Healthcare Networks for Referral and Follow-Up After Health Screenings

Introduction: In many low-income, or otherwise underserved areas, basic healthcare needs go unmet partially due to limited access to clinics, transportation barriers, and provider shortages. As preventive care is crucial for promoting long-term wellness and reducing disease incidence, effective strategies to reach these populations are essential. Mobile health units (MHUs) have emerged as valuable tools for improving access to preventive care by bringing services directly to communities. Previous studies demonstrate that MHUs, such as mobile eye units, improve disease detection rates by reaching populations that may otherwise go undiagnosed- thus serving as a bridge for accessible healthcare. However, challenges remain, such as lack of patient retention, incomplete follow-up after abnormal results, and limited integration with broader healthcare networks. Furthermore, disruption of medical services provided during the COVID-19 pandemic amplified the need to increase equitable access to preventive and diagnostic care. Thus, this study reviews existing evidence on the integration of mobile health units within established healthcare networks to provide patient care.**Method:** This literature review examines peer-reviewed studies on mobile health screening programs for conditions such as eye disease, breast cancer, and chronic diseases. Key outcome measures include disease detection rates, treatment compliance, and service delivery efficiency (e.g. cost per attendance and treatment duration). Both quantitative and qualitative analyses from prior studies are reviewed to assess impact and identify contextual factors influencing success.**Results:** Anticipated results of the analysis will help identify strategies for effective healthcare delivery. We expect to compare the effectiveness of various MHU providers to determine possible methods of increasing referral rates and efficient follow-up care.**Conclusions:** Mobile health units are a promising option for expanding screening access and early disease detection. The results of this research will identify methods to strengthen MHU integration, improve continuity of care, and support sustainable health equity

Zachary Duncan

Discipline: Chemistry

Authors:

Abstract Name: GC-MS Analysis of Commercial and Non-Commercial Herbal Tinctures

Herbal medicines are regulated as health supplements; however, they are treated by many as alternatives to medicines. This can lead to unfortunate consequences with people that do not inform their doctors that they are using traditional medicines, as some compounds in them can inhibit or increase the metabolism of certain drugs. Herbal tinctures are a common form of herbal medicines which have become a popular alternative to modern medicines, as they are typically portrayed as more natural. This may not be as true as portrayed, as while they come from natural herbs, some sources have documented several different additives or contaminants that have been found in herbal medicines throughout the world. In this study, ten commercial herbal tinctures were analyzed by GC-MS and compared to corresponding non-commercial tinctures prepared in the laboratory. The selected tinctures represent several cultural traditions to provide a broader view of current manufacturing practices. GC-MS analysis enables comparison of chemical profiles related to plant origin, processing methods, additives, and natural contaminants. While some variation is expected due to inherent differences in plant composition, any notable discrepancies between commercial and non-commercial samples will be documented and further investigated using LC-MS to quantify key compounds. More experimental conditions and results will be presented at the conference.

Breanne Dunn

Discipline: Psychology

Authors:

#1 Gabrielle Strouse

Abstract Name: Does Age and Reading Activity Predict Children's Engagement in Grandparent-Grandchild Zoom Sessions?

Prior studies show the quality of young children's connections with grandparents is vital, as feelings of closeness are linked to both parties' well-being. Because many families live far apart, understanding Zoom activities that promote meaningful interaction may help create more engaging virtual experiences that strengthen emotional closeness despite distance. This secondary analysis examines how structured book reading during video chat supports joint visual attention (JVA; sharing attention with another person on an object) between young children and their remote grandparents. 181 families with children aged 18–72 months completed the larger study. Each family completed a baseline video chat, three sets of three randomized experimental chats (structured play, structured reading, or control), and a final uninstructed chat. Surveys assessed grandparent enjoyment and closeness, and all recordings were coded for child engagement and joint attention. For this sub-study, 59 families who completed the structured reading condition were analyzed. The first five-minute segment of each interaction was coded. Each individual request for JVA was coded for who was the initiator, who was the recipient, whether the recipient responded within five seconds, and if so, the type of response (e.g., verbal response, gaze, or gesture). Successful bids initiated by the grandparent will be analyzed from three sessions per family: the baseline session, the second grandparent-led reading session (grandparents read a copy of the book, showing the child the pictures using their camera), and the second matching book session (the grandparent and the child read matching copies of the book, so both could reference the book in both environments). Four ANCOVAs will test whether session type and child age predict successful JVA responses and whether the frequency of verbal, gaze, or gesture-based responses differs by age or session type. Findings will show how video-chat reading formats facilitate shared attention in early childhood and promote long-distance relationships.

Emmanuelle Dunn

Discipline: English and Literature

Authors:

#1 Emmanuelle Dunn

Abstract Name: Of Women and Wolves: Hybridity, Gender and Colonialism in Medieval Lycanthrope Literature

Gerald of Wales's *Topographia Hibernica* contains an early example of a werewolf narrative which form connections between gender, early Irish subjugation, and lycanthropy that are similarly reflected in the unattributed *Melion*, estimated to be written shortly after the *Topographia*. *Melion* follows one of Arthur's knights—the eponymous *Melion*—and his marriage to an Irish princess, who abandons him for her native shores by tricking him into transforming into a wolf. In order to prevent him from returning to humanity, she takes with her the magical ring which allows him to change between human and animal. This point is notably similar to Marie de France's *Bisclavret*, wherein the wife of the titular character steals his clothing while he is in wolf-form, trapping him in his beastly shape. Though *Bisclavret* does not directly mention Ireland as the other two do, it navigates a complex relationship between women, monstrosity, and the law, perhaps due to influences from the previous two works. My research examines these three medieval werewolf texts—*Melion*, *Bisclavret*, and the *Topographia Hibernica*—and explores the relationship between wolves and subaltern identities, specifically intersecting the texts' treatment of both womanhood and Irishness. I argue that hybridity in the three works functions to place these identities within a liminal space that ultimately dehumanizes and subjugates them under the law, thus embodying Giorgio Agamben's definition of the bandit-outlaw posited in *Homo Sacer* (1998). The work takes a transnational approach by exploring the historical connections between French Normandy and Ireland which draw together French works—*Bisclavret* and *Melion*—with Irish progenitors such as the *Topographia Hibernica*. Alongside the use of Agamben as a theoretical cornerstone, I draw from a variety of feminist and postcolonial medievalist scholars such as Victoria Blud, Rhonda Knight, and Noah Guyunn.

Molly Dunne

Discipline: Interdisciplinary

Authors:

#1 Natalie Rodrigues

#2 Blythe Ennis

Lois Oshionameome Ijejeme

Emilia Gillen

Abstract Name: Peer Undergraduate Research Leaders: Advocating for Research Opportunities Through Student-Led Organizations

This project is about integrating undergraduate research into student culture. At Pace University, faculty and students collaborate on research projects for class assignments and grant-funded work. However, as endowments and funding for research across disciplines continues to be cut, a group of students have come together to realize new ways for research to thrive in spite of attempts to remove academic opportunity. With the support of faculty at the university, we created the idea for a student organization: the Peer Undergraduate Research Leaders (PURLs). We aim to empower students to explore personal inquiry, collaboration between peers and faculty, and pursue innovative academic and creative projects. The PURLs' mission aligns with undergraduate research values of fostering opportunities, dynamic interdisciplinary exploration, and

experimental learning. Our organization creates a roadmap for how students at any institution can advocate for themselves and their academic pursuits. Our aim was to build an association that is for students, and led by students, with the goal of making research enjoyable, collaborative, and an unfaltering part of our community through peer mentoring and collective engagement. As we have built the foundations for this project, we have uncovered an untapped interest within the student body to make research a more accessible feature of their academic journey, and to bring it from the classroom into campus life. We achieve this by centering principles of connection, advocacy, mentorship, and awareness. By pioneering this student research organization on our campus, we have created a space that is interdisciplinary and supportive of undergraduates with any level of experience. As universities across the United States continue to experience funding cuts, we propose our organisation as an example of how students can work with faculty and their institutions to champion themselves and their futures.

Molly Dunne

Discipline: English and Literature

Authors:

Abstract Name: "Passing through the garden door": Subversive Spaces in Jane Austen's Novels

This study contributes to the ongoing discussion of Jane Austen as a proto-feminist author and focuses on the relationship between place and space in her novels. Many argue that Austen's devotion to marriage plots prevents her work from realising its potential feminist messages. However, this research interacts with the idea posed by critical feminist Judith Butler in *Gender Trouble* to deny that claim. Butler notes that, "To operate within the matrix of power is not the same as to replicate uncritically relations of domination." I argue that this is the case for Austen; the physical places of her novels represent the power matrix of the 18th-century marriage system that she then subverts from within via the spaces she crafts. This work explores how space is tied to hegemonic notions of femininity and its role in providing an avenue for women in oppressive social networks to understand themselves and their potential. By combining settings with narrative techniques such as dialogue, free indirect discourse, and what I call "non-disclosure," Austen extends beyond tangible locations into malleable spaces in which female exploration of mind and body can occur. Through close readings of key passages in Austen's novels—including *Pride & Prejudice*, *Emma*, *Northanger Abbey*, and *Persuasion*—I define her work as critically operative within oppressive social networks. I propose that Austen navigates the marriage system of her time by queering space. In her work, space is not singular, rather it is a concept that can take many forms, such as distance, potential, or emptiness. Through this flexibility, space also transgresses the dominant social order that the rigid boundaries of place represent. I argue that it is through the discourse between place and these queer spaces that Austen weaves her social critiques based on the ideas of proto-feminist writers such as Mary Wollstonecraft and Mary Astell.

Kenneth Duong

Discipline: Engineering

Authors:

#1 Arya Bazargani

#2 Mohammad Hejazi

#3 Laleh Golshahi

Abstract Name: Enhancing Intranasal Aerosol Delivery of Antiretroviral Nanoparticles to the Olfactory Region via a Gas-Propelled Vibrating Mesh Nebulizer

Intranasal drug delivery has gained increasing attention as a noninvasive route for transporting therapeutics directly to the brain, emerging as an appealing alternative for treating central nervous system (CNS) disorders such as NeuroAIDS. This study addresses the challenge of effectively targeting the olfactory region, which is a small anatomical area high within the nasal cavity and the primary deposition site for nose-to-brain delivery. Despite its importance, existing delivery devices deposit large proportions of aerosolized drugs in the anterior nasal region, limiting the ability of therapeutics to reach the olfactory area. This study utilizes a gas-propelled vibrating mesh nebulizer to enhance targeted delivery to the olfactory region. We first evaluated the impact of vibrating mesh nebulization on the physicochemical properties of our optimized drug formulation—PEGylated combination antiretroviral therapy solid lipid nanoparticles (cART-SLNs). Nebulization resulted in negligible changes in nanoparticle size and polydispersity, indicating suitability for intranasal administration. Using three 3D-printed nasal models to account for anatomical variability, we examined how auxiliary flow rate (10–40 L/min), insertion tip geometry (wide vs. narrow), and head (or sagittal) angle influenced regional deposition. To monitor the deposition throughout the segmented model, fluorescein sodium salt replaced the cART-SLNs and was quantified by separating and rinsing the model segments. The results showed that greater airflow rates, narrower insertion tips, and higher sagittal angles increased deposition in the olfactory region—recovering up to 10%—while reducing deposition in the anterior nasal region. This work demonstrates a promising strategy for overcoming key barriers to nose-to-brain drug delivery. By combining PEGylated SLNs with a gas-propelled vibrating mesh nebulizer optimized for olfactory targeting, we highlight how nanocarrier design and device engineering work synergistically to enhance intranasal delivery of HIV therapies. These findings lay important groundwork for future in vivo studies and support the possibility of treating NeuroAIDS via the intranasal route.

Melina Duong

Discipline: Chemistry

Authors:

#1 Jose Juncosa

Gabriella Daskalova

Abstract Name: Synthesis of Potentially Selective 5-HT_{2A} Serotonin Receptor Agonists with A Forced Active Conformation

This proposal outlines work toward the synthesis of two potential serotonin 5-HT_{2A} receptor agonists based on the established molecule (2S,6S)-2-(4-bromo-2,5-dimethoxybenzyl)-6-(2-methoxyphenyl)piperidine (compound 3). A synthetic pathway has been developed based on work conducted in previous semesters for these molecules, which aim to improve the potency of their predecessor in the desired receptor while maintaining selectivity over the 5-HT_{2C} receptor. The addition of a methyl group to the central ring on compound 3 is hypothesized to favor the active conformation of the molecule, effectively increasing potency. This new agonist will give us a better understanding of the structure and function of the 5-HT_{2A} receptor and will give us further insight into its involvement in certain neurological conditions as well as its potential applications in the medicinal field. In the past, moderate amounts of tert-butyl (trans)-2-(2,5-dimethoxybenzyl)-6-(2-methoxyphenyl)-4-oxopiperidine-1-carboxylate (compound 10) were synthesized with great effort; thus, we have tested the proposed reactions on an analog of compound 10. By optimizing these reactions first, we will make it more likely that the reactions on the actual compound 10 will succeed, allowing us to ultimately synthesize desired compound 3.

Uyen Thy Duong

Discipline: Computer Science

Authors:

#1 Uyen Thy Duong

#2 Pakeeza Akram

Abstract Name: From Servers to Pi: Evaluating Open-Source Speech-to-Text Across the Hardware Spectrum

The proliferation of open-source Speech-to-Text (STT) models has enabled a new wave of on-device voice applications. However, their performance across heterogeneous hardware remains underexplored. To address this gap, we conduct the first systematic benchmark of six leading STT engines on four environments. These range from GPU-accelerated servers to resource-constrained Raspberry Pi devices. We use a reproducible, programmatic pipeline and evaluate datasets of 1,500 and 10,000 samples. Our analysis covers transcription accuracy, latency, resource usage, and multilingual support. Results show that model viability is not absolute but depends on the target hardware. We identify critical trade-offs between accuracy and efficiency. This study provides a practical, data-driven guide to help practitioners navigate these trade-offs and select STT models best suited to their deployment constraints.

Misael Duque

Discipline: Health and Human Development

Authors:

#1 Uikyung Jung

Haelee Manning

Abstract Name: Armor with Limits: Oil and Gas Field Workers' Perceived Value of Protective Clothing and Equipment

Fatality rates in the oil and gas extraction industry far exceed those of all U.S. workers, yet research on personal protective clothing (PPC) and personal protective equipment (PPE) in this context remains limited. Guided by the Customer Perceived Value (CPV) framework, this study examined how oil and gas field workers evaluate PPC and PPE and what drives their use. In-depth interviews were conducted with 10 experienced upstream production workers in Oklahoma (e.g., compressor foreman, roustabout, machinist; 13–20 years of experience). Findings indicate that workers' decisions are shaped by functional, psychological, and social value criteria. Participants typically wore long-sleeved flame-resistant (FR) shirts and pants, steel or composite toe boots, hard hats, safety glasses, and various gloves, often supplemented by hearing protection and personal gas monitors. Depending on the task, additional PPE included face shields, respirators, FR coveralls, Tyvek or sandblasting suits, and fall-protection harnesses for work at height. Despite physical discomfort and restricted mobility, participants consistently used PPE due to strong psychological benefits, particularly the desire to return home safely, protect their families, and maintain financial stability. Maintenance burden emerged as a critical pain point: laundering toxic, oil-soaked FR garments at home was labor intensive, raised concerns about residual contamination, and reduced functional value as perceived protection declined over time. Economic sacrifice further undermined perceived value, as gaps between employer allowances and market prices forced workers to overuse worn or damaged gear. Aesthetic and identity-related considerations also influenced compliance, with well-fitting, professional-looking gear viewed more favorably. Trust in PPE was conditional and fragile, especially regarding the chemical safety and durability of FR treatments. These findings suggest that design, procurement, and training strategies must jointly enhance protection, comfort, affordability, and credibility. Future research should quantify the relative influence of CPV dimensions on PPE compliance and test targeted interventions in larger samples.

Elijah Durant

Discipline: Criminology/Criminal Justice

Authors:
#1 Elijah Durant

Abstract Name: The Mentoring Promise: (Diversity+Equity+Inclusion) = Belonging

Purpose:For many men of color at Predominantly White Institutions (PWIs), college is not just an opportunity for academic achievement but a challenge in navigating environments that often overlook their identities. This research highlights the vital importance of belonging, where undergraduate students feel secure, valued, and empowered to be their authentic selves. Despite advancements in Diversity, Equity, Inclusion, and Belonging (DEIB), many still face racism, microaggressions, and stereotypes, leaving them feeling isolated on campus.**Methods:** This study employs an autoethnographic approach, analyzing personal narratives from Black male students to explore the significance of cultivating safe spaces. Qualitative data are gathered from the Barbershop Talk Experience, where students express themselves openly and engage in meaningful dialogue about their experiences. This method provides insight into candid conversations that foster a sense of community and belonging among participants. Literature emphasizes that sharing personal narratives in such environments facilitates healing and strengthens communal bonds, leading to collective empowerment. By situating findings from the Barbershop Talk Experience within this context, the study elucidates how affirming environments are vital for enhancing the educational experiences and well-being of men of color in PWIs.**Results:** Findings reveal compelling stories of Black male students who find support and solace in these environments. Participants reported transformative experiences that increased their confidence and sense of belonging, highlighting how cultural support significantly reduces barriers to academic engagement and retention.**Conclusions:** These findings underscore the need for fostering authentic belonging for academic success. Creating environments that honor students' identities enables men of color to thrive. Programs like Mentor Promise exemplify this commitment, empowering students to embrace their identities and enhance their college experiences.

Fatima Durrani

Discipline: Biology

Authors:
#1 Logan Thumm

Abstract Name: DNA Extraction from Teeth Using a Theralin-Based Approach

Background Extracting DNA from bones is crucial in cases involving unidentified human remains and mass disaster victims, where bone is often the only available source of DNA. Researchers at George Mason University have developed a method using Theralin™, a precipitating fixative that demineralizes bone. This process transforms the bone into a gum-like form, allowing it to be cut into smaller pieces and digested with lysis buffers. However, no research has yet determined the optimal DNA extraction method for Theralin-treated bone. This study aims to address that gap. **Methods** Human teeth, specifically third molars, will be used as the source for DNA extraction. Each tooth will be cleaned and demineralized into a workable, gum-like state. Two DNA extraction approaches will be applied. The control involves pulverizing the tooth and extracting DNA from the resulting powder using lysis buffer, a method adopted by FBI laboratories and other forensic institutions. The experimental method uses Theralin-based extraction. DNA will be quantified using a real-time PCR-based assay. Yields will be compared to assess the effectiveness of Theralin relative to the standard protocol. **Significance** This research evaluates the effectiveness of Theralin for DNA extraction from teeth. If successful, it could provide a reliable method for obtaining genetic material from dental samples, critical in forensic investigations. Because bones also contain DNA, results could suggest that Theralin is

effective on skeletal material as well. This has important implications for mass disaster scenarios, unidentified remains, historical or archaeological specimens, and cases involving exposure to harsh environmental conditions. Validating Theralin could advance forensic protocols and improve the ability to obtain high-quality DNA from human remains in complex investigative situations.

Daniela Durruthy Betancourt

Discipline: Biology

Authors:

#1 Jaeson Clayborn

Irene Fidalgo

Abstract Name: The Medusa Effect: Evaluating the Influence of a Moon Jellyfish Aquarium on Student Experience in an Academic Library

The growing use of biophilic design in educational spaces has sparked interest in how natural, visually dynamic elements can enhance student well-being and engagement. The Medusa Effect investigates the impact of a moon jellyfish (*Aurelia aurita*) aquarium on perceptions of tranquility, creativity, and behavioral engagement within the Miami Dade College Padrón Campus Library. To assess these effects, we implemented an on-site (online) survey that students completed while physically present in the library environment. The instrument included Likert-scale items measuring perceived tranquility, creative stimulation, engagement, visit frequency, purpose of library use, and demographic characteristics. The aquarium was installed in a centrally visible location, ensuring that all participants were directly exposed to the display as they responded. Our findings indicate that the jellyfish aquarium contributed to noticeable improvements in the library atmosphere. Participants consistently reported heightened relaxation, increased creative inspiration, and a greater willingness to spend additional time in the space. Many participants described the aquarium as a calming and aesthetically enriching feature that enhanced their overall library experience. Notably, 60 percent of participants shared that the aquarium made them feel curious and inspired, motivating them to learn more about marine life and sparking new creative ideas. More than 50 percent of the respondents also stated that they would consider caring for jellyfish at home, even while acknowledging the substantial effort required to keep moon jellyfish alive and healthy. Many students highlighted the survey statement, noting that “maintaining a jellyfish aquarium requires daily care, stable water conditions, and specialized feeding.” These results suggest that integrating bio-inspired design elements, such as jellyfish aquariums, can meaningfully improve mood, comfort, and engagement within academic environments, highlighting their potential value for future campus design initiatives.

Logan Dutton

Discipline: Computer Science

Authors:

Abstract Name: The Impact of Spectral Gap on Greedy Coloring Performance in Small-World Networks

This study investigates how the spectral gap of small-world networks affects the performance of greedy coloring algorithms, specifically focusing on the number of colors required for solutions. The methodology employs spectral analysis techniques combined with systematic testing of greedy coloring algorithms on the Watts-Strogatz model. This work addresses the gap in understanding between global spectral properties and local coloring decisions, revealing relationships that could improve algorithm selection for graph coloring

problems. This study shows a negative correlation between spectral gap and number of colors used by the greedy algorithm in small-world networks. This expands our understanding by demonstrating a relationship between global and local properties. These results have the potential to improve coloring algorithms used for small-world networks.

Branden Duyvestyn

Discipline: Biology

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Abstract Name: The role of HIV proteins in psychostimulant abuse

The amphetamine (AMPH) class of psychostimulants are highly addictive and their misuse is linked to behaviors associated with increased rates of human immunodeficiency virus (HIV) infection. In AMPH use disorder (AUD) patients, HIV infection increases the severity of AUD symptoms; however, there currently exists no mechanism that explains this phenomenon. AMPH functions by phosphorylating the human dopamine transporter (hDAT) N-terminus (NT) leading to the displacement of the hDAT-NT from phosphatidylinositol 4,5 bisphosphate (PIP2) and binding to the intracellular loop 4 domain of hDAT. This results in dopamine (DA) efflux rather than physiologically normal DA reuptake. Current psychostimulant use models depict blunted efflux as a cause for increased AMPH usage. In line with this, central nervous system viral replication persists in treated HIV patients and the resulting HIV proteins drive various neurological dysfunctions. The HIV protein Tat specifically is neurotoxic and has a high affinity for PIP2. We propose that Tat disrupts the hDAT/PIP2 interactions which are essential for AMPH-induced DA efflux leading to blunted DA efflux and increased AUD symptoms. We conducted molecular dynamic simulations to evaluate PIP2, hDAT, and Tat binding propensity; cellular and *Drosophila melanogaster* brain amperometry to evaluate the ability of Tat to regulate AMPH-induced DA efflux; and a behavioral assay in *Drosophila* to evaluate Tat's ability to alter AUD-related behaviors like escalation and preference. Our molecular dynamic simulations found that Tat has an ability to bind PIP2 and displace hDAT/PIP2 interactions. Further, Tat's ability to displace these interactions enabled a significant decrease in AMPH-induced DA efflux in vitro and ex vivo. In our behavioral assays, the addition of Tat led to significant increases in drug escalation and preference. Thus, through this proposed mechanism, we can better depict the double epidemic of HIV and AUD by partially explaining how HIV-Tat increases AUD symptoms in *Drosophila*.

Kilian Dziepak

Discipline: Exercise Science and Nutrition

Authors:

#1 Zachary Townsend
#2 Autumn Romanowski

Abstract Name: Comparison of Maximal Oxygen Uptake obtained via Seismofit and Cardiopulmonary Exercise Test

Introduction: Maximal oxygen uptake (VO2 Max) is a key health indicator, with sports performance and mortality implications. VO2 Max testing typically requires participants to complete a Cardiopulmonary Exercise Test (CPET), which can be time-intensive, physically demanding, and requires specialized equipment. A novel device (Seismofit) uses non-invasive technology in order to estimate VO2 Max; however, its effectiveness has not been studied. Methods: VO2 Max was measured in 24 healthy adults using the Seismofit device and a conventional cycle ergometer CPET. A paired t-test analysis was used to compare the average VO2 Max obtained via both testing methods. Results: There was no significant difference in VO2 Max between the Seismofit and CPET ($p > .05$). Conclusion: The Seismofit device provides equivalent VO2 Max measurement compared with the gold-standard CPET.

Mona Easterling

Discipline:

Authors:

Abstract Name: Data, Discovery, and Development: A Mentor's Journey in Undergraduate Research

My journey at Tulsa Community College shows how intentional mentorship and collaborative practices can transform classroom learning into undergraduate research experiences (UREs). Beginning in 2017 with interdisciplinary projects, I introduced students to research and presentation skills through the integration of high-impact practices in my course. There were many limitations to developing a sustainable project at a community college that included length of student degree completion at the institution, IRB timelines, and funding limitations. Collaborative efforts overcame these barriers with innovative strategies for data-driven inquiry, including the use of publicly accessible datasets such as the CDC's Behavioral Risk Factor Surveillance System (BRFSS). This led to the development of a scaffolded lab and presentation framework to emphasize the interpretation of public health data, fostering both scientific literacy and critical thinking. Initially shared among faculty in 2018, these resources expanded during the pandemic to support online learning and have become integral to departmental teaching. Continuous assessment of student perceptions of the URE meeting institutional learning outcomes (critical thinking, personal responsibility, communication skills, and social responsibility) has informed improvements aligned with the overarching goal of linking the URE to career preparation. Since this project was launched, I have been able to support student presentations at local, state, and national conferences. My role in developing curriculum further embedded scaffolded research experiences into college resources emphasizing critical thinking via the significance and limitations of health data. Since 2022, as Co-Coordinator of Undergraduate Research, I have supported programs that empower students and faculty while contributing to national communities of practice. A recent milestone includes authoring an open educational resource (OER) textbook funded by an OSRHE grant, integrating CDC data tools to promote equitable access. Attendees will learn practical strategies for embedding research and data literacy into general education courses.

Aidan Eberle

Discipline: English and Literature

Authors:

Abstract Name: Ethics in Translation: Ideology and Domestic Hierarchy in English and Japanese Translations of The Odyssey

This project examines how translators' cultural and ideological assumptions—what André Lefevere calls their “Universe of Discourse”—shape the way modern readers understand shame, hierarchy, and moral order in Homer's *Odyssey*. I focus on two scenes that raise difficult questions about gender and power: Helen's self-description in Book 4 and the execution of enslaved women in Book 22. By comparing four translators—Robert Fagles, Emily Wilson, Matsudaira Chiaki, and Nakatsukasa Tetsurō—I show how their choices reframe Homeric ideas about shame, domestic authority, and enslavement. Putting English and Japanese translations side by side allows patterns to emerge that would be impossible to see from within a single linguistic tradition. The project combines close reading of the Greek with a detailed comparison of each translator's word choices and tone. I pay particular attention to terms like κυνώπιδος (“dog-faced”) and ἀναιδείη (“shamelessness”), as well as vocabulary for enslaved women such as δμῳαί and ἀμφίπολοι. These words have very specific social and ethical meanings in Homer's world, and even small changes in translation can shift how modern readers interpret a character or judge an action. My analysis shows that translators inevitably reshape Homer's social world, whether by softening its harshness, emphasizing certain moral values, or trying to preserve its original structures as closely as possible. Ultimately, I argue that translation is always interpretive, and that our understanding of the *Odyssey*'s moral universe is inseparable from the cultural frameworks through which it is translated.

Emma Eberle

Discipline: Biology

Authors:

#1 Emma Eberle

#2 Casey Stroup

#3 Gianna Dressler

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#6 Matthew Persons

Abstract Name: Agrochemicals as infodisruptors on courtship and mating behavior of the wolf spider *Tigrosa helluo*

Agrochemicals are frequently applied multiple times per year within agricultural systems. These chemicals have the potential to disrupt sex pheromone communication systems of non-target beneficial generalist predators including spiders. We tested the infodisruptive effects of three frequently applied agrochemicals on the courtship and mating behavior of a common agricultural wolf spider species, *Tigrosa helluo*. We tested the insecticide imidacloprid, the fungicide propiconazole, and an organosilicone surfactant tank additive compared to a water control treatment. We allowed females to deposit pheromone-laden silk for one day on soil substrates, removed the female, then applied a field dose of an agrochemical or water to the substrate. The residues were allowed to dry for 30 minutes. Males were then placed on the substrate for ten minutes and we measured courtship responses to the residue. We then added the female that produced the pheromones and allowed the pairs to interact for 20 minutes and recorded courtship, mating, aggression (lunges) and cannibalism across pairs (N=177 pairs). We found no difference in the number of matings, cannibalism, or the number of males that courted across treatments, however males exposed to the surfactant showed significantly delayed courtship during exposure to only female silk compared to other treatments. During interactions with live females, males on surfactant treated soil resulted in further delays in male courtship, more female aggression, and shorter mating durations compared to all other treatments. Imidacloprid also delayed male courtship. Given that organosilicones are widely applied tank additives to most pesticides suggest that fields are frequently treated with chemicals that interfere with sexual communication among

lycosids. These surfactants may impair the chemosensory organs of spiders, chemically alter spider sex pheromones or both. Additional studies are needed to determine the mechanism of infodisruption.

Aiden Ebner

Discipline: Physics and Astronomy

Authors:

#1 Lena Cressman
#2 Robert Geissler
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#4 Tilda Pendleton
#5 David Purdham
#6 Evan Witczak
#7 Adrian Banu

Abstract Name: High-Precision Measurements of Half-Lives for ^{196}Au , ^{99}Mo , ^{122}Sb , ^{79}Kr , ^{77}Kr , ^{89}Zr , ^{85}Sr , and ^{77}Br Radionuclides via Photoactivation at the Madison Accelerator Laboratory.

The ground state half-lives of ^{196}Au , ^{99}Mo , ^{122}Sb , ^{79}Kr , ^{77}Kr , ^{89}Zr , ^{85}Sr , and ^{77}Br have been measured with high precision using the photoactivation analysis technique at an unconventional bremsstrahlung facility at the Madison Accelerator Laboratory that features a repurposed medical electron linear accelerator. The γ -ray activity was counted over about 5 half-lives with a high-purity germanium detector, enclosed into an ultra low-background lead shield. The preliminary measured half-lives are: $T_{1/2}(^{196}\text{Au})=6.143 \pm 0.009$ (stat) d; $T_{1/2}(^{99}\text{Mo})=65.874 \pm 0.025$ (stat) h; $T_{1/2}(^{122}\text{Sb})=2.690 \pm 0.012$ (stat) d; $T_{1/2}(^{79}\text{Kr})=32.787 \pm 0.072$ (stat) h; $T_{1/2}(^{77}\text{Kr})=71.506 \pm 1.591$ (stat) min; $T_{1/2}(^{89}\text{Zr})=86.187 \pm 2.235$ (stat) h; $T_{1/2}(^{85}\text{Sr})=66.274 \pm 0.509$ (stat) d; $T_{1/2}(^{77}\text{Br})=56.749 \pm 9.690$ (stat) h.

Lucia Eckel

Discipline: Interdisciplinary

Authors:

#1 Lucy Eckel
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#4 Nora Perez-Rubio
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#6 Natalie Lauchlan

Abstract Name: Gender Data Collective: An Interdisciplinary, Collaborative Study on Regional-Based Sex Education and Gender Attitudes in the U.S.

Will be conducting a mixed-methods survey of college students in the U.S, studying K-12 sex education and gender attitudes. The survey will have five sections: demographics, childhood environments, K-12 sex education, current gender attitudes, and open-ended questions on personal awareness of the correlation between sex education and gender attitudes. Attitudes include: what do participants think “gender” means, their respect towards diversity of sexuality, their notions of feminine and masculine roles, and more. We will examine differences by regional variation in the Comprehensive Sexual Education curriculum, controlling for childhood environments and general demographics such as sex, race, and class. Our mixed-methods analysis

will include both quantitative and qualitative analyses. This study will be interdisciplinary and collaborative. It will be interdisciplinary in that the survey results will be analyzed through four different lenses: Women's Studies/Sociology, Public Health, and Political Science. It will be collaborative in that each lens will be operated by a team of two researchers, and all six partners will write a conversational paper reflecting on their results and evaluation, to create a comprehensive guide of evidence-based recommendations for effective sex education.

Amanda Eckhoff

Discipline: Biology

Authors:

- #1 Briana Roberson
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Abstract Name: Wild Andean Camelids Alter Post-glacial Soil Microbial Community

Tropical Andean glaciers are rapidly melting, and it is important to understand ecological community emergence following glacial retreat. Soil microbes are the earliest taxa to colonize land exposed by glacier loss. Vicuñas (*Vicugna vicugna*), wild South American camelids, create dung piles which concentrate nutrient deposits on otherwise nutrient-poor sediments and become colonized by plants decades before the surrounding landscape. We hypothesized that vicuñas alter soil microbes in glacier forefields. We compared microbial communities between animal-modified patches and adjacent unmodified glacial moraines. Sites (N=23) were located on two soil ages: older soils exposed by deglaciation for >135 years, and younger soils exposed by deglaciation in the last ~45–135 years. We extracted DNA from soil samples, sequenced 16S rRNA amplicon for prokaryote and 18S for eukaryote taxa, and compared alpha and beta diversity using the phyloseq and vegan packages in R. Animal-modified soils had higher prokaryote ASV richness than moraine reference soil, and lower-elevation soils had higher richness than higher-elevation soils (elevation: $X=27.61$, $p<0.0001$, treatment: $X=3.15$, $p=0.076$) and the interaction between elevation and treatment was significant ($X=7.20$, $p=0.0073$). Soil age was marginally significant ($X=3.55$, $p=0.060$). Eukaryotic ASV richness was lower on higher-elevation soils and the interaction of elevation and treatment was significant but treatment alone was not. Both prokaryote and eukaryote beta diversity of animal-modified soils was significantly different compared to moraine reference soils on recently-exposed soils ($p<0.05$). Following glacial retreat, vicuñas create patches that alter microbial diversity. Vicuñas and other native Andean wildlife species may facilitate the establishment of unique soil microbial communities and accelerate succession in recently-exposed high-elevation soils.

Benjamin Edelman

Discipline: Chemistry

Authors:

- #1 Benjamin Edelman
- #2 Charles Sheppard
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#5 Felix Bevc
#6 Lillian Hughes
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#9 Michael Leopold

Abstract Name: Engaging “Bond” Angle with Nanomaterial Composites for Enhanced Halogen Bonding Toward Explosive Detection Interfaces

The expanding use of explosives globally, particularly by terrorists for improvised explosive devices (IEDs), calls for the development of fast, on-site sensing techniques that rely on fundamental intermolecular interactions at synthetic interfaces. One such interaction being explored for sensing schemes is halogen bonding (XB), a highly directional, noncovalent interaction formed between a region of positive electrostatic potential on a halogen atom (X) acting as a XB donor and electron rich portions of target molecules that act as a Lewis base, or XB acceptor. As leveraged by density functional theory (DFT) analysis, the strength of XB interactions relies on shorter XB bond distances and more linear R-X—B bond angles, which facilitate stronger, lower energy binding of the dimer molecule formed. While prior studies have sought to maximize interactions, few have explored or experimentally demonstrated how bond angles can enhance XB interactions. Herein, fundamental studies are conducted at self-assembled monolayers (SAMs) and gold nanoparticle (Au-NP) interfaces that are functionalized to engage in XB interactions. Alkanethiolate-stabilized Au-NPs, known as monolayer-protected gold clusters (MPCs), were enhanced with XB-donor capability by incorporating specialized XB donor thiol ligands including halogen terminated perfluorinated straight chain and rigid perfluoro-aromatic amide ligands – both of which were used within nanomaterial composite films of single-walled carbon nanotubes (SWCNTs) as a sensing interface in both solution and the gas phase. In particular, DFT and vapor studies targeting cyclohexanone (CH), a known by-product of hard-to-detect, non-volatile explosives (e.g., RDX), allowed for a sensing interface for CH that engaged XB bond angle to achieve detection limits of CH (< 10 ppm) that markedly outperform similar systems not considering this particular aspect of XB. The materials and methods presented in this study further demonstrate the potential of XB systems as a rapid and sensitive step toward developing field sensors for explosives.

Ryan Edmonds

VA - George Mason University

Discipline: Exercise Science and Nutrition

Authors:

Abstract Name: The Effect of Payroll on Team Success in Major League Baseball and Its Application to the Salary Cap Debate.

This project examines how payroll spending influences team success in Major League Baseball (MLB) and how these patterns relate to the ongoing debate over adopting a salary cap. As financial gaps between large- and small-market teams widen, concerns have increased about fairness, parity, and the league’s long-term stability. Existing research shows that success in MLB depends not only on total payroll but on how teams allocate their spending. Prioritizing key defensive positions, particularly pitchers and catchers, can enhance overall performance, whereas uneven or inefficient spending across positions may reduce cooperation and lead to diminishing returns. Studies also reveal limitations in MLB’s current revenue-sharing system. Although intended to help smaller-market teams, shared revenue is not always reinvested into talent, and some teams have instead lowered payroll. This suggests that revenue-sharing alone has not meaningfully narrowed the competitive gap. Additional research on salary structures in Minor League Baseball provides insight into how development systems, player pay, and organizational incentives shape competition and player movement. Salary negotiations and arbitration rules further complicate payroll decisions, as market

size and team incentives influence player earnings and contribute to league-wide inequality. Together, these findings indicate that competitive balance issues in MLB stem from both financial disparities and misaligned incentives built into the current economic system. This project seeks to determine whether MLB is experiencing a genuine competitive balance problem and to assess whether potential reforms—such as salary caps, adjustments to revenue-sharing, or redesigned incentive systems could address these challenges without intensifying labor tensions. Using publicly available databases such as Baseball-Reference.com, this research will analyze payroll trends, player movement, and negotiation mechanisms to evaluate where inefficiencies arise and how policy changes might improve competitive fairness. Ultimately, this project aims to contribute empirical insight to debates surrounding MLB's economic structure and the viability of its revenue-sharing system.

Paige Edwards

Discipline: History

Authors:

Abstract Name: Chernyshevsky's "What is to be Done?" and Anarcha-Feminism

This historical research paper examines the connection between Nikolai Chernyshevsky's 1863 novel *What is to be Done?* and the political ideology of anarcha-feminism, arguing that the novel is best categorized as an anarcha-feminist text. *What is to be Done?* is recognized by historians as the holy text of the Russian Revolution. The novel radicalized the Russian intelligentsia with radically simple demonstrations of utilitarian philosophy. Without this novel, the Russian Anarchist Terrorist movement and the Bolshevik Revolution would not have occurred. The exclusion of women's history from the metanarrative, however, has led previous historians to overlook the analysis of *What is to be Done?* as a fundamentally anarcha-feminist text. Anarcha-feminism is an adjustment to other leftist theories: it states that for hierarchy and class to be truly dissolved, patriarchy must be abolished first. This paper provides a comprehensive breakdown of the historiography of anarchism and previous analyses of *What is to be Done?*, identifying gaps that allowed for this ideological connection between the novel and anarcha-feminism to be missed. Next, the paper simultaneously analyzes the themes of the novel alongside the work of foundational anarcha-feminists like Emma Goldman, demonstrating their philosophical similarities. The mother of anarcha-feminism, Emma Goldman, was converted to the revolutionary cause as a teenager after reading *What is to be Done?* and modeled her life and moral compass after the protagonist of the novel, Vera Pavlovna. While it is commonly believed that *What is to be Done?* is a model for a socialist society akin to Leninism; it is more accurately a new model for gender roles. When it is broken down into its core components, *What is to be Done?* is about love that is uncontaminated by the policies of the patriarchal church and state—and this is the definition of anarcha-feminism.

Alice Efremova

Discipline: Biology

Authors:

#1 Efrain Rivera-Serrano

Abstract Name: Combining oncolytic virotherapy and chemotherapy against fibrosarcoma

Oncolytic virotherapy is in clinical trials for common cancers, but its potential against rare cancers has only been minimally explored. Fibrosarcoma, the target cancer in this study, is a rare soft tissue malignancy with

high mortality and resistance rates. Our laboratory recently identified reovirus strain DB62 as highly effective at infecting and killing human fibrosarcoma cells. Here, we further characterized DB62 and evaluated its potential when in combination with chemotherapeutic agents, with the goal of enhancing cytotoxicity and reducing therapeutic resistance. We observed higher replication and induced cell death for DB62 compared to the commonly studied strain T3D, as shown by analysis of viral protein expression and quantification of cancer cell viability, respectively. To assess combination therapies, the optimal concentration for eight FDA-approved chemotherapeutic drugs was determined using viability assays. Among the combinations tested, DB62 in combination with methotrexate produced a synergistic effect, reducing cell viability beyond the expected values for individual treatments. These findings suggest that combining reovirus strain DB62 with methotrexate may provide a more effective therapeutic strategy for fibrosarcoma and warrant further preclinical investigation.

M Egberongbe

Discipline: Sociology

Authors:

Abstract Name: Blackness and the Transness Between Us: Cultural Influence on Transgender Identity Across the Black Diaspora

This project examines how transgender people develop their transgender identities by analyzing the influences of cultural and legal environments across the Black diaspora. While transgender people are legally protected in most parts of the United States, identifying as a transgender person remains criminalized in Nigeria, where social stigma and legal sanctions restrict visibility and safety. To explore the effects of the difference in legal recognition, 28 Nigerian, African-American, and Nigerian-American transgender participants engaged in semi-structured interviews that examined identity questioning, stages of transition, sources of support, and barriers to affirmation. This paper focuses on findings across five dimensions: identity questioning, support groups, barriers to transition, stage in transition, and threats of violence. The data reveal that Nigerian participants often reported later identity questioning, received almost no support from community organizations, experienced the greatest threats of violence, and had the largest amount of non-transitioned transgender individuals. Conversely, African American and Nigerian American participants reported earlier identity questioning, broader access to community support, and were all actively medically transitioning or socially transitioned. Across all groups, queer and trans peers provided the most reliable and accessible form of affirmation, underscoring the central role of community in navigating systemic exclusion. By situating transgender identity within cultural, legal, and diasporic contexts, this research demonstrates how structural forces mediate the risks and opportunities of self-expression and underscores the importance of interdisciplinary frameworks for understanding identity across global contexts.

Zoe Eineichner

Discipline: Communications

Authors:

#1 Kristine Knutson

Abstract Name: Support or Silence? Empathy, Dignity, and Self-Censorship in Workplace Stress Communication

This study investigates how white- and blue-collar workers respond to coworker disclosures of workplace

stressors, focusing on the balance between supportive engagement and self-censorship. Prior research highlights self-censorship as the intentional withholding of information, motivated by fear of consequences, desire to avoid conflict, or strategic silence (Bar-Tal, 2017). Adamska (2017) further identifies acquiescence, defensive, prosocial, and opportunistic forms of self-censorship, each with distinct organizational implications. Occupational context may shape self-censorship behaviors such that blue-collar workers often face hierarchical structures and physical demands that can amplify defensive silence, while white-collar workers may experience greater autonomy but heightened reputational risks (Karasek, 1979; Hodson, 2001). Empathy and workplace dignity are proposed as key predictors of supportive communication. Empathy, conceptualized as monitoring, understanding, and responding to others' emotions (Abraham, 1999; King, 1995), has been linked to justice, moral reasoning, and compassionate communication (Miller, 2007). Workplace dignity, defined as feeling respected and valued, is associated with voice and prosocial action, whereas indignity correlates with silence and withdrawal (Lucas, 2017; Sayer, 2007). Together, these constructs may explain why some employees engage with coworkers' stress disclosures while others remain silent. To test these relationships, participants recruited through the Prolific platform will complete a 10-minute survey during winter 2026. Respondents will be randomly assigned scenarios depicting either white- or blue-collar coworkers discussing mental or physical stressors and will rate their likelihood of engaging in supportive or self-censoring behaviors. Measures of workplace dignity, self-censorship orientation, and emotional empathy will follow alongside occupational background and demographic questions. We anticipate finding differences in self-censorship and supportive behaviors between collar types, such that blue-collar workers display more defensive and white-collar workers elicit more opportunistic self-censorship, with empathy and dignity serving as significant predictors. Results will contribute to understanding how occupational context, emotional capacities, and perceptions of dignity shape communication around workplace stressors.

Zoe Eineichner

Discipline: Psychology

Authors:
Emilija Durdevic

Abstract Name: Tracking Motivation in Students' First College Math Class: Does Prior Achievement Matter?

Required math courses are taken by many students in their first semester, yet little is understood about how students' math motivation changes across their first semester of college math. Guided by Situated Expectancy-Value Theory (SEVT; Eccles and Wigfield, 2020), we conducted a longitudinal study examining changes in 53 undergraduate students' math task value, math self-efficacy, and math anxiety at three different time points across one semester. We compared motivational trajectories across two math courses: one for mostly STEM majors with relatively higher placement test scores and a course for mostly humanities majors with relatively lower placement test scores. Past research suggests different learning practices and variable educational outcomes depending on prior achievement (Yip, 2009; DiFrancesca, 2016). To understand how teaching practices and classroom experiences may relate to motivation changes throughout the semester, we also conducted classroom observations and interviews with four participating instructors. Quantitative student data collection is ongoing, and we hypothesize that there will be differences in math motivation from the beginning to end of data collection as well as differing motivational trajectories between high- and low-math achieving students. Preliminary qualitative findings from classroom observations showed instructors most often utilized tactics that made student learning more enjoyable (situational interest), less costly and difficult (cost alleviation and encouragement) and more relevant to worldly contexts (relevance). Those educating the high-math achieving group utilized more situational interest than low-math achieving instructors. Instructor interviews, coded reliably ($\kappa = 0.83$), revealed similar practices across both courses, such as emphasizing growth mindset, high standards for students, engagement with course material, and students' use of campus and classroom resources. By understanding how math motivation shifts during the transition to college, we can highlight pathways to foster student resilience, reduce barriers to learning, and create environments where diverse students can thrive.

Dessa Eisenhour

Discipline: English and Literature

Authors:

Abstract Name: A Writing Center How-To: A Guide For Tutoring Creative Writing Students

During my time as a creative writing student at the University of Findlay, a small, private university in NorthWest Ohio, I experienced a lack of resources from my college writing center to help with creative writing assignments. Writing center tutors were trained to help with academic writing rather than creative writing. My experience led me to the question, how can writing centers better help creative writing students with their assignments? To answer this question, I researched best practices for teaching creative writing and training writing center tutors. I also looked for different models at other college writing centers. The research shows that writing centers acknowledge that they have a lack of resources for creative writers (Birnbbaum and Kaufmann 1996, Denoto 2015, LaBlanc 1995, and Ozer 2020). The research also shows that most writing center tutors do not feel comfortable enough to help creative writing students (Cassorla 2004, Hutton 2023, and Ozer 2020). This project helps to solve this problem by creating a how-to guide for writing center tutors that addresses the basic genre of creative writing, how to approach a creative piece and the types of questions to ask creative writers so that they could get the most from their writing center appointment. This guide will be used in the tutoring training class required for all writing center tutors at the University of Findlay as well as in the University's DeLong Writing Center. Through its adoption of this guide, the University of Findlay's writing center could become a model for other schools looking to more effectively support their creative writing students.

Ogechi Eke

Discipline: Nursing and Public Health

Authors:

#1 Ogechi Eke

#2 Chinomso Nwozichi

Abstract Name: Effects of Fear of Cancer Reoccurrence among Adolescents and Young Adult Cancer Survivors

The fear of cancer recurrence, described as anxiety, weariness, or depression associated with the thought of reacquiring cancer after previously undergoing remission. FCR presentation can be significantly higher in adolescents and young adults (AYAS) compared to the general population. However, the underlying reasons associated with FCR among this group are not often discussed or investigated. Hence, the purpose of this study was to perform a narrative review that aims to synthesize current knowledge on the causes, predictors, and impact of FCR in AYAS, as well as identify any recurring patterns relating to fear of cancer recurrence, and examine interventions that are in place to mitigate the effects of FCR in adolescent and young adults. A comprehensive literature search using PRISMA methodology was conducted in scientific databases, combining terms such as "fear of cancer recurrence," "oncology," "teen," and "young adult." Eligible studies were published within the last 10–15 years, focusing on AYAs (ages 13–29). A thematic synthesis was performed to identify patterns and prevalence within existing data. Across studies, prior recurrence and a history of psychosocial distress or anxiety consistently emerged as strong predictors of FCR. Additional risk factors included pessimistic outlook, comorbidities, fewer follow-up visits, and limited cancer screening.

FCR was primarily manifested through depression, anxiety, and post-traumatic stress, underscoring its significant psychosocial impact on AYAs. Most studies emphasized the role of psychosocial interventions such as cognitive behavioral therapy, mindfulness, and acceptance/commitment therapy, although limitations were noted regarding durability and clarity of implementation. Conclusively, FCR is a factor particularly present in the AYA population, and its prevalence and severity can be predicted by the survivor's history of psychosocial disturbances. Moreover, there are current interventions in place, but further research is needed to maximize their effectiveness and improve the overall quality of adolescent and young adult cancer survivors.

India El

Discipline: Psychology

Authors:

#1 Erica Russell

Erica Russell

Abstract Name: "Doing It All, All the Time": Black Women's Experiences of Urgency Culture and Self-Mattering

This poster will present a proposed qualitative study exploring how Black women describe and navigate urgency culture, and how these experiences shape their sense of self-mattering. The guiding research question is: What are Black women's stories of urgency culture, and how do these experiences affect their perceptions of self-mattering? The literature highlights that Black women disproportionately face expectations to over-perform, provide emotional labor, and prioritize others' needs before their own—a pattern deeply tied to race- and gender-based stereotypes and labor histories. Traditional definitions of mattering emphasize feeling valued and significant to others (Rosenberg & McCullough, 1981). Russell (2024) expands this concept by framing mattering as a mindset rooted in self-compassion, empathy, and awareness of the human labor sustaining institutions. Yet no research has examined how Black women's sense of mattering is influenced by urgency culture, defined as the expectation to at once respond to the needs of others while deprioritizing one's own well-being, often resulting in chronic overwhelm. The proposed study will employ a Black Feminist framework to understand how race, gender, and cultural expectations intersect to shape Black women lived experiences of urgency and self-worth. A qualitative design will guide data collection through semi-structured interviews, focus groups, and brief surveys with approximately 10–15 Black women across varied professional and academic contexts. Interviews will explore themes related to time pressure, emotional labor, internalized expectations, and perceptions of mattering. Data will be analyzed using thematic analysis to identify patterns and variations in how urgency culture shapes identity and emotional health. This research aims to fill a significant gap in psychological and sociocultural scholarship by centering Black women's voices and lived narratives. Findings will contribute insight into how urgency culture impacts well-being, with the goal of informing culturally responsive interventions that promote mattering, self-compassion, and sustainable work-life boundaries for Black women.

Jona Elam

Discipline: Health and Human Development

Authors:

#1 Cody Frazer

#2 Meng Wu

#3 Ethylin Wang Jabs

Abstract Name: Differential Expression of Splicing Factors during Human Induced Pluripotent Stem Cell-Derived Osteogenic Differentiation

Osteogenesis is the process of bone formation. Osteogenic differentiation refers to the process in which mesenchymal stem cells (MSCs) differentiate into pre-osteoblasts (preOBs), and then into osteoblasts (OBs), essential for bone development, metabolism, and repair. MSCs are multipotent stem cells that can differentiate into a variety of lineages, including osteoblasts, chondrocytes, and adipocytes. There are multiple mechanisms that regulate cellular differentiation and function. One of these mechanisms is alternative splicing, a process by which one gene can code for multiple proteins, known as isoforms. Different isoforms may be present in distinct types of cells or at different points in one cell's life, and abnormal isoforms may contribute to diseases. Alternative splicing is regulated by genes termed splicing factors. We previously identified differentially expressed genes in osteogenic differentiation by an integrated transcriptomic analysis. In this study, we evaluate the expression of splicing factors during osteogenic differentiation. MSCs derived from human induced pluripotent stem cells (hiPSCs) were cultured and differentiated into preOBs and OBs. Total RNA was isolated from MSCs, preOBs and OBs, and RT-qPCR was performed to analyze the expression of the selected splicing factors (NRIP2, SRSF1, SF3B4, and SNRNPB) which were identified to be differentially expressed among MSC, preOB and OB stages. Aberrations of these splicing factors are associated with skeletal developmental diseases, including Acrofacial Dysostosis I, Cerebrocostomandibular Syndrome, and other skeletal malformations. By examining the expression of these splicing factors during osteogenic differentiation, we aim to elucidate alternative splicing in normal osteogenesis. New knowledge from this investigation may facilitate future development of novel therapeutics and interventions for osteogenic diseases.

Rodina Elasbali

Discipline: Health and Human Development

Authors:

#1 Hongming Chen

#2 Xin Feng

Abstract Name: Interactive Effects of SES and Parenting Stress with Maternal Depression in Predicting Child Internalizing and Externalizing Symptoms

Maternal depression is an established risk factor for internalizing and externalizing psychopathology in children. Although maternal depression, parenting stress, and Socioeconomic Status (SES) are known to be associated with child socioemotional adjustment, few studies have examined the interactive effects of SES and parenting stress with maternal depression in this association. This study examined the moderation of SES and parenting stress in the longitudinal associations between maternal depression and child internalizing/externalizing symptoms. Ninety-three mother-child dyads were recruited. Data was collected at two time points, one year apart (T1 and T2). Three variables were measured at T1 only. Maternal major depressive disorder was assessed using the Mood Episodes module of the Structural Clinical Interview for DSM-5 Disorders (SCID-5). SES was measured and coded using the Hollingshead Four-Factor Index of Socioeconomic Status, based on maternal and paternal education and occupation status. Parenting stress was self-reported by mothers using the Parenting Daily Hassles Scale (PDH). At both times, mothers rated child externalizing and internalizing symptoms using the Child Behavior Checklist (CBCL). Hierarchical multiple linear regressions were used. Baseline child externalizing and internalizing symptoms were included in the analysis as covariates. Results indicated that maternal depression, parenting stress, and SES did not predict child externalizing symptoms at T2 directly. However, SES and parenting stress each moderated the longitudinal association between maternal depression and child externalizing symptoms. In predicting child internalizing symptoms at T2, neither SES nor parenting stress moderated the longitudinal association between maternal depression and child internalizing symptoms; however, parenting stress positively predicted

child internalizing symptoms. In conclusion, parenting stress and SES affected the longitudinal influences of maternal depression on externalizing symptoms but not on internalizing symptoms in children. This suggests SES and parenting stress could identify children who are particularly vulnerable to externalizing symptoms resulting from maternal depression and inform targeted interventions.

Dina Elgamal

EGY - The American University in Cairo

Discipline: Biochemistry

Authors:

Abstract Name: Anti-inflammatory and Antioxidant Effects of Sea Urchin Spine Extract

The therapeutic potency of natural products derived from aquatic life has been widely assessed in terms of wound treatment. This research investigates the anti-inflammatory and antioxidant activity of the Sea Urchin spine extract in an experimental setup using the L929 cell line in vitro. Cell migration and proliferation of L929 cell lines were tested using an MTT assay to assess cell metabolic activity, where the sea urchin spine extract was applied to the cells at two concentrations: 100 µg/ml (yielding around 136% viability) and 200 µg/ml (yielding around 95% viability). The active compounds of the sea urchin's spine were investigated via GC-MS; the antioxidant and antioxidant activities of the extract were evaluated by catalase test, GSH, and NO. GC-MS identified bioactive components, including bisabolol oxide, which has anti-inflammatory and anti-irritant properties, protects the skin from free radical damage, and improves the percutaneous absorbance of skin-care chemicals. Oleic acid was also identified, a compound known for its pro-inflammatory effect that accelerates tissue regeneration and the wound healing process. Moreover, the oxidative stress tests (GSH and NO) revealed significant anti-inflammatory and antioxidant actions of the sea urchin spine in both 100 µg/ml and 200 µg/ml, with roughly 0.098 and 0.103 mmol/L in the GSH test, and 20.46 and 20.6 mmol/L in the NO test, respectively. However, the CAT results were inconsistent with those of the GSH and NO; therefore, repetition of this test is recommended. Nevertheless, the identification of significant anti-inflammatory and antioxidant effects of the sea urchin spine qualifies it as a potential candidate in wound healing ointments. Keywords: sea urchin spine, anti-inflammatory, antioxidant, wound healing

Mohamed Elghamry

Discipline: Psychology

Authors:

#1 Sophia Barrett

#2 Robert Melara

#3 Jazmine Taylor

Abstract Name: Why Doesn't Distress Lead to Help? Psychosocial Mechanisms Linking Mental-Health Symptoms to Treatment Engagement in College Students

Depression and anxiety are increasingly prevalent among college students, yet only a minority access professional mental-health services. Prior findings from the Healthy Minds Study show that psychological flourishing protects against distress, while loneliness and race-based traumatic stress are associated with greater symptom severity. However, these same factors show little association with treatment use, suggesting that many students recognize their distress but do not translate that awareness into help-seeking behavior. This raises a critical question: What determines whether psychological need results in actual engagement with

mental-health services?The present study will investigate psychosocial mechanisms that may shape this transition from distress to action. Using 2023–2024 Healthy Minds Study data from over 44,000 U.S. college students, we will examine whether sense of belonging, financial strain, perceived institutional prioritization of mental health, and mental-health stigma help explain why some students with significant symptoms pursue therapy while others do not. Logistic regression models will test whether these factors mediate or moderate the relationship between depression, anxiety, and past-year therapy use. By identifying the forces that either facilitate or block treatment engagement, this work aims to clarify why rising levels of student distress have not led to proportional increases in service utilization. Understanding how campus belonging, stigma, and resource perceptions shape help-seeking may inform institutional strategies capable of bridging the persistent gap between mental-health need and actual support.

Hana El-Hamalawy

Discipline: Health and Human Development

Authors:

Abstract Name: The Effect of Prolonged Conflict and Forced Migration on the Developing Minds of Syrian Refugee Youth

Syrian refugee youth face unique hardships with the interconnected biological, structural, and social effects of trauma and displacement that impact their mental health conditions. These challenges impede access to care and exacerbate depression, anxiety, and stress symptoms, with interventions that lack a holistic approach to addressing the needs of this population. This paper aims to explore the barriers to mental health care and review how integrated interventions that combine biological research, policy-level work, and a comprehensive understanding of real Syrian experiences are crucial to alleviate the mental health burden that the Syrian conflict has placed on numerous generations. This review synthesizes studies measuring the prevalence of biomarkers and inflammatory proteins; large-scale surveys assessing trauma exposure, executive function, and psychological symptom severity; and qualitative interviews with refugees and healthcare workers to capture lived experiences and propose an integrated intervention. This evidence shows that prolonged exposure to trauma and displacement activates neurobiological stress systems, specifically the corticotropin-releasing factor (CRF) and hypothalamic-pituitary-adrenal (HPA) axis pathways, contributing to the long-term persistence of emotional dysregulation in the child's brain. The continuous activation of hormones and increased symptomology interacts with Post Migration Living Difficulties (PMLDs) such as financial barriers, inadequate healthcare infrastructure, discrimination, and limited cultural interventions. Even when care is available, Syrian adolescents help-seeking behaviors are hindered by the normalization of trauma and intergenerational untreated mental health disorders. This stigma reinforces cycles of underdiagnosis and improper care and impacts the self-perception and identities of this youth population. Overall, it is apparent that Syrian refugee youth often face compounding disadvantages (biological sensitization, systemic neglect, social isolation) that perpetuate psychological distress and impede on successful integration into host countries. Improving the mental health of Syrian refugee youth requires multifaceted interventions that dismantle the stigma, rebuild trust, and center the lived realities of generations shaped by war.

Salma El-Houshy

Discipline: Sociology

Authors:

Abstract Name: Resources in Mental Health and Education for Immigrant and Refugee Students: Charlotte, North Carolina

Charlotte, North Carolina is home to a robust immigrant and refugee student population, housing over 25,000 migrant students between Charlotte-Mecklenburg Schools (CMS) and the city's nine colleges and universities. Considering the magnitude of Charlotte's immigrant and refugee student population, the need for the city to provide academic, psychological, and social resources cannot be understated. As such, it is critical to examine how these resources are offered to this population, and how resources can be made more accessible for students. This project utilizes a combination of a literature review and surveys distributed to students as well as several leading resource organizations. Preliminary research for this project indicates that, in addition to initiatives executed by the Charlotte-Mecklenburg School system, there are a number of resource organizations across the city that provide ample support and services. This support targets a variety of fields including mental health, education, and community outreach. Organizations including ourBRIDGE for Kids, Charlotte for Ukraine, and International House provide support based on specific demographics. These characteristics include age, English language proficiency, income, and racial or ethnic background, which all play a decisive role in allocation of support. Review of literature and information also points to a lack of programming and resources for integrating immigrant and refugee students in Charlotte's private schools, with the exception of specialized organizations, such as The Nest Academy. This project aims to explore the services and resources offered by both the city and by independent organizations in Charlotte, and as a result, their impact on the growing child and adolescent immigrant and refugee population. Pursuing this project will aid in public awareness and understanding of the necessity for these services while investigating potential areas in which the resources can be improved upon, not just for this particular population, but for Charlotte as a community.

Ean Elias

Discipline: Physics and Astronomy

Authors:

#1 Ean Elias

#2 Dylan Romero

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Dylan Romero

Clifton Murray

Abstract Name: Laboratory Comparison of Corona Emission from "Sharp" vs "Blunt" Lightning Rods

In the early 2000s, C.B. Moore et.al. of Langmuir Laboratory for Atmospheric Research published analyses of lightning-strike data taken from various lightning rods mounted on top of the Magdalena Mountains in New Mexico^{1,2}. Over a period of seven years, the blunt-tipped rods received several strikes from thunderstorms, while the sharper-tipped rods received no strikes at all. Those investigators hypothesized that, since sharp rods emit corona more readily than blunt ones, upward leaders (which make connection to downward leaders from the cloud, to complete the lightning channel) either did not form, or did not extend as high, from the sharp rods. Here we test their hypothesis, using Van de Graaf generators we have modified to accommodate standard-diameter blunt and sharp rods. We will measure the time and distance for which each type of rod neutralizes a distant test charge. This will be done with both negative- and positive-charging Van de Graafs (to simulate approaching positive and negative cloud-to-ground leaders, respectively), operating at the same charging rate. We expect that, regardless of whether the generator charge is negative or positive, the sharper rods should prove more effective than the blunt ones at neutralizing the distant test charge. If so, this will be consistent with the hypothesis of Moore et.al., that sharper rods are more effective than blunt ones at preventing upward leader formation because of their increased emission of corona.

Discipline: Law and Legal Studies

Authors:

Abstract Name: Shame as a Sociocultural Force in Contemporary Japanese Civil Litigation: Insights from the Okawa Elementary School Lawsuit

Despite overgeneralizations that reduce Japan to having a “shame culture”, shame continues to inform decision-making and social behavior in contemporary Japan. This is especially true in situations involving public exposure, criticism of social institutions, and social accountability. One such circumstance involved the Okawa Elementary School tragedy and aftereffects following the 2011 Great East Japan Earthquake. This research study aimed to investigate how cultural dynamics of shame influenced the civil lawsuit pursued by parents of children at the elementary school. Utilizing a multidisciplinary literature review and narrative accounts documented by Richard Lloyd Parry in *Ghosts of the Tsunami* (2017), this study examines how shame shaped decision-making for the involved parties. Books like Ruth Benedict’s *The Chrysanthemum and the Sword* (1946) form the foundation for the scholarly understanding of shame in Japan, and are built on by subsequent works in both English and Japanese. Pairing these works with *Ghosts of the Tsunami* creates a framework to understand how traditional notions of shame continue to impact contemporary events, like the Okawa Elementary School lawsuit. This case is particularly significant for this subject because it involves a school, an institution strongly associated with moral authority and responsibility in Japan. Findings indicate that families made their decision regarding participation in the lawsuit based on their personal grief, but also considering concerns about retaliation from the community or being perceived as troublesome. Conversely, the defendants responded to criticism through avoiding the subject. This reflects a cultural impulse to minimize exposure to oneself while also protecting institutional dignity. By viewing these individual behaviors with Japan’s complex cultural framework of shame, this study examines how social norms can affect the pursuit of civil lawsuits and influence public discourse following mass-death events. The findings contribute to research on how legal processes are affected by complex sociocultural factors.

Lydia Elkins

Discipline: Exercise Science and Nutrition

Authors:

#1 Lydia Elkins

#2 Caitlin Crump

Caitlin Crump

Abstract Name: Acute Effects of Yohimbine HCl Supplementation on Resting Metabolic Rate and Energy Metabolism During Submaximal Aerobic Exercise

Yohimbine, an alpha-2 adrenergic receptor antagonist commonly included in fat-burning supplements, is marketed to increase lipolysis and enhance body composition and exercise performance. However, evidence for its acute metabolic effects in healthy adults remains limited. This study investigated whether a single oral dose of yohimbine hydrochloride (YH) influences resting metabolic rate (RMR), energy expenditure, or fuel utilization during aerobic exercise. Twelve physically active adults (8 males and 4 females; age = 21.7 ± 2.5 years; height = 178.9 ± 8.1 cm; mass = 78.3 ± 7.3 kg; % body fat = $19.2 \pm 7.3\%$) completed two randomized double-blind, placebo-controlled crossover trials consuming either 5 mg YH or a cornstarch placebo after an overnight fast. After 10 minutes of seated rest, participants underwent a 30-minute RMR assessment, followed by 30 minutes of cycling at the intensity corresponding to their first ventilatory threshold, previously determined using standard gas-exchange methods. Expired gases, heart rate, and ratings of

perceived exertion were measured every five minutes throughout exercise, and blood lactate concentration was assessed every ten minutes. RMR did not differ significantly between conditions (YH vs. PLA: 1688 ± 313 vs. 1661 ± 233 kcal/day, $p = 0.68$). During exercise, total oxygen consumption, estimated using VO₂ area under the curve, was also similar between trials (YH vs. PLA: 43.41 ± 8.33 vs. 43.84 ± 8.10 L, $p = 0.43$). No significant effects of YH were observed for heart rate, respiratory exchange ratio, perceived exertion, or blood lactate. These findings indicate that acute yohimbine supplementation does not alter resting metabolism, energy expenditure, or substrate utilization during moderate-intensity aerobic exercise in healthy young adults.

Avery Ellis

Discipline: Psychology

Authors:

- #1 Suzanna Ginn
- #2 H. Colleen Sinclair
- #3 Anna Kemdal Pho
- #4 Natasha R. Wood
- #5 Andrew R. Burns

Abstract Name: Oh the (De)Humanity: Which Type of Dehumanization (Other, Self, Meta) Is Linked to Making Online Threats

We examined the link between dehumanizing language and making threats by expanding the Integrated Psycholinguistic Threat Assessment (IPTA) (Sinclair et al., 2025) framework and applying it to more than 15k subreddit posts of the extremist group known as involuntary celibates (self-titled “incels”). The original IPTA framework measured the casting of outgroups (not incel-identifying people), as lesser humans (other-dehumanization). The expanded IPTA framework added both whether the author dehumanized themselves (self-dehumanization) and if they perceived that outgroups dehumanized them (meta-dehumanization). These three overarching categories each included five dehumanization subtypes: Superhuman (lacking empathy, often due to being “too powerful”), In-Human (lacking morality, evil), Infrahuman (sharing characteristics with animals), Subhuman (more animal-like than human), Nonhuman (not human, things, objectification). The IPTA also assesses whether the post could represent a threat: i.e., tracks the presence of specific elements of an attack plan and subjective judgments of potential for action (posts viewed by coders as having a high potential for violent action were “red flagged”). Upon analysis, other-dehumanization and meta-dehumanization were significantly linked to both the presence of specific elements of a plan and red flagging. Self-dehumanization showed no link. Further regressions examined which subtypes of dehumanization were most strongly connected. Posts containing in-human and infrahuman forms of other-dehumanization were more likely to be red flagged. Whereas posts indicating that the author thought others viewed incels as completely unrecognizable as human (i.e., nonhuman) were red flagged. When it came to whether the post included specific elements of a plan, this nonhumanization was the only significant subtype for both other and meta-dehumanization.

Selkis Elong

Discipline: Biology

Authors:

- #1 Selkis Arinna Elong
- #2 Anastasia Blecker

#3 Derek Prosser
#4 Jason Newton

Abstract Name: Serine Availability Modulates Yeast Sensitivity to the Cyanotoxin 2,4-Diaminobutyric Acid

Non-proteinogenic amino acids such as 2,4-diaminobutyric acid (2,4-DAB) are emerging cyanotoxins associated with cellular stress and growth defects in diverse organisms. Because serine supports multiple essential pathways, including protein synthesis, stress resistance, and sphingolipid metabolism, cells experiencing serine limitation may be especially vulnerable to toxin exposure. This project investigates how endogenous serine biosynthesis influences 2,4-DAB toxicity in *Saccharomyces cerevisiae*, a genetically tractable model for dissecting metabolic determinants of cell survival. Wild-type and SER2-manipulated yeast strains were cultured under serine-replete or serine-deficient conditions and exposed to defined concentrations of 2,4-DAB. Growth kinetics, viability assays, and early stress-response indicators were measured to evaluate how nutrient state alters susceptibility to toxin-induced damage. In serine-limited conditions, yeast displayed substantially reduced growth, heightened stress signaling, and significantly increased cell death following 2,4-DAB exposure. In contrast, serine-replete cultures or strains with intact SER2-dependent serine biosynthesis maintained higher viability and exhibited attenuated stress responses. These findings demonstrate that intracellular serine availability is a key modifier of 2,4-DAB toxicity and that metabolic state strongly shapes cellular resilience to cyanotoxin exposure. By defining how nutrient conditions modulate toxin sensitivity, this work highlights metabolic vulnerabilities that may influence organismal responses to environmental toxins. Ongoing experiments are examining whether 2,4-DAB can serve as a substrate for serine palmitoyltransferase (SPT), potentially generating atypical sphingolipids that contribute to stress and cell death.

Chloe Els

Discipline: Nursing and Public Health

Authors:

Abstract Name: Evaluating how different sources of scientific evidence shaped the EPA's regulation of the herbicide Dacthal

The purpose of this project is to analyze the role of different sources of scientific evidence in the Environmental Protection Agency's regulation of the herbicide Dacthal. Per the 1946 Administrative Procedures Act, the 1970 Occupational Safety and Health Act, and the 1976 Toxic Substances Control Act, the EPA must be able to show that it makes its regulatory decisions based on the best available science. However, the lack of a standardized framework to guide the use of different sources of scientific evidence in EPA policymaking and ongoing concerns about biases associated with industry-generated data point to a continued need for more research on how the pesticide industry is able to influence the creation of evidence-based policy. Furthermore, because uncertainty remains regarding what specific sources of scientific evidence were prioritized during the EPA's decision to cancel Dacthal in 2024, the role of scientific evidence in this regulatory process warrants further investigation. To better understand the extent to which different sources of scientific evidence were prioritized during the EPA's regulation of Dacthal, a systematic review of the existing scientific literature regarding Dacthal's potential health hazards was conducted as well as document analysis of EPA Docket EPA-HQ-OPP-2011-0374 which contains the EPA documents relevant to the banning of Dacthal. These findings, along with interview responses shared by former EPA employees were triangulated and analyzed via process tracing which provided a case-oriented framework for systematically assessing specific events in which scientific data was used, who it was used by, and what outcomes resulted from its use. Based on preliminary findings, it appears that the EPA primarily used independently collected scientific evidence during early problem formulation stages of reviewing Dacthal to assess research gaps and then relied solely on industry-supplied data during later stages of the regulatory process.

Eberechukwu Emefiele

Discipline: Sociology

Authors:

#1 Matthew Keller

#2 Kara Sutton

Abstract Name: Students' Perception on Social Media

Social media has become a place where ordinary people can become overnight sensations. Their videos, personality, and ability to reach millions of screens attract people and their engagement just within a few seconds. Because of this, influencers work strategically to curate their videos to pertain to a certain audience that will guarantee the benefits of this engagement. Despite the work the influencer does, what truly brings engagement are the perceptions that viewers have of them. What do people, specifically college students, think when they engage with influencers? Are they trustworthy? Are they authentic? Are they someone they can see themselves in? This study will build upon previous research that explores trust and authenticity and will apply it to undergraduate and graduate students at Southern Methodist University (SMU) in Highland Park, Dallas, Texas, a private research institution in North Texas. This study will utilize a mixed methods approach where the data will provide a general outlook of the SMU student population through an anonymous, IRB approved Qualtrics survey. The survey will record a general demographic, students' perceived trust and authenticity, and possible future habits. In addition, interviews will occur with SMU students from diverse backgrounds to get deeper analysis into their perceptions. The separate survey and interview ensure full anonymity in survey responses and full confidentiality with interview responses. These results will be compared to see how students in a private institution in the North Texas area view social media and the impact influencers can have on college students.

RYAN Emmanuel

Discipline: Interdisciplinary

Authors:

Abstract Name: Gender Disparities in Mathematics GPA Among African-American High School Students

This study applies an intersectionality framework to examine gender-based disparities in mathematics achievement among African American high school students. Although prior research shows that African American girls often outperform boys in math, both groups continue to struggle with meeting grade-level expectations, signaling broader systemic inequities. Using data from the National Center for Education Statistics' High School Longitudinal Study (2009–2016), an independent t-test was conducted to determine whether a significant difference exists in 11th-grade mathematics GPA between African American males and females. Results indicate a statistically significant GPA gap of approximately -0.31 points ($p < .001$), suggesting consistent underperformance for one group with meaningful academic consequences. Even a difference of this magnitude can restrict access to advanced coursework, reduce competitiveness in college admissions, and contribute to long-term disparities in STEM pathways and future earnings. These findings underscore the necessity of equity-driven interventions, including culturally responsive teaching, expanded access to qualified math educators, and targeted supports such as small-group tutoring and mentoring. Addressing these intersecting race- and gender-based gaps is essential for promoting fair and sustainable academic outcomes for African American students.

Jake English

Discipline: Engineering

Authors:

#1 Jake English

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Abstract Name: Reusing Waste: Prototype 3D Printer Filament Recycler

3D printers are known for their filament purge waste. This waste and prints failing to meet expectations are thrown out though the material has little imperfections. The objective is recycling waste into filament and to develop a method utilizing 3D printed parts to increase accessibility for 3D printer hobbyists. This recycling process focuses on PLA recycling as it is commonly used in Fused Deposition Modeling 3D printing. The filament must be ground down into granular pieces using a rotating tooth-crushing system. The ground filament will be poured into a funnel which has an auger screw to push the filament down. At the bottom of this system there will be a hot end extruding at 220°C. The filament will be cooled and stretched. At this point in the process, the filament is expected to have imperfections and will require further processing. Filament will go into a pelletizer. These pellets will go through another extruder at 190°C to a cooling and spooling system creating the finished product. All parts will be modeled in Fusion360 using the iterative design process; however, some parts cannot be printed due to the high temperatures and pressures. The expectation is 95% of waste filament recycled back into usable filament. The expected loss is from the grinding process in which particles can fall out of the grinder. The expected cost of the printed parts is less than 3kg of any given filament. While this can be done for any material the intended material is PLA due to its widespread use within the 3D printing community. By developing this method to allow the average user to recycle waste filament, it increases access as current filament recyclers are expensive. As 3D printing grows as a hobby, more waste is produced. This method decreases effects of waste filament on the environment.

Ishani Eniyan

Discipline: Health and Human Development

Authors:

#1 Egle Prewit

Abstract Name: Role of Hypothalamic Oxytocin Receptor in Mediating Long-term Maternal Cardiovascular Benefits after Lactation

Epidemiological studies show that women who do not lactate have a higher risk of cardiovascular disease later in life. We hypothesized that lactation provides long-term cardiometabolic benefits through increased oxytocin production. Preliminary data from our lab showed that mice that did not lactate had lower circulating OXT and reduced hypothalamic expression of oxytocin (Oxt), oxytocin receptor (Oxtr), and CD38, a facilitator of central OXT release. This study aimed to investigate whether Oxtr signaling in the hypothalamus mediates the cardiovascular benefits of lactation. Experimental Design and Methods: Hypothalami (HT) from CD1 mice were collected at delivery and cultured for 24 hours. Tissue halves were exposed to media alone, plasma from dams one day after weaning, a CD38 antagonist, or both plasma and antagonist. Supernatants were collected at 4 and 24 hours. Tissue was collected 24 hours after the procedure, and gene expression of Oxt, Oxtr, and CD38 was measured using qRT-PCR. Cre-lox Oxtr hypothalamic knockout (KO) and control (CTR) mice were bred and assigned to lactated (KO-L, CTR-L) or non-lactated

(KO-NL, CTR-NL) groups. Blood pressure was measured at 6 months postpartum, and plasma OXT concentrations were assessed in lactated mice. One-way ANOVA with post hoc tests was used as appropriate. Results: HT explants treated with both CD38 antagonist and plasma showed a non-significant trend toward increased Oxtr and CD38 expression. CTR-L mice exhibited significantly lower systolic blood pressure than all other groups and lower diastolic and mean pressures compared to CTR-NL. Heart rate did not differ among groups. Plasma OXT tended to be lower in KO-L compared to CTR-L. Conclusion: Our tissue culture experiments demonstrate that lactation during pregnancy in mice increases Oxt levels by acting on Oxtr in the hypothalamus. Data from conditional knockout mice lacking Oxtr in the hypothalamus indicate that cardiovascular benefits of lactation are dependent on Oxtr.

Blythe Ennis

Discipline: History

Authors:

Abstract Name: COVID-19 and Black Lives Matter Movement Oral History Project

The COVID-19 and Black Lives Matter Movement Oral History Project contributes to the documentation of milestone crises while those events remain vivid in collective memory, thereby preventing the loss of crucial personal narratives. Oral history, as a qualitative research method, involves the systematic recording and preservation of firsthand accounts of historical experiences. It captures the personal reflections, emotional responses, and societal impacts felt by individuals during and after pivotal events, thereby expanding traditional historical narratives to include the voices of everyday people. In doing so, oral history enhances the historical record by foregrounding the lived experiences of diverse communities. A specific subset of this field, crisis oral history, focuses on collecting testimonies during or immediately following moments of upheaval—such as war, pandemics, and natural disasters—when recollections are at their most vivid. This temporal proximity enables the capture of emotional intensity and nuanced memory, preserving the immediacy and authenticity of individual experiences. The project is further situated within the framework of public history and civic engagement, which extends historical scholarship beyond academia to engage wider audiences. Public history emphasizes accessibility, relevance, and community involvement, manifesting through museum exhibitions, archival collections, and other platforms that democratize historical knowledge. Public historians often adopt interdisciplinary, collaborative methodologies, including direct engagement with community members as co-creators of historical narratives. Through this lens, the project incorporates audio recordings, video interviews, and transcripts produced by students enrolled in Pace University's HIS196H course. Students investigate oral history methodologies and apply their training by conducting interviews with individuals whose perspectives on the COVID-19 pandemic and the Black Lives Matter movement offer critical insight into these contemporary crises. The collected materials are curated and disseminated via the COVID-19 and Black Lives Matter Oral History Project blog hosted on Pace University's website.

Fariel Enyong

Discipline: Chemistry

Authors:

#1 Fariel Enyong

#2 Rabeya Bosri

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Abstract Name: Synthesis of Nitrogen Mustard–Modified HDAC Inhibitors for Enhanced Cancer Treatment

Histone deacetylase (HDAC) inhibitors are an established class of anticancer agents known for their ability to regulate gene expression and promote apoptosis in cancer cells. However, many existing HDAC inhibitors face limitations such as low selectivity and reduced therapeutic effectiveness. To overcome these challenges, this project focuses on developing novel compounds that combine the HDAC inhibitory function of existing ligands with the DNA-targeting properties of nitrogen mustard derivatives. Two precursors previously synthesized in our lab serve as the foundation for this design. One precursor was chemically modified to form a nitrogen mustard derivative, which exhibits independent anticancer potential and can also act as a reactive intermediate for further hybrid molecule formation. The combination of the nitrogen mustard derivative with the second precursor aims to produce a dual-function compound capable of simultaneously disrupting DNA replication and inhibiting HDAC activity, thereby enhancing overall anticancer efficacy. Structural design and synthesis are guided by rational drug design principles, with subsequent characterization and evaluation planned to assess stability and potential biological activity. While this research is ongoing, it highlights the promising role of hybrid molecule development in creating more potent and selective cancer treatments that integrate both epigenetic and DNA-targeting mechanisms.

Ciera Epps

Discipline: Health and Human Development

Authors:

#1 Jiale Hu

Jiale Hu

Abstract Name: The Influence of the Gut Microbiome in Health and Disease

The microbiome is an intricate system comprising approximately 10-100 trillion microbes, which are understood to play a crucial role in maintaining overall health. Most microbiome activity occurs in the gastrointestinal tract, where dysbiosis (an imbalance in essential microbial populations) in the gut is linked to chronic pain and disease. This study utilizes a literature review methodology that includes targeted data extraction from existing research, evaluates the validity and reliability of the findings, and synthesizes conclusions based on the collected evidence. Therefore, the aim of this literature review is to comprehensively evaluate the existing knowledge about the association between gut microbiome and chronic pain. The gut microbiome interacts directly with various systems of the human body, including the endocrine, nervous, and cardiovascular systems. These connections provide collectable, important insights regarding disease states, progression, and treatment potential. Metabolite signaling enables communication between gut microbes and various organ systems. Individualized genetic data can be used to unlock key features of the microbiome and guide the development of personalized treatments. Molecules such as short-chain fatty acids, endotoxins, 16 rDNA, and branched-chain amino acids can serve as biomarkers to clarify disease. Approaches that analyze microbiome-based biomarkers have emerged as non-invasive and highly specific tools for detecting disease, enabling earlier identification of pathological states and more targeted treatment planning. Pharmacomicrobiomics is an emerging field that seeks to bridge the gap between the microbiome and drug metabolism, offering significant potential to advance personalized medicine and improve the treatment of various illnesses. In closing, a deeper understanding of the microbiome will, in turn, revolutionize care methods and lead to a decrease in disease incidence.

Jack Ericsson

Discipline: Engineering

Authors:

Abstract Name: Laboratory Performance Characteristics of Fine-Graded Asphalt Mixtures Containing Recycled Asphalt Materials

The economic and environmental advantages of reclaimed asphalt pavement (RAP), along with the conservation of non-renewable natural resources, have made its use in fine-graded asphalt mixtures an attractive alternative for pavement rehabilitation compared to traditional mixes. This study investigates the potential performance enhancement of fine-graded asphalt mixtures by incorporating RAP materials. Six different fine-graded asphalt mixtures were sampled from plant-produced materials placed on roads in Virginia. Laboratory testing assessed the durability, rutting resistance, and fatigue cracking susceptibility of the mixtures. Binder and mixture properties were analyzed to compare rutting performance and fatigue resistance. The results indicated that RAP increased the stiffness of the mixtures, improving their resistance to permanent deformation. However, it negatively affected fatigue performance, though this impact was mitigated by higher binder content. Additionally, dynamic modulus test results alone were insufficient to fully characterize mixture performance, and performance rankings varied across different laboratory tests. To validate these findings, field performance data are necessary.

Tinbite Ermias

Discipline: Engineering

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#1 Arye Mindell

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#4 Celeste Tarula-Villarreal

Arye Mindell

Celeste Tarula-Villarreal

Abstract Name: Wildfire Propagation Prediction from Multimodal Data using Deep Learning Models

Wildfires are increasingly devastating in the United States and across the world, threatening lives, infrastructure, and ecosystems. Accurate wildfire propagation prediction remains a major scientific challenge because it depends on interacting chemical, physical, and environmental processes influenced by climate, weather, topography, land cover, and human activity. This project addresses this gap by aiming to develop a robust, physics-informed deep learning framework for accurate, high-resolution wildfire propagation prediction. The unique contribution lies in integrating heterogeneous multimodal data with physical constraints derived from established fire behavior principles. First, we present a novel comprehensive multimodal dataset integrating geospatial attributes (coordinates, elevation, slope), meteorological variables (wind speed and direction, temperature, humidity), environmental indicators (fuel type, vegetation indices, moisture content), socio-economic factors (population density, urban development metrics), and historical fire progression maps from publicly available data sources. These heterogeneous data sources, spanning diverse spatial and temporal resolutions, are collected and organized into a unified framework, which provides a critical research resource. This resource facilitates not only immediate fire spread prediction, but also the investigation of long-range dependencies in wildfire behavior, enabling the analysis of wildfire evolution against dynamic changes in the climate and environment. Second, we are designing and evaluating deep learning models, including autoencoders, Convolutional Neural Networks (CNNs), and transformers, to capture spatial-temporal patterns governing fire spread using our curated historical fire dataset. To overcome the limitations of single-model architecture, we are also exploring hybrid approaches with physics-informed regularizations to improve the prediction accuracy. Ultimately, this project is expected to deliver both a novel benchmark multimodal dataset and a robust AI-driven modeling framework that improves wildfire propagation prediction accuracy, enhances emergency preparedness, and strengthens wildfire resilience.

Emily Ernst

Discipline: Health and Human Development

Authors:

#1 Emily Ernst

Abstract Name: Beyond Access: How Social Mechanisms Shape WASH Infrastructure and Behavior in Rural Zambia

For over 50 years, non-governmental organizations have focused on increasing water, sanitation, and hygiene (WASH) practices in the developing world (Wit et al., 2024). While there have been great successes in the distribution of WASH resources, the sustainability of initiatives has been an ongoing issue (Taylor, 2013). This research examines how six behavioral mechanisms (accountability, diffusion, market, ownership, education, and shame) impact the sustainability of WASH initiatives in the Mbeza and Muchila communities in Zambia. During the summer of 2025, the researcher spent three months in Zambia assessing the impact of behavioral mechanisms on the sustainability of World Vision's WASH programs. World Vision is a global NGO that has a long history with WASH programs. A mixed-methods, person-centered approach was used to understand how people interact with WASH systems and how infrastructure outcomes are shaped by community behavior. Data was collected through semi-structured interviews (N=21) with community members, children, and a committee leader; school surveys across two schools and six classes; and direct observation of infrastructure outcomes. Findings show that strong systems of accountability (such as financial transparency and enforcement mechanisms), diffusion of practices through social networks, and market-based models (like solar-powered systems and community water fees) all contributed to sustainable outcomes. When community members were involved in decision-making and maintenance, a sense of ownership and responsibility increased. Education impacted the proper usage of WASH resources. Additionally, peer influence played a role in behavior change, especially among schoolchildren. Despite progress in World Vision area programs, issues such as locked ablution blocks, lack of soap and tissue, and poor reporting systems hinder long-term success. The findings underscore the need to embed sustainability into the design and delivery of WASH services to ensure continued impact.

Manuella Escobar

Discipline: Sociology

Authors:

#1 Manuella Escobar

Abstract Name: Rhythms of Resistance: The Role of Institutions and Cultural Expressions in Latinx College Students' Cultural Affirmation Processes

As of 2022, Latinx youth accounted for about one quarter of all U.S. children, from which the big majority were American born. These individuals not only navigate the complexities and challenges that come with coming of age and transitioning to college but face unique challenges in the process of self-identification. Latino kids who grow up in the United States often struggle to reconcile their vernacular culture and characteristics with the dominant American culture. They are constantly navigating the tension between their cultural identity at home and the persona they adopt in the broader American society, often opting to conceal their Latino identity due to negative stereotypes and reputation attached to it and fear of not fitting in. In this context, spaces such as college serve as transformative environments where Latinx students must negotiate their identity and experience not only the natural transformations and challenges that come with coming of age but also a deeper transformation in how they embrace or reject their vernacular culture. It is during this

phase of their lives that such transformations can be most clearly explored. Furthermore, examining how everyday tools like music accompany this process can serve as a magnifying glass into how students fight for recognition in a society that often marginalizes them, and how these tools help them reclaim their Latinx identity. The purpose of this study is to explore how Latinx students reconstruct cultural affirmation within the college environment, highlighting the institutional factors and cultural expressions that help students reconnect with their heritage, build a sense of belonging, and ultimately succeed in college. In this case, success not only being defined by academic achievement but also by the ability to integrate into the institutional and cultural fabric of their university, feeling empowered rather than constrained by their Latinx identity.

Aaron Escobar

Discipline: Computer Science

Authors:

#1 Aaron Escobar

Abstract Name: Pathfinding using Machine Learning

In computer science, pathfinding refers to the use of algorithms to determine optimal routes from a starting point to a target goal while avoiding obstacles. Applications of pathfinding span across GPS navigation, robotics, autonomous vehicles, drone routing, and AI movement in video games. With dozens of pathfinding algorithms in existence for different applications, and each implementation resulting in unique trade-offs in accuracy and memory consumption, a systematic review is needed to produce a new standard multi-purpose approach, inspired by A*, favoring scalability and performance with contemporary processing demands in mind. Furthermore, the rise of GPU-based computing power, yielding advances in machine learning, presents an opportunity to question the role of AI in the optimization of pathfinding. Can machine learning improve performance, defined as computation time or memory usage, of an A*-based algorithm under certain conditions? If so, what is the relationship between performance gains and the density of the graph? To test this, a controlled simulated environment was created using C++ and the raylib 3D graphics engine, and a static connected graph of 3D nodes were generated and placed on the digital ground. Training was later done on a neural network designed to approximate the heuristic function, using data collected from the previously generated graph. Although the overhead introduced by machine learning is expected to lower performance in very low-density graphs, we hypothesize that incorporating a neural network, specifically into the heuristic function, will yield measurable gains in computation speed within medium-density graphs.

Audrie Kim Escover

Discipline: Psychology

Authors:

#1 David Bridgett

Abstract Name: Beyond Parenting: The Role of Executive Function in Child Emotion Regulation and Sleep

Childhood sleep problems are a significant public health concern. They extend beyond mere tiredness, significantly affecting children's emotion regulation, behavior, and long-term development. Child aggression and behavioral problems negatively impact parents, caregivers, and children, and parenting behaviors play a pivotal role in either mitigating or exacerbating these effects. Although research connects sleep problems to emotional-behavioral difficulties, the mediating roles of parental executive functioning (EF)—such as

working memory, impulse control, and task-switching—and parenting behaviors remain understudied. This study aims to address this gap by investigating how mothers' EF and parenting behaviors shape children's sleep patterns and emotional development. Using a sample of 25 mother-child dyads (with children aged 5), this research will employ a multi-method assessment approach. Maternal EF will be assessed through standardized laboratory tasks, including the color-word interference task (assessing impulse control and task-switching) and the letter-number sequencing task (assessing working memory). Concurrently, mothers will complete three validated questionnaires: the O'Leary Parenting Scale, the Early Childhood Behavior Questionnaire (ECBQ), and the Child Behavior Checklist (CBCL). The present study tests three primary hypotheses: (1) lower maternal EF will be associated with increased child sleep problems and emotion dysregulation; (2) lower maternal EF will predict more maladaptive parenting behaviors; and (3) parenting behaviors will mediate the relationship between maternal EF and child sleep outcomes. Data will be analyzed using correlation and multivariate regression analyses in the IBM SPSS software, controlling for potential covariates such as child sex and family socioeconomic status. The findings aim to elucidate a key pathway in family dynamics and sleep interventions, potentially informing targeted interventions that support parental self-regulation to improve child sleep and developmental trajectories. Ultimately, this study may help break cycles of dysfunctional family dynamics by promoting healthier sleep habits, thereby benefiting families and society.

Samantha Esp

Discipline: Psychology

Authors:

Abstract Name: Affective Influences on The Neural and Subjective Timing of Error Awareness

The error-related negativity (ERN) and error positivity (Pe) are electrophysiological markers of performance monitoring. The ERN is elicited when an error occurs and appears to operate independently of whether the individual is consciously aware of the mistake. The Pe occurs after the ERN and is believed to reflect conscious awareness of the error. Prior research suggests that transient affective states exert limited influence on ERN and Pe amplitudes (Clayson, Clawson, & Larson, 2012), however the relationship between pre-task mood and the timing of conscious error awareness remains unexplored. The present study examined how a baseline affective state (i.e., mood) influences the neural and subjective dynamics of error awareness. Participants completed the Positive and Negative Affect Schedule (PANAS) to measure their present affect. They then completed a Stroop task embedded within a modified Libet clock paradigm, in which they reported both the presence and perceived timing of error awareness. EEG was recorded to extract ERN and Pe components time-locked to both response onset and subjective awareness reports. It was hypothesized that higher levels of negative affect would be associated with attenuated ERN and Pe amplitudes and delayed error awareness, reflecting reduced efficiency of performance monitoring during negative mood states. By integrating affective, neural, and phenomenological measures, this study has the potential to clarify the temporal and emotional determinants of conscious error detection and inform models of self-monitoring relevant to clinical populations.

Nayeli Esparza

Discipline: Physical/Occupational Therapy and Speech Language Pathology

Authors:

#1 Abigail Torres

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Abstract Name: Communicating Hardship: Paralinguistic Clues in Children's Emotional Expression

Experiencing sustained adversity has a significant emotional impact on children's expression and overall well-being. Although children use vocal expression as a primary way to convey suffering, research in this area remains limited. Furthermore, assessment still relies heavily on subjective interpretation, and it frequently depends on technical acoustic analysis, which may miss subtle emotional cues that human listeners might detect. Guided by Scherer's model, trauma-informed framework, and paralinguistic features, we aim to explore how children express their feelings during hardship to enhance communication and better address their emotional and health needs. To capture these subtleties, our study integrates Klaus Scherer's Component Process Model, paralinguistic features, and trauma-informed care. Scherer's model conceptualizes emotions as a continuous appraisal process that sets off coordinated responses across multiple systems (cognitive, psychological, expressive, and subjective feelings). Children's paralinguistic features reflect the expressive component, which, in turn, the trauma-informed care model reveals how they appraise and internalize hardship. We listened to data recordings of 12 children migrating with their parents towards the United States (authorized by the primary data's PI). Our study used a qualitative phenomenological approach and thematic analysis. The ongoing analysis reveals that children often utilize monotone speech to distance themselves from difficult circumstances, and silence became a strong indication of extreme hardship. On the other hand, coherence emerged while talking about positive relationships. Adversity frequently affected children's vocal characteristics, even when syntax was unaltered. The UTEP IRB guidelines were closely adhered to, and all ethical measures were taken during the data collection process. Keywords: Children, Forced Displacement, Hardship, Vocal Expression, Syntax

Mia Espinal

Discipline: Biology

Authors:
#1 Natasha Woods

Abstract Name: Increase in storm frequency impact on *Morella cerifera* growth and survival

Morella cerifera is an evergreen shrub native to the Atlantic and Gulf Coast regions. It is a moderately salt-tolerant species encroaching into grasslands dominated by the salt tolerant grass, *Spartina patens*, on Hog Island, Virginia. Hog Island receives storm surges and strong winds causing the landscape to be highly dynamic. Many of the factors that support the successful encroachment of *Morella cerifera* at early stages of development are largely unknown. It is important to study encroachment because it could impact the structural integrity of the island by adding stability to areas that need to erode regularly. *Morella cerifera* can grow from a seedling to an enclosed canopy thicket in 15 years; however, it is unknown how storms, which are predicted to increase in frequency, will impact its growth. To determine the impact of an increased frequency of storms on the growth of *Morella cerifera* an experiment was set up with twenty-four pots containing one *Morella cerifera* seedling and three plugs of *Spartina patens*. There were four groups: no disturbance, one storm disturbance, two storm disturbances, and three storm disturbances. Treatment groups were exposed to 30 ppt saline solution simulating saltwater inundation after a storm. Each of these simulated disturbances had a three week recovery period. As disturbance events increased, *Morella cerifera* experienced less growth, with a 50% decrease in growth after two disturbances relative to the control. In contrast, *Spartina*'s growth only decreased by 14% relative to the control after two disturbances. This is an indication

that an increase in storm frequency has a greater impact on the growth of *Morella cerifera* and may reduce its capacity to encroach into grasslands, while *Spartina* may continue to persist.

Alan Espinosa

Discipline: Architecture, Construction Management, and Interior Design

Authors:

Abstract Name: Designing for Dignity: Biophilic and Biomimetic Approaches to Assisted Living Interiors

This project aims to explore how interior design can dismantle stigmas surrounding aging while affirming the beauty, identity, and lived experience of older adults, responding to the growing demand for supportive senior housing. As the senior population expands, many assisted living environments continue to rely on institutional design cues, visually confusing circulation, and acoustically harsh conditions that undermine well being and reinforce negative assumptions about aging. Research in biophilic design, environmental psychology, and aging in place highlights the value of natural materials, controlled daylight, tactile surfaces, intuitive spatial organization, and hygienic and easy to clean finishes that support occupant health and reduce environmental stress. Drawing from the sun as both metaphor and design framework, the interior uses circular motifs reminiscent of sunspots and soft organic squiggles symbolizing the lines formed over time, creating a visual language that celebrates the poetic process of being kissed by time. Methodological approaches include case studies of assisted living facilities, literature reviews on sensory responsive environments, interviews with staff and residents, and field observations documenting challenges related to glare, acoustics, and wayfinding. Anticipated outcomes include biophilic modern design strategies featuring warm materials, glare free lighting, gentle color contrast, and organic circulation routes that enhance clarity and comfort for residents, including those with visual impairments. Proposed solutions introduce restorative indoor outdoor connections, inclusive wayfinding systems grounded in the project's symbolic motifs, acoustically balanced communal spaces, and residential units designed for accessibility, personalization, healthy maintenance, and long term independence. By merging research driven design strategies with a narrative that honors the natural beauty of aging, this project reframes assisted living as a place of dignity, connection, and meaningful daily experience.

Jasmine Espitia

Discipline: Mathematics

Authors:

Abstract Name: Delving into the Logic behind Mancala

Mancala is a family of board games defined by the movement of sowing. Sowing is the distribution of the amount of pieces one has counter-clockwise around the board one-by-one. The generic layout of a typical Mancala board is six bins on each side and one big bin per player, otherwise known as the "store," where only the select player could interact with. The goal of the game is to collect the most pieces into the player's store. For this research project, the idea was to delve into the mathematics and logic behind the popular two-player version known as "Avalanche" in which a player could continue to move if their last piece landed in a non-empty bin. In this work, various research papers involving the simple solitaire mancala game, "Tchoukaillon," were utilized to analyze the importance of "sweeping" moves and the most optimal play. Through this, it was determined that discrete functions, matrices, and the Chinese Remainder Theorem were the best way to describe and detail the inner workings of the solitaire game. Along with this, a Python program

was built to incorporate the best possible move-sets involving various categories of moves and their effects. To connect it all together, trial and error of actually playing through the Avalanche gamemode led to a better understanding and analysis of the logic behind it. Furthermore, a new gamemode was created, named "Ambush," that could lead to further study.

Alina Esser

Discipline: Psychology

Authors:

#1 David Shields

#2 Lori Sheppard

Abstract Name: Rest vs. Risk: The Cost of Poor Sleep Habits for Student Well-Being

Sleep affects almost all aspects of life. Not getting enough sleep can cause physical, cognitive, and mental health issues. College students require adequate sleep to fulfill their academic tasks. This research study focused on identifying different factors that impact sleep and, examining the problem in context with depression. The main research questions were 'What factors impact college students' sleep quality?' and 'Does depression impact sleep?'. Additionally, the research explored different factors, like chronotype, bedtime procrastination, and cell phone use. Literature has suggested these factors may produce mental health problems and sleeping problems, and that college students often struggle with sleep. Moreover, high screen time can indicate worse sleep quality. The study employed a quantitative and descriptive research design. For the analysis, independent t-tests and Pearson product-moment correlation tests were conducted to analyze the different assessments used. Those assessments included the Pittsburgh Sleep Quality Index (PSQI), Morningness-Eveningness Questionnaire, Bedtime Procrastination Scale, questions regarding cell phone use, and the Patient Health Questionnaire (PHQ-9). An online survey that was distributed to seated students at a rural four-year university (N=101). Results showed significant correlations between sleep quality and depression. With rising depression, sleep quality decreased. Almost 50% of participants reported mild to severe depression levels. Additionally, evening people and individuals with higher bedtime procrastination reported higher levels of depression. Lastly, results showed that the usage of phones 30 minutes before sleep significantly increased sleep disturbance. These findings show the many different factors impacting college student sleep and mental health. With significant relationships between sleep quality and depression, and established literature connecting these factors to academic outcomes and retention, addressing sleep behaviors has the potential for multifaceted benefits for both students and universities. This study addresses these issues and proposes potential solutions at both the individual and institutional levels.

Nathanaens Estervil

Discipline: Health and Human Development

Authors:

Abstract Name: Investigating the Effectiveness of Aromatherapy and its Supportive Combinations in Reducing Pain and Anxiety of Breast Cancer Patients

Introduction: Breast cancer surgery is often associated with pain and anxiety, which can hinder physical functioning and overall quality of life, even after treatment. Often, usual care and pharmacological treatments can neglect the management of these side effects or symptoms. Thus, complementary therapies, such as aromatherapy, can be utilized to alleviate pain and reduce anxiety in breast cancer patients. Aromatherapy-the

holistic practice of using essential and/or herbal oils- aims to improve a person's health by promoting effective healing beyond the standard biological treatment, addressing social and psychological well-being. While one systematic review reported "no effect" of aromatherapy on pain, the effectiveness of aromatherapy combined with other interventions has not been systematically reviewed in breast cancer populations. Therefore, this thesis serves to evaluate the effectiveness of aromatherapy, alone or integrated with other therapies such as music therapy in reducing pain and anxiety among breast cancer patients. Method: This systematic review will follow PRISMA 2020 guidelines. A comprehensive, systematic search will be conducted in PubMed, CINAHL, Cochrane Library, and SCOPUS for randomized controlled trials (RCTS) published from 2020 to 2025. Eligible studies will include adult women breast cancer surgery patients who received aromatherapy during various periods of breast cancer. Results: Based on preliminary literature screenings, evidence suggests that aromatherapy, particularly when paired with complementary interventions, yields to reduction in pain and anxiety of breast cancer patients. Conclusion: This review will contribute to the understanding of how non-pharmacological approaches, especially aromatherapy, can relieve the pain and anxiety endured by breast cancer surgery patients within the biopsychosocial framework. Findings can potentially clarify the extent of its effect, illuminate physiological and psychological mechanisms, and further aid in the development of optimized interventions for breast cancer patients that will mitigate the pain and anxiety experienced.

Emily Estrada

Discipline: Psychology

Authors:

#1 Emily Estrada

Abstract Name: Impacts of Von Restorff Effect on Memory Recall

The von Restorff effect was originally discovered in 1933 by Hedwig von Restorff, a German scientist. The von Restorff effect states that items and information that is perceptually distinct is more likely to be encoded and retrieved than information that blends into its surroundings (Manandhar, 2024). This project explores font color as a visual mechanism capable of producing such distinctness, focusing on how color can influence memory retention and recall. Prior studies show research that suggests that attention, color salience, and the encoding processes within the brain contribute to stronger memory traces for items that stand out visually, whereas homogenous stimuli are less likely to receive attention and prioritized cognitive processing (Elhalal, 2014). Building on this research, this empirical study is proposed to test whether red text, compared to standard black text color, can create an isolation effect in a word-recall task. The proposed experimental design consists of three conditions, red, black, and mixed-color, to determine whether or not red font color improves recall by drawing more attention more efficiently than a neutral format with homogenous stimuli. It is hypothesized that the mixed color condition will have greater impact on memory encoding, and retention of information. The model provides a foundation for testing how color-based distinctiveness supports memory performance. Understanding these mechanisms can help learn how visual distinctiveness can have practical implications. For example, intentional use of color can help educators guide students toward understanding key concepts in their learning plans as well as support cognitive organization. In marketing or media contexts, the von Restorff effect may impact the memorability of the media design.

Holly Eubanks

Discipline: Environmental Science and Sustainability

Authors:

#1 Heidi Adams
#2 Paige Parks

Abstract Name: Influence of Cattle Grazing and Prescribed Fire on Longleaf Pine Avian Communities

Cattle (*Bos taurus*) grazing in longleaf pine (*Pinus palustris*) forests with a prescribed burning regime may sustain savannah-like conditions in the understory better than burning alone, increasing plant species richness and structural diversity, decreasing organic ground cover, and reducing potential needs for suppressing invasive plants with herbicides. Cattle grazing in longleaf pine mimics grazing patterns of American bison (*Bison bison*) populations that subsisted in the southeastern United States prior to European settlement, maintaining a grass- and forb-dominated understory desirable by many wildlife species. Specifically, our research objective is to evaluate how cattle grazing in combination with prescribed fire influences the longleaf pine avian community. Using autonomous recording units (ARUs) in 2 longleaf pine stands in central and southwest Louisiana, we are collecting data from 5 treatment plots: grazing + burning (mature stand), grazing + burning (young stand), burning only, pre-treatment grazing, and control (no disturbance). We began recording avian songs and calls in October 2022 and concluded in September 2025. ARUs record for 5 minutes every day at dawn. After downloading recordings, we review only those from every third day, documenting avian species heard, date, recording start time, ARU location, and treatment. Though data collection is currently ongoing, we intend to evaluate the difference in avian species richness among the 5 treatments to educate landowners—particularly those in southwestern and central Louisiana and southeastern Texas—on how the integration of cattle grazing into a fire-disturbed longleaf pine forest may create optimal habitat conditions for forest birds in these ecosystems.

Emily Euler

Discipline: Chemistry

Authors:

#1 Haley Frankovich
#2 Kendra Letchworth-Weaver
#3 Ashleigh Baber

Abstract Name: Modeling Isomeric Butanol Reactivity on TiO₂/Au(111) Inverse Model Catalysts

Biobutanol, or butanol sourced from biomass, can produce butene which serves as a viable chemical precursor for a fossil-fuel free route to plastic production. Developing a deeper understanding of the fundamental thermal catalytic processes of butanol over heterogeneous model catalysts aids in the design of more efficient catalysts. Temperature-programmed desorption (TPD) experiments demonstrate differences in both reactivity and selectivity for butanol isomers. 1-BuOH reveals little reactivity and high selectivity for butene (reduced) products, whereas 2-BuOH displays high reactivity and low selectivity, producing both 2-butanone (oxidized) and butene (reduced) products. To gain an atomically-detailed perspective on these processes, density functional theory (DFT) was used to investigate energetic trends and identify comparisons between 1- and 2-BuOH as they adsorb on Ti₃O_x nanoparticles supported on a Au(111) surface. Findings suggest Ti-OBuOH bonding, van der Waals interactions between the alkane chain and the Au surface, and electrostatic interactions between H and the nanoparticle all impact butanol's interactions on the catalyst material. Adsorption energies of both BuOH isomers place greater significance on Au surface interactions over Ti coordination number in determining favorability. The configuration of 2-BuOH enables it to interact more favorably with both the nanoparticle and Au surface compared to 1-BuOH, influencing reactivity and selectivity. Transition state energetics support experimentally observed trends for the thermodynamic favorability of 2-BuOH forming oxidized products compared to 1-BuOH.

Synia Evans

Discipline: History

Authors:

Abstract Name: Between Rootwork and Revelation: African American Hoodoo and the Supernatural in Southern Black Literature

This project examines Hoodoo as both a lived religious practice in Florida and the Delta South and as a literary and cultural motif in African American folklore and fiction from the 1930s through the 1990s. It explores the intersections of oral tradition, ethnographic documentation, and literary expression to demonstrate how Hoodoo functions not only as a spiritual system but also as a framework for cultural memory and creative storytelling. Centering the works of Zora Neale Hurston and Toni Morrison, the project argues that Hoodoo has long served as a tool of resilience, identity formation, and community survival. It contributes to ongoing conversations in African American religion, folklore, literature, cultural history, and studies of race, memory, and the supernatural in the Black South. Research findings show that much existing scholarship reduces Hoodoo to superstition or remnants of an earlier cultural moment, overlooking its significance as a site of empowerment and creativity. However, oral accounts, folktales, and literary reinterpretations reveal a more layered understanding in which conjure practices operate as spiritual resources and narrative inspiration. This project, therefore, examines how Hurston's 1930s ethnographic work and her contributions to the Federal Writers' Project preserved and legitimized Hoodoo traditions, while later writers such as Morrison reshaped these traditions into literary strategies for representing history, trauma, and endurance within Black communities. The goals of this project are to: (1) recover the voices and practices present in African American communities in the Carolinas and Florida through oral traditions and ethnographic records, and (2) trace the literary evolution of Hoodoo—from Hurston's fieldwork to Morrison's fiction—to illustrate how Black Supernaturalism became central to cultural expression over the twentieth century. This study ultimately demonstrates that Hoodoo's spiritual and narrative power continues to shape African American cultural identity, providing pathways for understanding community memory, collective resilience, and Black creative expression.

Chloe Evans-Whitley

Discipline: Chemistry

Authors:

#1 Scott Reed

Abstract Name: Improvement of Spatial Reasoning in LLMs via Automated Prompt Optimization

Despite their rapid evolution, large language models (LLMs) remain limited in their ability to spatially reason. LLMs lack comprehension of space, relationships between objects, environments, and physical constraints. LLMs rely on patterns in text to generate responses, which makes it difficult for them to interpret and manipulate information that relies on these concepts, limiting their utility for chemical and biochemical research. This project aims to explore solutions, including automated optimization of prompting, to improve LLMs' ability to use spatial reasoning and allow for more reliable use of LLMs in scientific research that involves complex physical interactions. Specifically, this project will evaluate how accurately base LLMs and optimized LLMs can predict the pKa values of titratable residues in proteins based on three-dimensional structure.

Discipline: Interdisciplinary

Authors:

#1 Blake Barnett

Abstract Name: Testing Dissimilar Metals and their Interface Strength: How do the Interface Characteristics of Collision-welded Metals Affect the Strength of their Weld?

Collision welding is an atypical method of welding first discovered during the Second World War, when soldiers noticed bomb fragments attached to sides of vehicles and other metal objects without any human interaction. Known as explosion welding, it is unique among welding methods, since it is able to bond metals that have differing characteristics such as melting points, heat capacities, etc., in addition to similar metals. It employs explosives to accelerate a flyer plate into an awaiting base plate. When they collide, the surfaces of the metal plates hit with so much force, the metals, briefly, act like liquids. This causes the formation of sinusoidal waves to propagate along the joined surfaces where the two plates meet, called the interface. The wave characteristics can be calculated using a first derivative test. The goal of my research is to compare which wave characteristic, wave length, frequency, or amplitude contributes most to the weld strength.

Gloria Eyong Ayuk

Discipline: Biology

Authors:

#1 Gregory Walsh

Abstract Name: Investigating the role of Protein Kinase C in axon guidance of spinal commissural neurons in zebrafish

Precise axon pathfinding is essential for establishing functional neural circuits during vertebrate spinal cord development. Axonal pathfinding is controlled by evolutionarily conserved molecular guidance cues that direct axons along the dorsal–ventral and anterior–posterior axes. Protein Kinase C (PKC) is known to regulate cytoskeletal dynamics and neural growth behavior in several systems, yet its specific contribution to axon navigation within the zebrafish spinal cord remains undefined. To determine the role of PKC in axon guidance, we have examined the pathfinding of commissural neurons in the spinal cord of zebrafish. Commissural primary ascending (CoPA) neurons are born dorsally and extend axons ventrally to the floorplate, cross to the contralateral side, and navigate dorsally and anteriorly to extend along the dorsal longitudinal fasciculus towards the hindbrain. These neurons, therefore, respond to multiple guidance cues to reach their destination, including Netrin/DCC (ventral extension), Slit/Robo signaling (midline crossing and dorsal growth), and non-canonical Wnt signaling (anterior turning). It remains unclear which guidance system requires PKC activity. Embryos preliminarily treated with the PKC inhibitor, GF109203X (10 μ M), exhibited axon pathfinding defects. Specifically, CoPA axons, in PKC inhibitor-treated embryos, extended within the floorplate for longer than normal distances, and often failed to extend dorsally once they crossed the midline. This phenotype is reminiscent of that seen in *robo2*^{-/-} mutants and suggests that PKC may be required for Slit/Robo signaling. Ongoing work using additional PKC inhibitors aims to dissect the molecular pathways regulating commissural axon pathfinding using this chemical genetic approach. By unraveling the influence of PKC on the development of zebrafish spinal circuits, this study seeks to reveal an underexplored signaling mechanism that shapes neuronal connectivity and provide broader insight into conserved molecular pathways governing vertebrate axon guidance.

Samantha Ezell

Discipline: Art History

Authors:

Abstract Name: Cipe Pineles: Furthering Women's Role through Design

Cipe Pineles, born in 1908, faced the difficulties of the patriarchy head on as a working woman in design. Although she was turned down again and again, she still continued her journey of looking for a job, which eventually led to her working at Condé Nast. Her experience as an immigrant helped shape her perspective of design itself, viewing mistakes as not a discouragement, but as a path to something new and wonderful. As an art director of Seventeen and Charm, she helped the changing ideas of what women could do and their roles in society. Seventeen was geared toward younger teenage girls and women, treating them like intelligent individuals opposed to treating them as an addition of their mothers and future wives. Charm was directed toward the working women providing tips on the addition of work life and normalizing the idea of women in the workforce. These magazines showed women in workwear fashion and helped the process of normalization of the working women. She pushed the standard even more when she was the first women to join the Art Directors Club in 1948 after countless rejections of nominations and joined its hall of fame in 1975. This denied the idea that women should not be taken as serious as men and spread the idea that women could be and were just as skillful as men. This paper will explore how through Cipe Pineles' hard work, developed skills, actions, and tenacity, she broke through the many barriers that held herself and other women back from working in graphic design and helped the change in viewpoints of the general working women.

Logan Fain

Discipline: Business

Authors:

Abstract Name: Does productivity plateau after working 40+ hours a week

Research shows that in other parts of the world work life balance is better than in the United States contributing to Americans' lower mental well-being. To explore this further, I surveyed 411 Americans to understand how they feel about their productivity after working more than 40 hours a week and their control over their work schedules. Overall, 44% of respondents responded that they are very/slightly unproductive when working over 40 hours a week. Furthermore, I found that people with low and middle income feel very unproductive compared to those with high household income when working over 40 hours a week. In addition, those individuals with a high school degree or less feel more unproductive than those with more education when working over 40 hours a week. These patterns highlight how job income and education level affect productivity. Individuals in lower-income or lower-education groups often face limited autonomy, more rigid schedules, and greater job-related stress, all factors that contribute to decreased productivity when hours extend beyond the standard workweek. In contrast, those with higher income and education levels may have more control over their workload, better working conditions, and increased job security, which can help maintain productivity even when working longer hours. However, the findings also suggest that productivity is not determined by hours alone; instead, it is shaped by the combination of work environment, degree of control, and overall mental well-being.

Harvest Fairchild

Discipline: Physical/Occupational Therapy and Speech Language Pathology

Authors:

Abstract Name: Bridging Disciplines: An Assessment of Interprofessional Education in Rehabilitation

Careers in rehabilitation are vital for addressing patients' physical needs, such as mobility, speech, and coordination. These fields encompass diverse occupations—each requiring specialized skills acquired through rigorous graduate and professional education. Advancements in addressing motor and sensory requirements have broadened the possibilities and applications within the field of rehabilitation. However, the complex interplay of patients' disorders and diseases necessitates interprofessional collaboration (IPC) for holistic and effective care. Interprofessional collaboration involves consistent networking and cooperation among various health professionals, pooling their expertise to craft optimal care strategies. By fostering communication, teamwork, and shared problem-solving, interprofessional education (IPE) offers a transformative framework for preparing future health professionals to engage in collaborative practice. Evidence suggests that IPE not only enhances students' readiness for interdisciplinary teamwork but also has sustained long-term effects, equipping professionals with collaborative skills that persist throughout their careers. Additionally, teams trained in IPE have demonstrated improved patient outcomes, such as higher recovery rates, reduced medical errors, and enhanced patient satisfaction. These outcomes stem from improved care coordination and holistic, patient-centered approaches that integrate physical, cognitive, and psychosocial elements of health. Using a scoping review, this study analyzes existing literature on IPE's role in rehabilitation practice. It explores key trends, barriers, and opportunities, laying the groundwork for future research on the long-term impact of IPE on healthcare education, collaborative practice, and patient outcomes.

Piper Falcon

Discipline: Visual Arts

Authors:

#1 Joseph Rother

#2 Shane Simes

#3 Kendra Lyons

#4 Sara Huffman

Abstract Name: Verdant Echoes: An Emotional Plant Care Simulator

Verdant Echoes is a VR experience set in a cozy greenhouse where players nurture plants that grow in response to their emotions. Each session, a seedling evolves as the player speaks, and an LLM analyzes the speech transcript with help from a vocal timbre analysis model developed by VCU Engineering graduates. Those emotions control how the plant grows, turning the greenhouse into a visual diary across sessions. Verdant Echoes explores generative AI not as asset production but as a game mechanic for affective interaction, offering an immersive, calming space that develops with you and around you.

Bara Fall

Discipline: Interdisciplinary

Authors:

Abstract Name: The responsibilities of a student worker_Barara Fall

This autoethnography will explore how holding a job within college, especially within the first year of college, impacts and shapes the academic, social, and personal lives and experiences of students transferring into higher education for the first time. Drawing from my own personal experiences as a full-time student and part-time worker, I took the time to examine how this workload influenced me in terms of time management, stress management, social engagement in college, and an overall adjustment towards college life as a whole. Throughout this new school year and this research, I have traced back how my studies, emotional well-being, and daily habits were affected by the demands of a part-time job and the degree to which it was detrimental or beneficial to me as a student. The study highlights several themes, such as the constant struggle between academic priorities and financial responsibility, the strain of limited free time due to class and work schedules, and financial independence. While holding a job provides important benefits like income, time management, discipline, and practical work experience, it also contributes to fatigue, decreased participation in campus activities, and moments of academic strain. By relating personal experiences within the broader conversation of college workloads, economic pressure, and student success, this autoethnography attempts to shed light on the realities of what first-year college students with jobs face. Ultimately, this project argues that employment during the first year of college is a complex and often contradictory experience: it empowers students financially and emotionally while simultaneously amplifying stress and reducing opportunities for full campus participation. By sharing my story, I hope to provide a better understanding of how work shapes student identity, motivation, and resilience.

Chloe Falls

Discipline: Gender, Ethnicity, Diversity, or Cultural Studies

Authors:

Abstract Name: Mini Skirts, Major Impact: Mary Quant

This research examines how Mary Quant transformed fashion design into a catalyst for cultural and social change during postwar Britain. Emerging amid the rise of youth culture in the 1950s and 60s, Quant challenged restrictive ideals of femininity by introducing bold, functional, and affordable designs that reflected the growing independence of women. Her signature creation—the miniskirt—became both a symbol of liberation and a visual marker of shifting gender norms, aligning with broader conversations surrounding autonomy, identity, and second-wave feminism. Through innovative silhouettes and experimentation with modern materials, Quant rejected the exclusivity of haute couture and reimagined clothing as a democratic form of self-expression. The impact of her boutique, Bazaar, further reshaped retail culture by fostering an environment rooted in accessibility. Quant's work illustrates how design can both reflect and influence social values, as media responses highlighted ongoing tensions surrounding women's visibility and bodily autonomy during her time. While her commercial success complicates purely feminist readings of her work, it also demonstrates how consumer culture and empowerment intersected during the 1960s. Mary Quant's designs revolutionized the fashion industry by merging functionality with sexual liberation; she transformed clothing into a medium of self-expression that challenged traditional gender norms for women and situated fashion as a form of activism and social change. Her legacy endures in contemporary fashion, feminist discourse, and ongoing conversations about the role of design in shaping cultural identity.

Chloe Falls

Discipline: History

Authors:

Abstract Name: The Striking History of Matchbox Design

This research examines how matchbooks and matchboxes became influential artifacts in design and visual culture. Beginning with early fire-starting tools in sixth-century China, the study traces the development of matches from simply functional to globally standardized packaging shaped by technological innovation. The Swedish safety match and the sliding-drawer box established the foundations of modern match design, while improvements in printing turned matchboxes into miniature canvases for illustration, typography, and branding. By the late nineteenth and early twentieth centuries, matchbooks evolved into pocket-sized billboards, showcasing advertisements for hotels, airlines, restaurants, and more. Their designs reflected broader movements like Art Deco and Modernism, capturing cultural identities across countries, from Soviet propaganda to Indian folk imagery and American corporate aesthetics. Exploring how matchbooks shifted to collectible ephemera, drawing on Arthur Danto's ideas about collecting, matchbooks gained meaning as personal and cultural artifacts, valued for the stories they hold about people, places, and design. Although their popularity declined in the mid-twentieth century with the rise of butane lighters and anti-smoking campaigns, matchbooks have re-emerged as nostalgic design objects. Today, boutique hotels, artists, and designers revive matchbooks as historic symbolism. This study shows that matchbooks reveal how design lives in ordinary objects. They demonstrate the power of small-scale design to communicate history and culture in ways that continue to resonate long after their original purpose has faded.

Ikra Farah

Discipline: Nursing and Public Health

Authors:

#1 Sadia Anjum Ashrafi

Abstract Name: Cardiovascular Risk Among Asian Americans: A Narrative Review

Cardiovascular disease (CVD) remains a major cause of morbidity and mortality in the United States, and key risk factors including hypertension, diabetes, and obesity continue to increase. Asian Americans represent one of the most diverse and rapidly growing racial groups, yet much of the existing research aggregates them into a single category, creating a significant literature gap that limits understanding of subgroup-specific CVD risk patterns. This narrative literature review explores current evidence on CVD prevalence, incidence, and major risk factors among Asian Americans while identifying how these patterns differ across subgroups. A systematic search was conducted using PubMed to locate peer-reviewed articles reporting trends, prevalence, incidence, or risk related to CVD among Asian Americans. Inclusion criteria required English-language studies presenting measurable CVD outcomes or risk-factor data for at least one Asian American subgroup; studies lacking relevant data or not focused on Asian Americans were excluded. A narrative synthesis approach was used to organize and interpret patterns across the literature. Three findings emerged from the reviewed studies. First, major CVD risk factors particularly hypertension, diabetes, and obesity remain prevalent within Asian American populations. Second, substantial subgroup variation exists: Filipino and South Asian Americans consistently show elevated levels of multiple CVD risk factors, whereas Chinese Americans demonstrate lower mortality but rising hypertension rates. Third, major gaps persist, including limited subgroup-specific reporting, underrepresentation of Southeast Asian and Pacific Islander Americans, and evidence that standard clinical risk-prediction tools may underestimate risk for certain Asian American subgroups. Overall, the literature indicates that CVD remains a significant concern among Asian Americans, with meaningful variation across subgroups. The continued lack of disaggregated data and subgroup-specific research limits accurate risk assessment and hinders the development of tailored prevention strategies, underscoring the need for more inclusive and culturally informed research.

Anila Fariab

Discipline: Biology

Authors:

#1 Sara Clasen

#2 Caroline Guess

Abstract Name: Flagellin-dependent signaling in non-motile bacteria

Bacteria assemble flagellin proteins into filaments, called flagella, for motility. These proteins activate mammalian innate immune receptors, like Toll-like receptor 5 (TLR5), which initiate host defenses against flagellated pathogens. As such, flagellins represent the trade-off between motility and immune evasion. However, several findings challenge this view. The motile pathogen *Helicobacter pylori* (Hp) produces flagellins that fail to bind TLR5, thus allowing Hp to evade host immunity. Yet, Hp still activates TLR5: Cag proteins function as non-flagellin TLR5 ligands. Moreover, in Tlr5 knockout mice, gut bacteria respond to the absence of Tlr5 by expressing genes associated with nutrient starvation. These observations suggest a homeostatic role for TLR5 apart from its function in host defense. To test if TLR5 activation benefits bacteria, we used *Citrobacter rodentium* (Cr), a bacterial pathogen that primarily colonizes the colon and cecum in mice. Although two intact flagellins (fliC and lafA) are present in the Cr genome, the genes required for flagellum biosynthesis are absent. Thus, Cr is predicted to lack flagella. Through both functional assays and TEM imaging, we confirmed that Cr is both non-flagellated and non-motile. Next, we tested whether Cr-encoded flagellins are Tlr5 ligands. Both FliC and LafA induced NF- κ B signaling in Tlr5 reporter cells, indicating that they activate Tlr5. Finally, we investigated the nutrient conditions that induce expression of Cr flagellins. To mimic the limited-nutrient environment of a mouse gut in vitro, we cultured Cr in low-nutrient conditions and measured fliC and lafA gene expression using quantitative PCR. These experiments lay the foundation for future studies to address the alternative ways non-motile bacteria use flagellin to control host signaling pathways, initiate immune responses, and shape their surrounding environment.

Chelsea Fariss

Discipline: Biology

Authors:

#1 Sarah Timis

#2 Mohammad Siddiqi

#3 Andrew Ottens

Temmm Phan

Abstract Name: Modeling Wildfire Smoke Exposure in the Mouse to Assess Dementia-Relevant Neurocognitive Outcomes

Wildfire smoke (WFS) is an emerging environmental pollutant. Recent epidemiology suggests that living in WFS prone areas increases the risk for dementia. Thus, research models are needed to assess neurological outcomes of WFS. In this research, the well-documented Teague smoke exposure system was adapted to simulate WFS exposures in mice. The Teague system, designed for combusting reference cigarettes, was adapted for use with wildfire-relevant wood media. Wood chips were ground to a course powder, mixed at different ratios, and packed into paper cartridges compatible with the Teague's robotics system. An ideal 45%:55% red oak to pine mixture was identified to efficiently ignite and exhibit a controlled static burn rate

consistent with that of a 3R4F reference cigarette. The exposure hood was fitted with a Thermo DataRam 4 particulate monitor, used to optimize particle dilution and burn duty cycle. An 8 min to 52 min minute on/off burn duty cycle was optimized. Serial dilution with particle aging was optimized to simulate a 100 µg/m³/day WFS particle exposure. Outbred mice were used to assess impacts on learning and memory. The novel object recognition, Barnes maze, and Morris water maze were employed. Latency values before and after simulated 89 ug/m³/day WFS exposure for 10-days at 4-h per day were compared. Preliminary findings show an impact on spatial learning in Barnes and Morris water maze tasks, with trials ongoing. Thus, the research here supports development of an effective research model to assess learning and memory impairment consequent simulated wildfire smoke exposure at particle levels equivalent to that experienced in urban centers such as New York City in the summer of 2023.

Mia Farley

Discipline: Exercise Science and Nutrition

Authors:

#1 Mia Farley

#2 David Sallee

Abstract Name: The Correlation Between Hamstring Flexibility and Vertical Jump Height

The purpose of the research is to evaluate the correlation between hamstring flexibility and vertical height jump in recreationally active young adults. While the hamstring muscle group plays a crucial role in producing power during vertical jumping, limited flexibility may restrict range of motion, whereas excessive flexibility without adequate strength may be harmful. Existing research has largely focused on elite athletes, leaving a gap in understanding how these variables relate to average individuals. The research on elite athletes has generally shown that moderate to high hamstring flexibility, when paired with strong eccentric control is associated with improved jump mechanics. This cross-sectional study recruited approximately 20 recreational athletes aged 18-24, excluding those with recent lower-extremity musculoskeletal injuries. Hamstring flexibility was assessed using goniometric measurements of the hip flexion in both knee-bent and knee-extended positions. Vertical jump height was recorded using a plate analysis in the kinesiology lab. Additionally, participants were asked to perform warm-up stretches to control muscle stiffness. All data was collected in a controlled laboratory environment to reduce external influence. Findings from this study could contribute to clarifying the role of flexibility in power-based movements such vertical jump height and may inform training strategies geared toward optimizing performance and preventing injury. Results will be conducted by the end of the semester.

Josiah Farrell

Discipline: Political Science

Authors:

#1 Spencer Bakich

Abstract Name: Safeguarding Democracy: Lessons from U.S. Deterrence in West Berlin for Taiwan

Presently, the United States' most critical diplomatic relationship is with that of the People's Republic of China. America finds itself straining to maintain peace in Eastern Asia, as well as globally. As tensions rise between the U.S. and China, especially over American support for the democratic Republic of China, questions arise over the United States' ambiguous military obligations to Taiwan. At issue, is specifically how

the United States can continue effective deterrence of Beijing's advances on the island. The answers to such questions can be elucidated by developing an understanding of the United States' strategy in similar situations. This project seeks to understand the conditions that led to successful deterrence against the Soviet Union in the context of West Berlin by analyzing American national security policy to contain Soviet irredentism. The findings will then be compared to the current situation in Taiwan to garner a better conception of the potential strategies that the U.S. could utilize to deter further Chinese encroachment and protect Taiwanese sovereignty. By developing an understanding of the United States' position on West Berlin, this project will work to draw conclusions as to the extent of deterrence action that the U.S. can engage in without jeopardizing their critical relationship with the People's Republic of China.

Ava Fasone

Discipline: Anthropology and Archaeology

Authors:

Abstract Name: In Dignity and In Honor: The Leipzig 19 and the Black Body as a Script in the Medical Museum

In 2025, the skulls of 19 Black Americans were repatriated to New Orleans following more than a century in the custody of German medical institutions. These skulls, largely stripped of their names and identities, were taken from the corpses of 19 Black patients who died during the 1870's, and were exported to spend their afterlives benefitting European understandings of phrenology— a study which purported that intellect and morality could be determined based upon the shape and measurements of the human skull. Though their return reflects evolving standards in the field of repatriation, questions persist regarding the structure of these repatriations, delays in their return, and the deeper implications of deceased Black remains in scientific practice. This paper argues against a long-standing historical tradition of misappropriation, highlighting this occurrence as only a single incident in the ever-evolving and dynamic relationship between the global Black community and medical science, viewing this occurrence as neither insular nor discreet, but instead as an example of exploitation's role in the development of medical techniques. In deconstructing this event, therefore categorizing it by deconstructionist and symbolic terms, I seek to generate a more comprehensive picture of the exploitation of Black bodies in the scientific tradition through the use of the body as a 'script' in medical science, and emphasize the dual political and cultural importance of bodily repatriation as a method of remedying enduring legacies of trauma.

Jae Fast

Discipline: Psychology

Authors:

Abstract Name: Emotional Working Memory Across The Visual Mental Imagery Spectrum: Considerations for Aphantasia

In 2015, the term "aphantasia" was coined to describe a small group of individuals who lack the ability to voluntarily produce visual mental imagery. This caused a rising interest in aphantasia and its associated neural, behavioral, cognitive, and emotional features. Understanding the role of visual mental imagery in both emotional and cognitive processes, it is reasonable to question whether aphantasia may result in importantly unique experiences that may require improved therapeutic practices to account for these differences. Previous studies have found that aphantasics experience reduced emotional responses to recalled emotional events,

reduced affective processing, poor autobiographical memory, and other cognitive differences in a variety of domains. Notably, research shows that imagery play a central role in emotional generation and regulation as well as memory. As a result, almost all major therapeutic orientations include visual components, causing the aphantasic population to report reduced efficacy of psychotherapy and barriers to diagnosis and treatment due to unfamiliar symptomologies. This study aims to address a gap in the understanding of the connections between the emotional and cognitive realms of aphantasia by explaining the relationship between emotional working memory and visual mental imagery ability in adults. In a controlled lab environment, consenting adult participants in Greeley, Colorado completed two surveys and an emotional memory task that measured visual imagery ability and emotional working memory across multiple dimensions. This researcher hypothesized that those with lower visual mental imagery ability experience emotional working memory deficits. Research is ongoing at the present moment and is expected to be completed by March 2026.

Faiza Fatima

Discipline: Gender, Ethnicity, Diversity, or Cultural Studies

Authors:

Abstract Name: The Effects Of Perfectionism Along With Acculturation On The Anxiety And Depression Rates Of Asian Indian Immigrants

Asian Indian Immigrants often face expectations regarding perfectionism that are prominent in both their ethnic culture and American culture. The expectations of success in India are strongly correlated with ideas of perfectionism and specific standards that must be fulfilled to determine whether an individual has truly succeeded. Even while in the US, they face stereotypes regarding high intelligence and are pressured to meet these expectations, which impacts their mental health. This study uses comparative analysis to examine the effects of these expectations on the anxiety and depression rates in Asian Indian Immigrants, and also how factors of acculturation and stigma inhibit their willingness and ability to receive treatment for their mental disorders. The findings display that Asian Indian Immigrants portray an increased risk of developing anxiety and depression due to the pressure of living up to expectations created by both their ethnic culture and American culture. The expectations of being a model minority and representing their culture well add extra pressure on Indian Immigrants and immigrants in general. Being a model minority also acts as a barrier to immigrants' willingness to receive treatment due to the stigma around mental health in India. The added stress that comes with acculturation was shown to further increase the anxiety and depression rates in Asian Indian Immigrants due to the effects of stereotypes and discrimination. The factors of acculturation were also found to decrease an immigrant's willingness to receive treatment due to fear of judgment and fear of tarnishing family honor. These perfectionistic expectations and stereotypes were found to negatively impact the mental health of Asian Indian Immigrants and cause them to develop mental health disorders such as anxiety and depression.

Jokebed Fauge

Discipline: Biology

Authors:

#1 Clayton Carlson

Abstract Name: Human Associated Antimicrobial Resistance in Community Soils

Antimicrobial resistance occurs when bacteria develop the ability to survive drugs designed to kill them,

creating a growing public health challenge. The Centers for Disease Control and Prevention reports that resistant infections affect millions of people and cause numerous deaths in the United States each year. Because resistant bacteria can spread through humans, animals, and the environment, researchers are increasingly studying everyday locations to understand how resistance moves outside clinical settings. The PARE Project at Tufts University has shown that soil from parks, paths, and other community areas frequently contains antibiotic-resistant bacteria, providing evidence that human activity can introduce these organisms into the environment. Building on this research, soil was collected from four different locations, including the lawn near the TCC library, a hiking trail in the Cook County Forest Preserves, a site ten feet along the trail, and a site one hundred feet from the trail point, to examine the presence of human-associated antimicrobial resistance. When grown on MacConkey plates, the library lawn displayed the highest total bacterial growth and the greatest number of coliform colonies, which serve as indicators of human or animal contamination. The trail sites also supported diverse bacterial populations and contained resistant colonies, though in smaller proportions than the library lawn. These findings indicate that antibiotic-resistant bacteria are present in community soils and suggest that their abundance may correspond to patterns of human activity. This project demonstrates the importance of environmental monitoring in tracking the spread of antimicrobial resistance and reinforces the need for ongoing surveillance to protect public health.

Alexander Faunce

Discipline: History

Authors:

Abstract Name: Uncovering a Tombstone: The Fate of Fascist Italians, 1943 - 1945

In the chaotic aftermath of Italy's September 1943 armistice, the German-backed Italian Social Republic drew thousands of volunteers who chose to continue fighting for Mussolini's failed regime. While most Italians welcomed the end of the war and rejected Fascism, these volunteers - ranging from seasoned soldiers to fervent youth - embraced a cause whose defeat had already become inevitable. Understanding why they continued the struggle sheds light on the final dramatic phase of Italy's fascist regime and reveals a psychological and ideological evolution that produced an increasingly brutal campaign of survival and revenge. The final two years of the war witnessed the rapid radicalization of these forces, particularly within volunteer formations such as Decima MAS and the infamous "Black Brigades". Contemporary songs, propaganda posters, and veteran testimony reveal how early motivations rooted in concepts of duty or honor soon gave way to a fatalistic worldview centered on sacrifice, retribution, and loyalty to fallen comrades. As partisan attacks expanded across northern Italy, these units became increasingly socially isolated and responded with harsh reprisals that further deepened local hostility. Their ideological hardening occurred alongside a constant dependency on German military support and resulted in a growing sense of paranoia. In the spring of 1945, German forces in northern Italy collapsed and Fascist loyalists faced overwhelming partisan strength. Many attempted to reach Allied forces to avoid torture and execution, while others fought to the death or were captured and often executed amid the chaotic dissolution of the Italian Social Republic. The fate of these volunteers illustrates how ideology, fear, and loyalty combined to help sustain a doomed regime long after its collapse had become apparent.

Alejandro Fayad

Discipline: Economics

Authors:

Daniela Vazquez

Abstract Name: Miami's Housing Crisis: Uncovering the Forces Behind Rising Costs and Charting a Path to Affordability

Miami has rapidly become one of the least affordable housing markets in the United States. What was once a vibrant, diverse city offering opportunity has turned into a place where many working families and young adults struggle just to keep a roof over their heads. This project seeks to answer a central question: What economic, social, and policy forces are driving the rise in Miami's housing costs, and what solutions could realistically improve long-term affordability? To address this question, the research draws on data from the U.S. Census Bureau, HUD, the Florida Housing Coalition, and other public sources. Using descriptive statistics and trend analysis, the study examines how factors such as rapid population growth, the influx of out-of-state buyers and investors, the expansion of short-term rentals, and limited development of affordable housing interact to widen the gap between income growth and housing prices. The findings highlight not only the economic pressures shaping Miami's housing market but also the human impact of these changes. The study discusses potential strategies, including inclusionary zoning, public-private housing partnerships, and incentives that support local homeownership, that could help promote greater stability and fairness. By understanding the root causes of Miami's affordability crisis, the city can take meaningful steps toward ensuring that its future growth benefits the entire community.

Andrew Fedor

Discipline: Film/Photography Studies

Authors:

Abstract Name: Dreams and Reality: The Tragedy of Creation in *The Wind Rises*

Hayao Miyazaki's 2013 animated semi-fictional biopic, *The Wind Rises*, tells the tragic story of Jirō Horikoshi, the engineer who designed the Mitsubishi Zero fighter plane used by the Japanese Empire during World War II. The film sparked widespread controversy in both its domestic and international releases, with critics suggesting that it willfully ignores Japan's responsibility for thousands of deaths during the war in favor of whimsically romanticizing aeronautical engineering. Miyazaki has even been accused of the same fascist apologetics and revisionism that continue to plague Japan's cultural and historical discourses surrounding WWII. However, these same critics have failed to recognize not only the spirit of Miyazaki's film but also his nuanced, self-reflexive approach, which foregrounds the fraught implications of creation rather than fascism or militarization. In the film, although Jiro's dream does become inextricable from wartime destruction, Miyazaki avoids simplistic admonishment. Instead, he crafts a grounded and highly autobiographical reflection on the intractable confrontation between the nature of dreams and the circumstances of reality both from which they stem and ultimately seek to subvert—that is, the struggle between creators and creations. By engaging with the perspectives represented in Susan Napier's 2018 monolithic work in Miyazaki studies, *Miyazakiworld*, this paper examines the film's provocative thematic conundrum. Integrating textual analysis, historical context, and the intertextual influence of Paul Valéry's 1922 poem "The Graveyard by the Sea", I argue that Miyazaki conscientiously explores Jirō's poignant struggle with the relationship between creation and destruction through the lens of engineering. In a military-industrial world that inherently commodifies the works of dream-driven engineers, paralleling the worlds of filmmaking and animation, Miyazaki challenges the audience to question the pursuit of dreams intertwined with inescapable questions of nationhood, technology, and war.

Rebecca Fekru

Discipline: Exercise Science and Nutrition

Authors:

#1 Bodhi Martin
#2 Rebecca Fekru
#3 My Linh Trujillo
#4 Dr. Jacqueline Lauer
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Abstract Name: The Availability and Effectiveness of Nutritional Support Interventions on TB Outcomes Among Low-Income Populations

Tuberculosis (TB), a chronic infectious disease of the lungs, disproportionately affects low-income populations. TB outcomes are worsened by poverty, food insecurity, and unstable housing, which complicate the implementation of effective interventions. Nutritional status is a key determinant of TB treatment adherence, disease progression, and survival outcomes. Emerging evidence suggests that nutritional interventions, such as cash vouchers, dietary supplements, and feeding programs, may improve TB outcomes. However, the range, characteristics, and effectiveness of these interventions in low-income settings remain insufficiently explored. This scoping review aims to characterize the availability, nature, and effectiveness of nutritional interventions for TB outcomes in low-income populations globally. Using the Arksey and O'Malley framework with PRISMA-ScR methodology, we systematically searched PubMed, MEDLINE, EMBASE, and CINAHL, and found 50 eligible studies. Included studies evaluated nutritional interventions such as food vouchers, micronutrient supplementation, and conditional cash transfers in relation to outcomes, including treatment adherence and mortality. This review will underscore the importance of recognizing nutrition as both a preventative measure and a therapeutic support strategy in TB care, while drawing attention to critical gaps in literature and need for further research. Data extraction and synthesis are ongoing. Early findings report that meal vouchers and conditional cash transfer incentives are associated with lower TB-related mortality rates among lower to upper-middle-income populations. Future studies should advance evidence-based, effective nutritional interventions for TB outcomes in low-income populations and guide the development of targeted strategies to improve outcomes among nutritionally vulnerable groups, given the known adverse impact of malnutrition on infectious diseases.

Beatriz Felchak Monteiro

Discipline: Economics

Authors:

Abstract Name: Immigration Perceptions and Well-Being in Brazil and the U.S.: A Cross-Country Study

This study investigates how perceptions of immigration relate to individual well-being, measured through self-reported happiness and life satisfaction. Using nationally representative data from the 2017–2021 World Values Survey (Wave 7), we employ probit regression models to examine how beliefs about immigration shape well-being outcomes. Specifically, we focus on whether respondents think immigration increases crime rates or contributes to higher unemployment among citizens in Brazil and the United States. By comparing these two distinct socio-political contexts, the study provides insight into whether and how attitudes toward immigration influence personal evaluations of life. Our preliminary results indicate that individual well-being is associated with a wide range of demographic and socioeconomic factors, including health conditions, education, gender, perceived social class, financial conditions, number of children, marital status, and sense of security. However, both the direction and magnitude of these effects vary between Brazil and the United States. Crucially, perceptions of immigration exhibit significant but divergent influences on well-being across the two countries. Respondents in the United States tend to evaluate immigration more negatively, and these negative perceptions correspond to stronger reductions in reported happiness and life satisfaction compared to

respondents in Brazil. The significance of this project lies in its contribution to understanding the psychological and social implications of immigration discourse. As debates over immigration continue to shape political climates worldwide, identifying how such perceptions affect individual well-being offers valuable insight for policymakers and social researchers. By highlighting cross-national differences, this study underscores the importance of cultural, economic, and institutional contexts in shaping both immigration attitudes and their consequences for individual well-being.

Joshua Feld

Discipline: Health and Human Development

Authors:

- #1 Joshua Feld
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Abstract Name: Physical activity among toddlers in urban Bangladesh, a lower middle income country in South Asia

Background: Physical activity supports healthy growth and neurodevelopment and is linked to childhood obesity, key public health concerns in low- and middle-income countries. However, most evidence on children's activity patterns comes from high-income countries. Despite the importance of early movement behaviors and emerging evidence of cross-cultural variation, little is known about toddler physical activity in Bangladesh, a lower middle-income country in South Asia facing a dual burden of malnutrition, with high stunting and rising urban obesity. **Methods:** Data for this analysis came from 304 toddlers (mean age 20.52 months [Standard Deviation, SD 2.30]) enrolled in a cohort study in Dhaka, the capital of Bangladesh. Physical activity was assessed using the PRE-PAQ questionnaire. Parents reported how often their child played actively inside the house, how often they played with sit-and-ride or push toys, how often they played actively in the garden, yard, rooftop, or roadside, and how often they engaged in physical activity or play that made them sweat or breathe harder. **Results:** On average, toddlers in our study achieved 19 minutes of moderate to vigorous physical activity (MVPA) (SD = 35.66), and 278.34 minutes (SD = 179.81) of total physical activity per day. The MVPA average is under the recommended amount, while 67.96% of children met the total recommended daily amount of PA. Nearly all children had access to a place where they could be physically active. Additionally, 78.29% of parents reported that their child had access to a public park or a rooftop play area. **Conclusion:** Toddlers in urban Bangladesh get limited physical activity, and many lack access to appropriate places to be active. These findings highlight the need for future research to identify context-specific predictors of toddler physical activity to inform intervention development and targeting in low-resource, rapidly urbanizing settings.

Madisyn Feliciano

Discipline: Psychology

Authors:

#1 Claudia Romero Carpio
#2 Ahmed Abbas
Samantha Pelfrey

Abstract Name: The Effects of Coping Motives on Alcohol Use Consequences

The purpose of this study was to examine the difference in alcohol use consequences between those who drink to cope with anxiety or depression symptoms and those who do not. Our research aimed to expand on earlier studies by placing emphasis on how coping with anxiety and depression influences alcohol consequences using constructs aligned with DSM-V symptom criteria. Research has consistently shown that those who drink to regulate distressing emotions experience more harmful consequences, making this an imperative area for prevention efforts. It was hypothesized that coping motivated drinking would be associated with an increased amount of alcohol related consequences. Participants were college students who participated in a Spit for Science study ($n = 457$). Spit for Science is a research initiative that aims to understand the biological and environmental underpinnings for substance use and mental health in college aged students. Those who participated completed a self-report measure evaluating drinking motives and alcohol consequences. We conducted an Independent Samples T-Test using our measures to evaluate drinking motives and alcohol consequences. Results show there is a significant difference in alcohol use consequences between those who drink to cope ($M=1.77$, $SD=2.25$) and those who did not drink to cope ($M=0.8294$, $SD=1.42$), $t(338) = -4.777$, $p < 0.001$. These results support the current research literature indicating that coping motivated drinking can result in more consequences. Other studies suggest that by developing positive coping strategies this not only decreases anxiety and depressive symptoms, but also decreases alcohol consequences. Therefore, highlighting the importance of teaching healthy coping skills and alternative coping mechanisms as an intervention strategy for risky alcohol consumption. Implementing new program approaches that teach students emotional regulating skills, stress management and positive coping strategies offer promising ways to reduce risky alcohol use.

Rong Feng

Discipline: Computer Science

Authors:
#1 Rong Feng

Abstract Name: Can LLMs Recover Program Semantics? A Systematic Evaluation with Symbolic Execution

Obfuscation poses a persistent challenge for software engineering tasks such as program comprehension, maintenance, testing, and vulnerability detection. While compiler optimizations and third-party code often introduce transformations that obscure program intent, existing analysis tools and large language models (LLMs) struggle to recover the original semantics. In this work, we investigate whether LLMs, when fine-tuned with symbolic execution artifacts, can effectively deobfuscate programs and restore analyzability. We construct a benchmark by applying four widely studied transformations—control-flow flattening, opaque predicates, arithmetic encoding, and branch encoding—across diverse C programs from TUM Obfuscation Benchmarks, the LLVM test suite, and algorithmic repositories. We then compare three state-of-the-art LLMs under two training configurations: baseline fine-tuning on obfuscated/original code pairs, and enhanced fine-tuning with additional KLEE artifacts such as SMT constraints, path statistics, and test cases. Our evaluation examines syntactic correctness (compilation success), semantic fidelity (behavioral equivalence under symbolic execution), and code quality (readability and structure). Results show that GPT-4.1-mini achieves the strongest deobfuscation overall, and that incorporating KLEE artifacts consistently improves semantic preservation and compilation success across models. Across all four transformations, GPT-4.1-mini shows consistent gains with KLEE artifacts—compilation success increases from 75.8% to 87.9% and semantic scores improve by 6–7 points. These findings highlight deobfuscation as a broader software engineering

concern, demonstrating that combining LLMs with symbolic execution can strengthen automated testing, static analysis, and program comprehension in the presence of obfuscation.

Sam Ferguson

OK - University of Central Oklahoma

Discipline: Sociology

Authors:

Abstract Name: Threshold Theory: Navigating Stake Escalation and Societal Pressure

This research project focuses on developing Threshold Theory, a new sociological framework synthesizing Liquid Modernity and Functionalism to explain how individuals and communities disengage from escalating societal pressures. My goal is to refine this theory using research on alternative lifestyles; minimalism, off-grid living, and decentralized education, as an adaptive response to modern changes. By conducting a literature review, studying case studies, and conducting survey research on students at UCO, I will provide a structured analysis of 'walking back from the threshold' as a functional response to contemporary instability.

Emma Fernandez

Discipline: Music

Authors:

Abstract Name: Diary of a Child: A Pedagogical Exploration of Ernesto Lecuona's Children's Suite

In Western music education, the contributions of Cuban composers are often underrepresented despite their rich influence on global musical traditions. Among them, pianist and composer Ernesto Lecuona (1895–1963) stands out as a pivotal figure who brought Cuban and Afro-Cuban musical idioms into international recognition. Through his prolific output, including works ranging from pedagogical piano pieces to virtuosic concert repertoire, Lecuona bridged cultural and stylistic divides, expanding the reach of Latin and Afro-Cuban music. This poster presentation examines one of his lesser-known yet pedagogically significant works: *The Diary of a Child*, a piano suite composed for young learners. It highlights the suite's cultural and educational value by analyzing selected excerpts that incorporate Afro-Latin rhythms, syncopations, and melodic motifs within an accessible framework. To complement the analysis, attendees will also be able to listen to recorded excerpts from the suite, illustrating both its pedagogical potential and artistic richness. Special attention will be given to how these works introduce developing pianists to diverse musical languages while reinforcing essential technical and interpretive skills. By situating *The Diary of a Child* within the broader scope of piano pedagogy, this presentation seeks to advocate for a more inclusive repertoire that acknowledges and celebrates Latin American contributions. In doing so, it underscores both the artistic legacy of Ernesto Lecuona and the pedagogical opportunities his music offers for expanding cultural awareness in piano teaching.

Edgar Fernandez

Discipline: Biology

Authors:
#1 Edgar Fernandez

Abstract Name: Snail Secret Slime: Uncovering the Antimicrobial and Antibiofilm Power of Mucin

Bacteria are constantly adapting to their environments, increasing their ability to resist antibiotics. This growing challenge highlights the need to identify new antimicrobial compounds naturally produced by microorganisms and other living organisms to improve the effectiveness of modern treatments. The Giant African Snail (*Achatina fulica*) secretes mucin that is commonly used in skin care for its rejuvenating properties, yet its antimicrobial potential remains underexplored. This study investigated the antimicrobial and antibiofilm properties of mucin extract from *A. fulica*, as well as an antimicrobial compound produced by an unknown soil microorganism. The snail mucin extract was tested against a panel of 20 bacterial strains and two fungal strains using a 96-well plate broth assay, 24-well plate spot assay, and biofilm assay to evaluate its effect on growth and biofilm formation. The unknown soil microorganism was also tested for antimicrobial activity against several pathogenic bacteria using a streak inhibition assay. Results showed that snail mucin significantly reduced the growth of Gram-negative bacteria, including *Escherichia coli*, *Pseudomonas aeruginosa*, and *Acinetobacter baumannii*. It also reduced biofilm formation in *Streptococcus oralis* and *Staphylococcus epidermidis*. The unknown microorganism displayed promising inhibition of growth in both Gram-negative and Gram-positive bacteria. These findings demonstrate that natural compounds from organisms such as snails and soil bacteria possess antimicrobial and antibiofilm properties that may contribute to addressing the global problem of antimicrobial resistance. Future studies will focus on identifying the unknown microorganism and isolating and characterizing the active compounds from *A. fulica*.

Karina Fernandez-Saito

Discipline: Anthropology and Archaeology

Authors:
#1 Karina Fernandez-Saito
#2 Dr. Patricia Antonello

Abstract Name: Burden of Dementia Care Among Latina Women

Introduction Among Latine families, caregiving is disproportionately carried out by women, particularly when supporting relatives with progressive chronic illnesses such as dementia. Caring for a progressive illness such as dementia can be incredibly taxing for caregivers, placing Latina women at heightened risk for caregiver burnout. Family ideals and gendered expectations intersect to shape the caregiving experiences of Latina women, with profound effects on their physiological and psychological health. Yet, research overlooks the experiences of Latina women, resulting in a limited understanding of their unique needs and an inability to sufficiently support this group. This research aims to uncover both the origins and outcomes of caregiving disparities of Latina women by examining the sociocultural and systemic factors that intensify caregiving strain. Method Drawing on writings by Latin American philosophers such as Ofelia Schutte, Sor Juana Inés de la Cruz, and Octavio Paz, provide the sociocultural framework of the submissive and sacrificial role Latina women are placed into. Following includes a comprehensive literature review discussing the physiological and psychological effects of caregiving. Lastly, qualitative interviews with Latina caregivers, aged 18 to 65, will capture firsthand accounts of caregiving burden within this population. Preliminary findings from the literature and interviews indicate that dementia caregiving is associated with elevated cortisol levels, depressive symptoms, and other adverse health outcomes. Focusing specifically on Latina women reveals how traditional gender roles embedded within family structures and cultural expectations exacerbate these burdens. Predicted conclusion This study anticipates that Latina women caring for relatives with dementia face uniquely heightened caregiving strain, driven by intersecting cultural expectations and

systemic inequities. The goal of my research is to advocate for policy reforms and culturally grounded support systems that address the gendered roots of caregiving disparities and promote the well-being of Latina women.

Kaitlyn Ferreira

CA - University of the Pacific

Discipline: Gender, Ethnicity, Diversity, or Cultural Studies

Authors:

#1 Kaitlyn Ferreira

Abstract Name: Mob Mentality: How the Media Shapes Societal Perspectives of the Mafia

This project examines how media depictions of the Mafia have shaped societal perceptions of organized crime. While Mafia films are central to United States popular culture, little research has analyzed how these narratives influenced crime reporting. This study addresses that gap through a case study of *The Godfather*. Through archival research, newspaper articles were coded as positive, neutral, or negative and divided into three periods: before the novel's publication, after the novel, and after the first film. This design enabled statistical comparisons using Pearson's chi-square tests and Kendall's tau-c correlations. Articles were identified using the search term "Mafia," chosen as the most widely recognized label for the Cosa Nostra. To produce a balanced dataset, one year of articles prior to the novel and three months following both the novel and the film were coded. From more than 5,000 identified articles, duplicates and unrelated pieces were removed, leaving over 700 articles from New York State publications for analysis. Findings reveal notable shifts in representation. Pearson's chi-square tests show both the novel and film corresponded with statistically significant differences in reporting compared to pre-novel coverage. Kendall's tau-c correlations revealed weak but positive relationships. Raw data indicated fewer negative portrayals and more neutral ones, with a modest rise in positive portrayals after the novel but a slight decline after the film. No significant difference was found between post-novel and post-film reporting, suggesting that the medium itself did not determine outcomes. Overall, the findings suggest entertainment media shifted Mafia coverage from predominantly negative portrayals to more neutral representations.

Wennia Ferreira Reis

Discipline: Biology

Authors:

#1 Wennia Ferreira Reis

#2 Jessica Clark

Abstract Name: Axon degeneration in hyperglycemia-induced zebrafish (*Danio rerio*)

Diabetic peripheral neuropathy (DPN) is the most common symptom of diabetes mellitus with patients often presenting with pain/tingling in the extremities and motor deficits. These symptoms arise because peripheral nerves degenerate due to elevated blood glucose levels, known as hyperglycemia. Although DPN is widespread and debilitating, treatment is limited to pain management because its molecular mechanisms remain unclear. The Clark lab has developed a model of hyperglycemia-induced DPN in larval zebrafish. Previous data from our lab has suggested that Lavendustin-A (LavA), an epidermal growth factor receptor (EGFR) inhibitor, facilitates remyelination in hyperglycemic zebrafish. Here, we tested if axons are also regenerating (as the myelin tube creates a structure that supports axonal regrowth and axons expressing

EGFR). To study this, Tg(olig2:DsRed) zebrafish (which tags motor nerve axons with red fluorescent protein) were incubated in egg water for five days, split into either control or glucose groups for five days, then divided into six groups: (control was split into egg water +1% DMSO (C12) or C12+65.5 uM LavA (C12Lav); glucose was split into four groups, glucose+1% DMSO (G12), G12+ 65.5 uM LavA (G12Lav), egg water+1% DMSO (R12) or R12+65.5uM LavA (R12Lav)). Preliminary data show that LavA treatment allows for axonal regeneration, although it is unclear if this is a direct effect of the EGFR inhibition or if it is due to the support of the myelin tube. I'm continuing this work to determine if the perineurium also regenerates and is capable of pulling regenerating axons back into functional fascicle, as perineurial cells are both affected by hyperglycemia and also express EGFR.

Andrew Fewins

Discipline: Economics

Authors:

Abstract Name: Securing the Spark: Evaluating the Relationship Between Spatial Scale and Cost to Defend in Ukrainian Power Infrastructure

From the onset of the Russo-Ukrainian War in 2022, academics across the disciplines of economics and geography have concentrated on power generation sites as locations where spatiality, economics, and security demands intersect. This study utilizes thermal, hydroelectric, nuclear, and photovoltaic (PV) sites in Ukraine's Mykolaiv and Dnipropetrovsk Oblasts from 2022 to 2024 as a case study to conceptualize cost-to-defend (CDEF) as an energy production externality correlated to spatial scale. According to academic Hans Liwång, non-frontline distributed power generation infrastructure in the 21st century requires negligible inputs of defense material or manpower to maintain operability, in contrast to concentrated facilities with operability contingent on shielding from long-range munitions. Secondly, building on Liwång, this project incorporates Comprehensive Defense Theory, where defense is a whole-of-society problem where the cost to defend should be aggregated into the price for critical infrastructure by nations during war and peace. To evaluate the relationship between CDEF and spatiality, this study will incorporate the externality into the levelized cost of energy equation (LCOE) to create LCOE'. Ultimately, this project will evaluate whether spatially distributed methods of production, such as PV sites, are an economically efficient manner for states to achieve energy security. An evolved understanding of the correlation between kilowatt-hour costs and production spatiality will allow for public and private stakeholders to simultaneously increase energy security and decrease output costs through efficient resource allocation.

Elaina Fife

Discipline: Engineering

Authors:

#1 Ernest Asiedu

#2 Huaguo Zhou

Abstract Name: The Development of Rectangular Rapid Flashing Beacon (RRFB) for Improving Pedestrian Safety

Among the various devices used at uncontrolled, marked pedestrian crossings, the Rectangular Rapid Flashing Beacon (RRFB) aims to enhance driver awareness and improve pedestrian safety. Prior research examined installation practices, applications, and both driver and pedestrian yielding behavior at the RRFB-

equipped crosswalks, as well as the importance of pedestrian safety in response to rising pedestrian fatalities and factors influencing crossing behavior. This study analyzes the effects of RRFB at an uncontrolled pedestrian crossing by studying pedestrian and vehicle behavior before and after the device was installed on Auburn University's campus on West Glenn Avenue through video observation and data extraction. The necessity of the device was analyzed for a multilane pedestrian crossing with the specific characteristics of a college campus environment. 400 events were collected before installation, and 400 events were collected after installation. Before installation, a high percentage of vehicles yielded to pedestrians, with the most common type being a soft yield. Only a small percentage of pedestrians were unobservant at the busy intersection during both observation periods. After the device was installed, the percentage of unyielding drivers decreased by 12%; however, the results were affected by a defect in the reflective flashing device. The total yield rate increased from 80% before installation to 92% after they were installed. These findings highlight the significant improvements in pedestrian safety that RRFB-equipped crosswalks provide through increased driver yielding rates.

Discipline: Psychology

Authors:

#1 Victoria Scott

#2 Jimmy Green

#3 Marrin Scalone

Abstract Name: Strengthening the Referral Loop: Examining Follow-Up Practices in South Carolina School-Based Health Centers

School-based health centers (SBHCs) often mitigate common barriers to adolescent care by delivering services directly in school settings. Despite this accessibility, gaps remain in closing the referral loop when students require external speciality care. Data from a needs assessment of SBHCs in South Carolina in 2024 identified that about 50% of external referrals received follow-up, highlighting a significant area for strengthening continuity of care. Given SBHCs unique position to support coordinated care, examining current referral systems and follow-up practices can help identify opportunities for improvement. In November 2025, the Youth Access to Psychiatry Program administered a state-wide asset and needs assessment to all identified SBH program administrators ($n = 7$) within South Carolina. The assessment examined a range of organizational factors, including operational and service provision characteristics. Frequency counts were calculated for items related to referral outcomes to quantify the current landscape and identify service-level facilitators that may play a role in closing the referral loop. Preliminary results revealed that all programs (100%) communicated about referrals to parent/guardians while only 57% of SBH programs indicated additional follow up. Referrals were also communicated through student record documentation (29%) and providing referral directly to students (29%). External referrals were managed across various roles with similar proportions (43%) handled by school-based health providers, behavioral health providers or care coordinators. Among programs whose students' primary care providers (PCPs) were not affiliated with the SBHC, 71% shared updates with the PCP while 14% reported no communication or were unsure. In this poster session, additional findings will be discussed along with qualitative insights from the literature to contextualize these results. Findings from the needs assessment, particularly in comparison to 2024 data, will highlight key areas for SBHCs to improve referral outcomes.

Jonathan Findley

Discipline: Chemistry

Authors:

#1 Kelling Donald

Abstract Name: Chalcogen Polarization and Bonding between $X_2E \cdots Z$ Complexes: From Dative to Bridged

The sigma hole concept has found applications in many areas of chemistry including materials science and crystal engineering. The question of how to rationalize and model the influence of sigma holes (in tandem standard models of chemical bonding) for strong non-covalent and dative interactions remains an area of significant interest. In this contribution, we investigate the potential for and the nature of chemical bonding by Lewis bases in which the lone pair region(s) coincide with positive sigma hole regions due to strong polarization. That phenomenon occurs, we found, in certain group 16 bases. As the chalcogen atom, E, gets larger and softer going down the group in EX_2 complexes, the area on E outside the E-X overlap region may develop a positive potential if X is very strongly electron withdrawing. Consequently, that E site in the molecule, which normally acts as a conventional Lewis base due to the presence of lone pairs, exhibits an

anomalous bonding behavior. In this work, we consider specifically $X_2E\cdots Z$ type complexes in which $E = O, S, Se, Te, \text{ and } Po$, $X = H, F, CH_3, \text{ and } CF_3$, and $Z = BH_3, BF_3, BCl_3$, and their Al analogues. This range of model complexes enable us to demonstrate certain limits of sigma holes as predictors of bonding and also their significant influence as tools to tune base strength and the modes of bonding by bases. As well that as E gets larger and more polarized, for example, the complexes considered transition from a linear dative $X_2E\cdots Z$ type bond to a bridged structure.

Alana Fisher

Discipline: Interdisciplinary

Authors:

#1 Alana Fisher

#2 Yura Lee

Abstract Name: Going Home: Reminiscence Intervention for Asian Immigrants with Dementia Abstract

Older Asian adults account for more than 8% of dementia cases, despite being less than 6% of the nation's population. However, geographical, financial, and health challenges can make revisiting their home countries difficult. This program uses virtual reality to create a virtual home environment, helping to alleviate the sense of longing for home in this population. Going Home (GH) is a technology-based, culturally responsive reminiscence program designed for Asian immigrant persons with dementia (PwD). With our interdisciplinary team from social work, neurology, and electrical engineering, we aim to design, develop and test the feasibility, acceptability, and preliminary psychosocial outcomes of the GH Program. We will recruit 10 Asian PwD and their caregivers from Milwaukee, Madison, Chicago, and South Bend through in-person and virtual outreach by targeting specific community organizations. Examples of target populations includes Korean, Chinese, Hmong, Vietnamese, and Filipino families (etc.). This six-week program will incorporate the five senses (sight, hearing, taste, touch, smell) using prompts related to home, such as favorite cultural songs, traditional food, and family photos. We will then use survey data, observational summaries, and qualitative data from participants to create 10 systematic case studies. We expect that participating in GH will improve mood, cognition, quality of life, and behavioral and psychological symptoms among PwD's, enhance mood, positive aspects of caregiving, and caregiver self-efficacy while reducing caregiving burden among family caregivers; and improve the relationship quality between PwD and their caregivers. This study is innovative as it addresses the cultural needs of Asian families and actively engages PwD to share stories of home by recognizing cultural heritage and family traditions, thereby strengthening mutual understanding and relationships with caregivers. The long-term goal of the GH program is to improve the quality of life among underserved racial and ethnic groups by enhancing their access to culturally responsive dementia care.

Gabrielle Fisher

Discipline: Chemistry

Authors:

#1 Nicholas Boaz

Abstract Name: Carbon Dioxide Capture Project: Redefining Depollution

Capturing carbon dioxide gas from the environment is a current challenge for scientists seeking to mitigate the harm caused by manmade greenhouse gases. Recent work indicates organic compounds known as xylenediamines can be used as effective reversible traps for pulling carbon dioxide directly from the air. In

this work, we focused on the synthesis of 2-(nitrophenyl)methenamine which we aim to use as a gaseous carbon dioxide trapping system. Using readily available 2-nitrobenzaldehyde as a starting material, we reduced the aldehyde functional group to an alcohol group. 2-nitrobenzylalcohol was then converted to 2-nitrobenzyl chloride using thionyl chloride and pyridine. Two separate methods were used to convert the benzyl chloride into an amine: Delapine reaction and Gabriel synthesis. Future work seeks to determine the ability of 2-(nitrophenyl)methenamine to react with carbon dioxide and refine amine synthesis for ending product.

Kaitlyn Fisher

Discipline: Education

Authors:

Abstract Name: Filling in the Gap: An Evidence-Based 9th Grade ELA Academic Writing Unit

A recent study of employers' most sought-out skills ranks written communication as the third most important skill for future employees (NACE 2024). Although an essential work and life skill for students, many English Language Arts (ELA) educators struggle to teach writing, leading students to lack critical knowledge in this area. While a fair amount of research exists surrounding educational writing theories (Herdi et al. 2025, Reed et al. 2023, Rosnanda et al. 2025), gaps remain in instruction as many teachers face difficulties transferring evidence-backed frameworks into their practices. With no one established method for teaching writing, professionals are left to adapt instructional methods on their own without an understanding of how well they will work for students. This project helps to resolve the lack of confidence teachers experience in this area of ELA by presenting a fully research-based and "ready-to-teach" unit plan. By compiling a list of effective writing instruction strategies from existing research and examining common patterns, the unit plan serves as a blueprint that 9th grade ELA educators can use to improve their teaching. Based solely on studied methods, this unit has the potential to equip teachers with the most effective strategies they need to strengthen students' writing skills. With the support of a strong unit plan, teachers can have the confidence to help every student reach their full potential as writers.

Miranda Fitch

Discipline: Political Science

Authors:

Abstract Name: An Analysis of Factors that Influence the Likelihood of Juvenile Transfer to Adult Criminal Court

Judicial transfer is a process by which judges are granted the deciding power over whether a child is tried in juvenile or adult criminal court. This decision can have significant impacts on a child's life and can be based on anything from the defendant's prior record to the judge's mood. While research exists on how judge partisanship and media attention affect sentencing in adult courts, study is lacking in the juvenile space. This project examines how judicial partisanship and media attention shape transfer decisions. By analyzing both historical shifts in juvenile justice laws and data from the National Juvenile Court Data Archive, the research examines the impact of factors like media attention around juvenile crime, national perceptions of the juvenile justice system, partisan judicial elections, electoral proximity, and defendant attributes on the likelihood of transfer. This project's findings will aid in the understanding of juvenile transfer decisions and in addressing inequities within the juvenile justice system. As data collection and access change under the

second Trump Administration, this project will also explore potential consequences of the elimination of specific oversight regarding race, ethnicity, gender, and other marginalized identities within the juvenile justice system. Understanding better which juveniles are more likely to be tried as adults and why will contribute to a significant gap in the research regarding the juvenile justice system.

Morgan Fitzgerald

Discipline: Nursing and Public Health

Authors:

Chloe Harbaugh

Abstract Name: Prevent, Preserve, Protect: The New Age of Dental Treatment

Dental Hygienists focus on the prevention of disease within the oral cavity. Minimally invasive approaches for caries management emphasize preserving natural tooth structure, minimizing overtreatment, and improving the longevity of patient outcomes across their lifespan. This review analyzes evidence from quantitative and qualitative studies that evaluate the efficacy of both established and emerging non-invasive and micro-invasive agents. Advances in newer remineralization treatment modalities and bioactive materials have enhanced clinicians' ability to halt and control incipient carious lesions. These agents include silver diamine fluoride (SDF), self-assembling peptide P11-4 (SAP P11-4), povidone-iodine (PVP-1), fluoride varnish, glass ionomer sealants, and arginine-based technologies. Yearly application of SDF demonstrates promising results in arresting active lesions, particularly when focused on pediatric and special needs patients. Despite its aesthetic limitations of staining soft tissue and active lesions, a study showed a 77% average effectiveness of arresting active caries. Similarly, evidence shows that SDF has a higher fluoride release in a shorter amount of time when compared to varnish. Clinical findings from a study on SAP P11-4, a biomimetic peptide, demonstrate significant regression of proximal caries lesions across enamel and outer dentin stages, with 37-40% radiographic improvement reported. Another research study shows that Povidone-Iodine (PVP-1) has shown rapid antimicrobial activity, with a longitudinal study showing a 95% decrease of *Streptococcus mutans* after 12 months. Glass ionomer sealants should be a staple in pediatric and public health dentistry because they can be placed more effectively and adapt to moist environments. Additionally, research shows that the use of arginine-based technologies can shift biofilm ecology, creating an environment less favorable for cariogenic bacteria. The collective evidence demonstrates that minimally invasive dentistry, using established and emerging products, not only prevents and arrests caries but also aligns with a patient-centered, preventive model of care that clinicians should strive for.

Hope Fiveash

Discipline: Exercise Science and Nutrition

Authors:

#1 Hope Fiveash

#2 Samantha Schow

#3 Esperanza Salazar

Abstract Name: Relationship of Magnesium Supplementation with Calcium Levels in High Endurance Athletes

Endurance athletes are at an elevated risk of developing magnesium (Mg) deficiency due to its crucial role in regulating muscle contraction and breakdown by blocking calcium in muscle fibers. Calcium (Ca) triggers

muscle contractions by its release from the sarcoplasmic reticulum in striated muscle and triggers a conformational change, which eventually allows contraction via a cross-bridge. In the event of mitochondrial Ca overload, muscle breakdown can be triggered and subsequent release of reactive oxygen into the tissue. This study aims to determine the relationship between Mg and Ca levels in collegiate endurance runners undergoing Mg supplementation. This study is part of a larger investigation into the impact of magnesium on kidney function, performance, and stress in a total of 23 collegiate endurance runners (12 men, 11 women). Participants each ingested one 500mg supplement of Mg daily for 6 weeks. Blood draws were performed before and after supplementation to analyze their Mg and Ca levels. Two tubes were drawn from each participant and spun down to plasma. The samples were frozen at -80 degrees Fahrenheit to preserve them until clinical laboratory testing. The pre- and post-supplemental Mg and Ca values will be compared using a Pearson r correlation. A preliminary repeated measures ANOVA revealed statistically significant improvement levels of Mg: $F(1,21) = 54.03$, $p < .001$, $\eta^2 = .720$, from pre- (1.97mg/dL) to post-intervention (2.20). There was also a significant time $\times$ group interaction, $F(1,21) = 9.50$, $p = .006$, $\eta^2 = .312$, showing that the change over time differed between males (Group 1) and females (Group 2). Results of the correlation are pending the laboratory analysis of Ca levels.

Evelyn Fixley

Discipline: Psychology

Authors:

#1 Evelyn Fixley

Abstract Name: A Comparative Autoethnography - From My First-Hand Observations in Europe and the United States: How Do Everyday Business Practices Reveal Deeper Truths About National Economies and Personal Work Habits/Work-Life Balance?

This project explores how cultural norms surrounding work and leisure shape both economic outcomes and individual approaches to daily life. Drawing from my lived experiences studying and traveling across five European nations, I examine how differing business practices, government policies, and social attitudes toward labor reflect broader economic systems and collective mindsets. Using an autoethnographic and observational approach, I connect personal field notes, photographs, and secondary data with cross-cultural frameworks from psychology and economics to understand how cultural expectations become embedded in everyday economic behavior. This study investigates how variations in work ethic, business operations, and lifestyle - from Greece's relaxed post-crisis economy to France's legally limited 35-hour workweek - illuminate the complex interplay between culture, productivity, and psychological well-being. By situating these observations alongside American work culture, characterized by longer hours, limited vacation time, and a strong emphasis on output, the project highlights both parallels and striking contrasts in how nations construct meaning around labor, rest, and success. Beyond offering descriptive insights, this project demonstrates the value of autoethnography as a methodological tool for understanding economic psychology: lived experience becomes a form of data that reveals nuances often overlooked by traditional research. Ultimately, this work aims to contribute to a broader conversation about how cultural environments shape worker motivation, national economic rhythms, and the subjective experience of work. These insights have meaningful implications for future business leaders, policymakers, and organizations seeking to understand or redesign workplace norms in an increasingly globalized world.

William Flaherty Jr

Discipline: Social Work and Human Services

Authors:

Abstract Name: Retrospective Identification of Overlooked Suicide Risk Indicators in Jail Populations

The leading cause of death among incarcerated individuals is suicide. Suicide contributed to about 30% of all deaths in facilities between 2000 and 2019. The rate of suicides in local jails has increased by almost 15% from 2001 to 2019. Being incarcerated heightens many risk factors that are common with instances of suicide, isolation, and situational stress. Understanding risk factors involved with individuals who are incarcerated could help prevent the widespread problems of suicide that are seen in jails across the nation. The goal of this study was to determine patterns in individuals who have died by suicide and to examine possible risk factors that are not being pointed out currently in facilities. This study looked into the histories of five individuals at a local jail who died by suicide from 2017 to 2024 by using an in-depth review of medical, mental health, and security records, and cross-referencing profiles to detect patterns. All five individuals had a few common factors: all were white males over the age of 30, all had escalating criminal charges, all had chronic medical conditions, mental health diagnoses, and substance use, and all were in single cells while incarcerated. Studying the patterns of individuals who die from suicide in jails and facilities can inform prevention strategies by changing behavioral screenings, improving staff training, with the goal of decreasing the prevalence of suicide in jails.

Tori Flath

Discipline: Environmental Science and Sustainability

Authors:

#1 Arcata Leavitt

#2 Justine Becker

Abstract Name: Examining the significance of human disturbance on nest selection in Great Gray Owls (*Strix nebulosa*) in southwest Montana

Great Gray Owls (*Strix nebulosa*) are one of the most understudied species in North America. In Montana, there is currently no peer-reviewed research about the species and many aspects of the species' ecology, including the influence of human disturbances on their populations, are not well understood. In this study, we aimed to quantify the effect of human landscape disturbances (roads, trails, recreation sites) on Great Gray Owl nest selection in southwest Montana. We used ten known nest sites with breeding attempts in the last five years that were identified by wildlife managers in southwest Montana. We then used a resource selection function to compare the human disturbance covariates between the used nest sites and randomly generated available points ($n = 10$ per nest site). We used a forward stepwise model selection approach to determine which combination of human disturbance variables best explained the observed data. Surprisingly, we found that Great Gray Owls selected for nest sites in areas with higher trail density ($p\text{-value} = 0.0476$). However, we found no support for an effect of roads or recreation sites on nest site selection. Latent habitat covariates such as trail construction creating gentler slopes with mixed open/forested areas, or the small sample size could have contributed to the observed results. The positive relationship with trail density could also be the result of a potential bias towards trails in our nest site data because nests are more likely to be found near trails than in less accessible areas. We were not able to measure intensity of use and seasonal availability of trails, therefore the influence of these factors could not be identified. Future research using a larger sample size and exploring the effects of intensity of trail use would be valuable to further evaluate the effects of human disturbance on nest selection.

Mason Flatt

Discipline: English and Literature

Authors:

Abstract Name: A Portrait of the Artist as a Statistician: A Reversal of the Probit Model to Suggest Sentence-Level Mechanical Patterns

In counterpoint to the prevailing research methodologies of deep and machine learning, this project aims to create a simpler, more transparent method, in the form of a python package, that reverses the use of the predictive probit model to suggest differentiating factors that may be key to conversations of authorial style and thus provide quantitative foundations for new lines of traditional, close-reading inquiry. The paper uses the Bloomsbury Group as an example case, but still intends, as an ancillary product, for the results of this demonstration to provide genuine insight into the authorial conventions of Virginia Woolf. Preliminary results of this analysis suggest a preference for non-proper nouns, optional reflexives, non-passive and non-perfect verb constructions, “adjunctive” adverbs, and intransitive prepositions, as well as a preference against interjections, definite articles, parenthetical asides, and the Oxford comma. Though the magnitudes and directions of these proclivities are subject to change as the method undergoes further refinement, these identified significant variables will likely persist and so offer a reasonable example of the method’s output. Average partial effect (APE) values denote the magnitude and direction of each variable’s influence, the significance of which is denoted by a p-value, each value being calculated by the script during probit analysis alongside all standard checks and corrections (psuedo-R2, LR-stat, Bonferroni, etc). All interpretations of these variables incorporate prevailing understandings of Woolf’s conventions and the effects that they engender within readers to contextualize qualitative judgements as to their reasonableness and effect on what readers experience as style. At conclusion, the script should provide users new to both authorial attribution (stylometric) studies and statistical analysis a means through which to test theories about standard authorial differentiation, development of style over time (intra-author differentiation over time), and authorial lineage (author series differentiation from representative analogues of each period).

Grady Fleming

Discipline: Biology

Authors:

#1 Kaitlyn Kinslow
#2 Elizabeth Hiltz
#3 Rommel Pagkalinawan
#4 Ethan Hoffman
#5 Jamie Martin
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#7 Joy Kanapala
#8 Haley Dewitt
#9 Maggy Dwyer
#10 Sara Charri
#11 Sara Charri
#12 Jack Medlin
Alexis Thai-Nguyen

Abstract Name: Zebrafish (Danio rerio) Exhibit Sex-Dependent Visual Responses To Shoals Exposed to Varying Doses of Hypoxanthine-3N-Oxide (C5H4N4O2)

Zebrafish (Danio rerio) are commonly used organisms for behavioral neuroscience as a result of their social behavior. Shoaling is a social behavior where members of a group of fish loosely aggregate together but do not move in a coordinated, synchronized fashion. The current project investigates whether zebrafish (Danio

erio) can behaviorally distinguish between shoals exposed to different concentrations of a synthetic alarm substance and whether these responses vary by sex. Previous research shows that zebrafish prefer stable social environments and can detect subtle movement changes within groups, making them a strong model for studying social and anxiety-like behaviors. However, little work has examined how alarm cue intensity interacts with subject sex to influence social preferences in the 3-Chamber Open-Tank Free-Swim Task (3C-OTFST), leaving an important gap in understanding predator-related social cues. Using the 3C-OTFST, individual subjects were placed in a center chamber and given simultaneous visual access to two flanking shoals: one exposed to a synthetic alarm substance (1.5 nM, 3.0 nM, or 5.0 nM H3NO) while the other shoal remained intact. Behavioral activity was digitally recorded with MediaRecorder and analyzed with EthoVision XT 16.0 to quantify movement patterns across experimental zones. The study found that responses to the lowest concentration (1.5 nM) were highly variable, with males showing significantly more immobility than females. At the highest concentration (5.0 nM), this pattern reversed in the unalarmed zone, with females showing increased immobility and males becoming more active. These results suggest that higher alarm cue concentrations produce stronger anti-predation responses, expressed in sex-specific ways. The findings will be discussed in the context of how zebrafish process social threat cues and how sex differences shape anti-predation behavioral strategies.

Lonnie Fleming

Discipline: Biochemistry

Authors:

#1 Justin Biffinger

#2 Jessica Schneider

#3 Courtney Henthorn

Abstract Name: Optimization of the Scalable Purification of a Recombinant Lanthanide Ion Selective Protein and Metal Binding Affinities

Over recent decades, rapidly growing global demands for advanced electronics have exacerbated the need for certain Lanthanide metals (elements 57-71), due to their irreplaceable functions in various consumer electronic devices, including smartphones, computers, tablets, and more. Unfortunately, conventional methods for acquiring lanthanides from natural sources, primarily in the form of large-scale mining, frequently fail to meet commercial and environmental demands. Lanmodulin (LanM), a recently discovered lanthanide sequestering protein from *Thermoplasma*, offers a potential solution to both of these problems. LanM is capable of selectively sequestering many lanthanides from environmental and electronics sources. Accordingly, this research project is focused on the development of methods to optimize the scalable production of purified LanM as a first step toward developing efficient biomining strategies for lanthanides. To accomplish this, my project utilized lactose-based autoinduction of *E. coli* transformed with a plasmid encoded for a recombinant form of LanM containing a 6×Histidine (His6x) protein binding tag connected to the native LanM protein through a Tobacco Etch Virus (TEV) Protease cleavage sequence. Following expression and with a variable heat treatment (85°C), the His6x-tagged LanM was isolated using nickel-nitrilotriacetic acid (Ni-NTA) affinity chromatography. After cleavage of the 6×Histidine tag, we then compared the binding of lanthanides and transition metals to calculate the binding constants. Our systematic approach to isolate high purity His-tag LanM directly from Ni-NTA column fractions without a size exclusion chromatography step was successful. We confirmed that LanM purified using this scalable SEC-free method had a purity between >97% (by densitometry gel imaging). We will also present complementary selective metal binding results for Eu (III) and Fe(III) with LanM using data from a colorimetric xylenol orange back-titration approach.

Ayanna Fleming

Discipline: Engineering

Authors:

#1 Mojtaba Sirjani

Abstract Name: UV-Visible Spectroscopy and Electrochemical Sensing for Analytical and Comprehensive Characterization of Substances

Research was conducted to investigate the use of UV-Visible spectroscopy and electrochemical sensing. UV-Visible spectroscopy is an optical technique used to analyze the optical properties and characteristics of a sample. The spectroscopy provides a comparison of the absorption behavior between the liquid and dry substances. Multiple samples of liquid and dry substances were tested under different chemical conditions to test their wavelength and absorbance interactions with light. Electrochemical sensing is a technique that compares the voltage and current in a substance. This was conducted by using standard and gold plasma electrodes for sensitivity analysis. Using gold plasma electrodes is a more intensive process than using standard electrodes, due to their ability to enhance electrochemical responses. Both techniques are findings that aid in a more comprehensive and analytical characterization of substances. Both UV-Visible spectroscopy and electrochemical sensing are used in real world applications in the environmental, industrial, scientific, and medical fields. Both techniques are often combined in hybrid systems to further enhance quality (e.g., drug quality testing and heavy metal detection in water sources). Keyword: UV-Visible, Electrochemical, Gold Plasma

Ryan Flood

Discipline: History

Authors:

#1 Ryan Flood

Abstract Name: Insert Coin: How the Console Wars prompted video game companies to “level up” from the 70s to the 90s

This project analyzes the competition between two major video game companies of the 80s and 90s, Nintendo and SEGA. This project uses the context of the American market, paired with the restraints of Japanese law and regulation to understand why these companies moved in the direction they chose, and how their competition affected the market for years to come. Secondary sources shed light on these elements and assist in contextualizing the market. The research methodology included library searches to find books and other scholarly sources to support the project. Primary sources were collected on translation websites, the internet archive, and in video form on youtube. The sources selected were chosen for their proximity to the relevant companies, such as first party magazines such as Nintendo power and SEGA visions, although third party fan magazines are also included. The translation websites are focused on interviews with important people involved with both companies who provide their insight and reasoning from their perspectives. The expected conclusion will reveal what happened during the third, fourth, and fifth console generations between these rival companies that shaped the industry as a whole. The elements that these companies shaped range anywhere from marketing and sales strategy to the design of their consoles and games.

Madsen Flores

Discipline: Art History

Authors:

Abstract Name: Mass of St. Gregory: Hybridized Art in Colonial Mexico

This research examines the hybridity of art in colonial Mexico by examining the featherwork of Mass of St. Gregory. First, this research will briefly discuss the colonization of Mexico, specifically the distribution of Catholic ideals during 1521-1540. Second, this research will formally analyze Mass of St. Gregory. Third, this research will textually analyze the formal elements and their religious, cultural, and social meaning. Fourth, the study will assert featherwork as an Indigenous visual language by providing references to other hybrid artwork from this period. This research will demonstrate Mass of St. Gregory's complex composition as hybrid art in relation to colonial power and Catholicism, created by the Indigenous peoples of Mexico who were active participants in the formation of visual culture under colonial rule.

Madsen Flores

Discipline: Art History

Authors:

Abstract Name: Sweet Mother-of-Pearl: Indigenous and Hybrid Shell Art of the Toltec and Bontoc Societies

This research investigates mother-of-pearl as a principal material utilized in the artistic expressions of the Toltec and Bontoc societies in the pre-colonial and colonial periods. While many scholars emphasize the similar effects of Spanish colonization on the Toltec and Bontoc societies, not many scholars emphasize their similar artistic exploitations of natural materials and contributions to hybrid art. Therefore, this research emphasizes the shared material practices of the Toltec and Bontoc societies and their endurance in material culture. This research will pose as synchronic and diachronic analyses of the shared artistic evolution involving mother-of-pearl and the artistic manifestations of colonialism between these transmarine communities. First, this research will highlight mother-of-pearl as an accessible material to the Toltec and Bontoc societies by examining Face Emerging from a Coyote's Maw (Toltec) and Fikum (Bontoc) as symbols of adornment and status. Second, this research will examine the 16th century Spanish colonization of the Toltec and Bontoc societies considering the transformation of sociopolitical structures and dissemination of Catholic ideals thus affecting the artistic production of the Toltec and Bontoc peoples. Third, this research will investigate The Virgin of Guadalupe (Toltec) and Colonial Philippines Baptismal Shell (Bontoc) as hybrid artworks that fuse Catholic imagery with Toltec and Bontoc material practices under Spanish colonial rule. This research emphasizes the shared artistic practices of the Toltec and Bontoc societies and demonstrates their similarities beyond Spanish colonization.

Kenya Flores

Discipline: Health and Human Development

Authors:

#1 Kenya Flores

#2 Ashley Jerome

#3 Samantha Licerio

Ashley Jerome

Samantha Licerio

Abstract Name: Corazones Activos: Strengthening Resilience in Elderly Displaced Women Through Dance, Craft-Making, and Social Engagement

Elderly displaced women face increased risks of falls, chronic illness, and depression, often worsened by limited access to supportive health programs. Evidence shows that physical activity like dance and creative movement, can improve mobility, balance, confidence, and emotional well-being in aging populations. Despite these benefits, displaced older women remain underserved in community wellness initiatives. This service-learning program aims to improve mobility, reduce fall risk, and enhance quality of life. This service learning program assesses changes in mobility and quality of life over six weeks. Participants engaged in twice-weekly sessions incorporating adaptive exercise, modified dance, and creative social activities. Functional mobility was measured using the Timed Up and Go (TUG) test, and quality of life was assessed using the Quality of Life Enjoyment and Satisfaction Questionnaire (Q-LES-Q-SF). Paired t-tests and Wilcoxon analyses were conducted to evaluate change. Seven individuals participated in the service-learning program. However, only 2 participants completed the pre- and post-assessments. Paired t-tests showed no statistically significant changes from pre- to post-intervention. Q-LES-Q-SF did not differ significantly [$t = (-1.889)$; $p = 0.310$], and TUG performance also remained non-significant [$t = (5.808)$; $p = 0.109$]. Wilcoxon tests confirmed these results, with no significant differences for both Q-LES-Q-SF ($p = 0.180$) and TUG ($p = 0.180$). Overall, the intervention produced no statistically significant improvements in either outcome measure. Despite the absence of significant quantitative changes, qualitative observations revealed increased energy, motivation, and social engagement among participants. The women demonstrated greater enthusiasm during sessions and more consistent involvement in movement and creative activities. These behavioral shifts suggest that community-based wellness programs may foster meaningful psychosocial benefits even when objective metrics remain unchanged. Future research with a larger sample and extended duration may clarify the program's full impact on functional mobility and well-being.

Julianna Florez

Discipline: Psychology

Authors:

#1 Chelsea Williams

#2 Kaelen Diaz

#3 Llorielle Gregory-Jerome

#4 Abhinaya Sridhar

#5 Arlenis Santana

#6 Kiara Brown

#7 Aya Caballero

Abstract Name: The Moderating Roles of Ethnic-Racial Identity Components in the Association between Adverse Childhood Experiences and Cannabis Use: Exploring Ethnic-Racial Differences between Black, Asian, & White Students.

Cannabis is the most widely used illicit substance globally and remains a major public health concern, especially among young adults, whose use has increased significantly (Johnston et al., 2013). Understanding the factors influencing cannabis use during late adolescence and emerging adulthood is crucial, particularly the roles of adverse childhood experiences (ACEs) and ethnic-racial identity (ERI). Prior research links ACEs with higher cannabis use risk (Halpern et al., 2018), but little is known about whether ERI components, exploration, affirmation, and resolution, can buffer this relationship. ERI involves exploring one's ethnic-racial group, affirming positive feelings about it, and understanding its meaning (Umaña-Taylor et al., 2014). While some studies suggest ERI relates to lower cannabis use, its moderating role remains unclear. This study examined whether ERI components moderate the association between ACEs and cannabis use and whether these relationships differ across ethnic groups. Participants were 733 emerging adults (ages 18–22; 72.2% female) from a larger ongoing project, including Black, White, and Asian participants. Three moderation

models were tested in Mplus, each including one ERI component as a moderator. Results showed that ACEs predicted higher cannabis use among Black youth. ERI exploration significantly moderated the ACEs and cannabis relationship for Black and White participants, but not for Asian participants. Specifically, Black and White youth with low ERI exploration showed a strong positive association between ACEs and cannabis use. In contrast, for those with high ERI exploration, ACEs was no longer significantly linked to cannabis use. These findings suggest that ethnic-racial identity exploration may protect against the negative effects of childhood adversity on cannabis use, particularly for Black and White youth. The study highlights the importance of considering both adversity and ethnic-racial development in understanding and preventing substance use.

Alexis Florit

Discipline: Engineering

Authors:

#1 Dr. Jean-Francois Louf

#2 Tofayel Ahammad Ovee

Abstract Name: Soft Tactile Endoscopic Probe (STEP) for In Vivo Real-Time Mechanical Mapping and Detection of Submucosal Colon Tumors

Colonoscopy is the primary tool for detecting colorectal cancer, yet standard visual inspection and surface biopsies often miss tumors hidden beneath the mucosal surface of the colon. We present a mechanically based diagnostic approach that uses soft contact mechanics to sense subsurface stiffness variations. Our device features a water-inflatable silicone probe tip that applies controlled deformation to the colon wall, allowing pressure measurements that reveal underlying mechanical contrast. Tests on artificial colon models and excised biological tissue show that regions with submucosal tumors produce elevated pressure responses, enabling stiffness-based detection up to 2 mm beneath the surface, beyond the reach of traditional methods. Because the probe integrates easily into existing colonoscopic tools, this technique offers a practical route to improving early detection of tumors that would otherwise remain hidden.

Sungu Flottman

Discipline: Political Science

Authors:

Abstract Name: Disarmament, Demobilization, and Reintegration and the Compensated Eradication Plan: The United States and NATO's Counternarcotics Strategies in the War in Afghanistan from 2001-2005

Starting in the late 1980s, Afghanistan became a major source of opium production, but with the ban on opium in 2000, Afghanistan's share in the world's supply of opium decreased. The United States' intervention in Afghanistan in 2001 removed this ban on opium, and the United States may not have been interested in stopping the narcotics trade since the task of counternarcotics fell to the British. The question then becomes whether these counternarcotics strategies were effective in curbing the Afghan narcotics trade, which may reveal the possible complacency behind the United States intervention in Afghanistan. Current research on this topic covers in detail the corruption and narcotics in Afghanistan, as well as the Western intervention in Afghanistan. This paper aims to understand what effect this Western intervention may have had on narcotics and corruption in Afghanistan. This paper examines academic sources that discuss the United States' apparent apathy toward the opium problem as well as Britain's failed counternarcotics experiment in Afghanistan,

which attempted to use compensated eradication to stop the decades-long habit of opium production and trade. Articles regarding Disarmament, Demobilization, and Reintegration (DDR) programs in Afghanistan and how DDR may have worsened the problem of corruption and narcotics in Afghanistan are also examined. This paper discusses the unintended consequences of counternarcotics and nation-building policies and examines the effectiveness of these policies, which may lead future policies to counter corruption and narcotics simultaneously. Answering these questions may add to the larger discussion surrounding the United States' involvement in foreign territory. Keywords: Afghanistan, Narcotics, US Intervention, DDR.

Levi Flournoy

Discipline: Interdisciplinary

Authors:

#1 Levi Flournoy

Abstract Name: Representation of Race in Medieval Fantasy: Creating Yoruba-inspired Concept Artworks

Due to its emphasis on marketability, medieval fantasy media often falls short of respectful and well-written representation of its Black characters. Main arguments against the inclusion of Black or non-European characters in medieval fantasy include discussions of 'realism', which fall back upon the incorrect belief that Europe was the center of the medieval world, debunked by the existence of powerful kingdoms and empires across the globe during the 5th to 15th centuries. The argument for realism also disregards the suspension of disbelief that comes with fantasy, the medieval concept of race, and the inaccuracy of most pop-medieval media. However, just including a Black character in medieval fantasy media set in Europe does not make it representative because of the way the genre talks about race metatextually. Authors Ebony Elizabeth Thomas and Helen Young have written about ways in which race is talked about indirectly in fantasy literature through narratives of "The Dark Other" and race being linked to morality. Africanfuturism (separate from Afrofuturism, coined by Nnedi Okorafor) provides a helpful starting point for an African focused, decolonial genre, and recent addition to the Pathfinder Universe, the Mwangi Expanse, is examined for its creativity and thought when depicting an African-inspired medieval fantasy region. Through explorative essay, masterwork copy sketches, character design, and concept painting, this project seeks to show how medieval fantasy outside of Europe (specifically in Yorubaland) can be depicted in a way that includes the most compelling elements of the pre-established Medieval fantasy and also disregards those that uphold inappropriate meta-textual narratives about race.

Sarah Flynn

Discipline: Gender, Ethnicity, Diversity, or Cultural Studies

Authors:

#1 Sarah Flynn

Abstract Name: Bodies, Politics, and Performance: Reproductive Justice and Activism in Neo-Burlesque Communities in the United States and France

Scholars of burlesque and performance studies have long noted the form's feminist and political potential, yet little research compares how national contexts shape its activist capacities. This project investigates how reproductive justice is embodied, expressed, and constrained within neo-burlesque communities in the United States and France. It asks: How do political, commercial, and community pressures shape neo-burlesque activism—its risks and its forms—across U.S. and French reproductive-justice contexts? Using a humanities-

based ethnographic method, this study draws on interviews, performance observation, and reflexive field notes. To analyze these narratives, I developed a framework distinguishing explicit activism (overt political storytelling), embodied activism (the political meaning of marginalized bodies onstage), and relational activism (backstage care networks and safety practices). Preliminary analysis of 13 interviews and nine observations shows that U.S. performers frequently engage in explicit activism, including abortion-rights fundraisers and protest-themed acts, while also experiencing bullying, backlash, and reduced bookings when their work becomes overtly political. French performers more often emphasize embodied activism, citing cultural norms of universalism that discourage naming racial, gendered, or reproductive injustice; for Black, disabled, queer, immigrant, and aging artists, visibility itself becomes a political act. Relational activism appears in both contexts through mutual aid, community protection, and collective care that enable performers to continue working amid political or interpersonal risk. By comparing these dynamics, this study demonstrates that activism in neo-burlesque is not inherent to the form but shaped by national ideology and performers' everyday negotiations of visibility, safety, and care. More broadly, it offers insight into how performance cultures adapt to shifting political environments and how the body becomes a site where reproductive politics are contested and lived.

Brianna Folino

Discipline: Nursing and Public Health

Authors:

#1 Brianna Folino

#2 Lauren Sugden

Tara Wills

Abstract Name: Prediction of Ovulation with Progesterone Patterns in individuals with and without PCOS

Understanding the menstrual cycle is essential for diagnosing reproductive disorders and improving fertility tracking, yet the natural variation in hormone patterns throughout the menstrual cycle is still understudied. Here we use data collected with the Mira ovulation tracker to analyze the Progesterone (PDG) pattern across the menstrual cycle, focusing on individuals with PCOS in comparison with healthy controls. Mira provides quantitative urine hormone measurements, and collects self-reported PCOS status, making this data well-suited for analyzing PDG patterns in this context. A common hallmark of PCOS is anovulatory cycles, or cycles in which ovulation does not occur. Confirming ovulation typically requires an ultrasound, but a spike in Luteinizing Hormone followed by a sustained rise in PDG can also indicate that ovulation has occurred. The main objective of this analysis is to assess how this hormone-based approach performs in both typical and PCOS-affected cycles. We first streamlined and structured hormone recordings, resolved multi-reading days, and aligned hormonal data to defined cycle phases. Then, by setting different thresholds and defining how many days a PDG rise must be sustained, we can assign each cycle a label of ovulatory or anovulatory. Preliminary results indicate distinct differences in the dynamics of PDG. Well-timed increases in PDG following the predicted ovulation window characterize baseline ovulatory cycles. In contrast, PCOS cycles are more often characterized by delayed or inconsistent PDG patterns, suggestive of lack of ovulation or irregular luteal phases. These distinctions make apparent a way in which hormonal data can enhance accuracy in the prediction of ovulation and provide a deeper understanding of cycle variability. This work demonstrates how tracking quantitative hormones in conjunction with methods in data science can support more personalized insights into reproductive health. Ultimately, it may help refine digital fertility tools and contribute to better screening for disorders such as PCOS.

Judith Folmar

Discipline:

Authors:
chloe vautrin

Abstract Name: From Story to Science: Mentoring Creativity, Empathy, and Innovation Through Interactive Fiction Research

This mentor-led presentation explores the collaborative research journey between faculty and an undergraduate student in the design, development, and evaluation of an interactive fictional software tool created to teach empathy. What began as a creative concept evolved into a rigorous interdisciplinary research project that blended psychology, counseling theory, narrative design, and educational technology. Through close mentorship, the student became an active co-creator—developing scripts, shaping character perspectives, learning research methodology, and ultimately evaluating the very tool she helped design. This project highlights a model of mentorship in which students are not only researchers but innovators—learning how professional identity, creativity, and scientific inquiry intersect. The presentation will explore how the mentoring relationship supported skill development in coding logic, qualitative analysis, ethical research design, and professional collaboration, while also fostering deep student ownership and confidence. Findings from the tool’s evaluation suggest promising applications for empathy training in helping professions and educational settings. This work demonstrates how mentoring students in the creative research process can transform them into emerging colleagues while producing meaningful, socially relevant scholarship.

Judith Folmar

Discipline:

Authors:
madeline mitchener

Abstract Name: When Research Is “Me-Search”: Mentoring Lived Experience, Family Systems, and Student Well-Being

This mentor-led presentation examines a deeply relational research partnership centered on the lived experiences of students from non-nuclear family structures navigating college life. Rooted in the shared personal experiences of both mentor and student, this project exemplifies how “research as me-search” can be both rigorous and transformative. Through sustained mentorship, the student developed a sophisticated qualitative research study examining how family transitions, institutional policies, and social supports intersect to influence student mental health, resilience, and academic persistence. The mentoring relationship itself became a powerful vehicle for growth, as both mentor and student navigated personal resonance, ethical reflexivity, and scholarly accountability. The project resulted in multiple conference presentations and competitive research recognition while also deepening the student’s professional identity as a future public health leader and advocate. This presentation highlights how mentoring grounded in authenticity, mutual respect, and shared meaning can amplify scholarly excellence, emotional insight, and long-term student success—demonstrating the profound impact of mentorship on both research outcomes and student/mentor development.

Ella Fomby

OK - University of Central Oklahoma

Discipline: Psychology

Authors:

Abstract Name: : Colonial Erasure and Cultural Renewal: The Psychological and Spiritual Dimensions of Two-Spirit Identity in Southwestern Indigenous Communities

This research examines the historical and contemporary experiences of Two-Spirit individuals in Southwestern Indigenous communities, including Navajo, Pueblo, Apache, and Hopi peoples. Traditionally, Two-Spirit people held respected roles as healers, mediators, and cultural leaders. Colonialism, Christian missionary efforts, and boarding-school assimilation disrupted these roles, contributing to stigma, erasure, and psychological harm. Using a mixed-methods approach, the study integrates qualitative analysis of oral histories, literary texts, and archival materials with secondary quantitative data on mental health disparities among Indigenous LGBTQ+ populations. This framework highlights how Two-Spirit individuals navigate identity, belonging, and mental health challenges in the present day. The research emphasizes resilience strategies rooted in Indigenous cultural practices—including ceremony, storytelling, and language preservation—that support well-being and foster community connection. It also documents contemporary efforts to reclaim and revitalize traditional Two-Spirit roles, illustrating the ongoing cultural renewal within these communities. By centering Indigenous knowledge systems alongside Western psychological frameworks, the study aims to inform culturally responsive mental health care, support Two-Spirit identity affirmation, and contribute to broader efforts in cultural revitalization and advocacy.

Brooke Fannesbeck

Discipline: Biology

Authors:

#1 Emelia Morgan

#2 Danielle Ulrich

Abstract Name: Spatiotemporal variation of plant phenology and forage quality and their effects on ungulate migration in the Greater Yellowstone Ecosystem

The seasonal migration of ungulates often follows peak vegetation growth throughout a region; however, with climate change affecting season durations, the different timing of peak vegetation may influence migration paths over time. In this study, we aimed to answer the questions: (1) How can Chlorophyll A content show seasonal variation in nutrient quality patterns? (2) How might the nutritional quality patterns shown by Chlorophyll be driving elk migration patterns in the Greater Yellowstone Ecosystem? By building effective methods in vegetation mapping, we will better understand ungulate migration patterns and how to manage migrating populations in an ever-changing landscape. The study area was broken into classes based on the average start of season growth rate and previous elk migratory movement to sample our data. These groups were classified into three groups by start of season growth and elevation, including early (1,231-2,134m), middle (2,134-2,438m), and late (2,438-3,453m). We then sampled from these groups in predetermined locations during June-September. Quadrant sampling methods were used to collect vegetative samples, which were subsequently prepared for Chlorophyll A analysis. Forage quality was determined using a spectrophotometer. We determined that there is a month-elevation interaction driven by the middle elevation class ($p = 0.0003$), while the changes in the early and late elevations were too subtle to detect. Our findings were consistent with the presence of delayed peak green-up, as the largest difference in Chlorophyll concentration occurs between June and September ($p = 0.0095$). With this, we can evaluate the behaviors of migrating elk. Elk may prefer to first stay on early elevations as the Chlorophyll content becomes stable early, then there may be a pull into the middle elevations. There may be fewer incentives for elk to move into high elevations, as there was no significant improvement in forage quality.

Ana Fonseca

Discipline: Health and Human Development

Authors:

#1 Ana Fonseca

#2 Ana M Valentin Cabrera

#3 Joshua D Hutcheson

Abstract Name: Pre-clinical assessment of hRXFP1 agonists ML290 and 8394 as therapeutics for vascular calcification

Vascular calcification is the most significant predictor of cardiovascular disease and mortality, especially in patients with chronic kidney disease. Medial vascular calcification occurs when calcium phosphate deposits stiffen the arterial wall, impairing vascular function. Relaxin, a naturally produced hormone closely related to dilatation and loosening of muscles during childbirth, has been recently presented as a possible treatment for cardiovascular diseases. Relaxin despite being highly vasoprotective and antifibrotic has limitations due to its short stability and bioavailability in vivo, reducing its therapeutic potential. As an alternative, targeting the relaxin family peptide receptor type 1 (RXFP1) is being researched, as it allows to implement the hormones benefits while overcoming its drawbacks. ML290 and 8394 are allosteric agonists of the human relaxin family peptide type 1, both of which have demonstrated an ability to mitigate calcification progression and mineral presence in cultured vascular smooth muscle cells. This study aimed to determine if 8394 and ML290 (10mg/kg and 30 mg/kg dosages) can inhibit vascular calcification progression in an in vivo model of chronic kidney disease. Chronic kidney disease was induced in hRXFP1/hRXFP1; apolipoprotein E-deficient (ApoE^{-/-}) mice by administering an adenine-rich diet for 6 weeks, followed by a high adenine-high phosphate diet for the remaining 2 weeks of the experiment. Simultaneously, we will administer a daily dosage of either ML290 (10mg/kg), ML290 (30mg/kg), 8394 (10mg/kg) or vehicle through oral gavage. Results suggest a significant decrease in cardiovascular calcification progression in mice that received ML290 at 30mg/kg dosage, establishing it as a possible treatment for medial vascular calcification. However, there were clear sex-dependent differences between the female and male results, with females presenting less calcification overall, making the results of the treatment unclear for this demographic.

Amaria Ford

Discipline: Psychology

Authors:

#1 Safa Saad

#2 Destinee Allen

#3 Arlenis Santana

#4 Nilee Kerr

#5 Elizabeth Taylor

#6 Chelsea Derlan Williams

Abstract Name: Strengthening the Village: Maternal Mental Health, Parenting, and Youth Mental Health in Black Families

Caregiver mental health has been found to inform youths' mental health, such as depressive symptoms. This association demonstrates the intergenerational transmission of mental health challenges from caregiver to child; however, there is insufficient research on the factors that influence this relation. While experiencing mental health challenges, mothers may have difficulty engaging in positive parenting behaviors with their child, which may then affect their child's increased depressive symptoms. Additionally, not only is it

important to focus on mediators in this relation, but also potential protective moderators that may prevent negative effects in youths' depressive symptoms, such as social support. To our knowledge, no studies have tested this full moderated mediation model among Black children and their caregivers. To address these gaps, the current study tested whether the relation between mothers' depressive symptoms and supportive-engaged parenting was moderated by social support from friends and/or family, and whether supportive-engaged parenting, in turn, impacted youths' depressive symptoms. The current study included data from 128 Black children ages 5 to 11 and their mothers who participated in a larger study. Findings indicated that mothers' depressive symptoms predicted greater children's depressive symptoms, with various significant moderating and mediating pathways. Familial social support predicted greater supportive/engaged parenting, which was associated with youths' decreased depressive symptoms. Social support from friends moderated the relation from mothers' depressive symptoms to support-engaged parenting. Specifically, among mothers with high levels of social support from friends, they engaged in greater supportive-engaged parenting despite experiencing depressive symptoms, which was, in turn, associated with lower depressive symptoms among youth. Overall, our findings indicate that mothers' mental health, social support, and supportive-engaged parenting all play important roles in Black children's depressive symptoms, which could be used to bridge disparities that are prevalent among Black families in the United States.

Gena Ford

Discipline:

Authors:

#1 Gena Ford

#2 Susmita Hazra

Susmita Hazra

Abstract Name: Empowering Community College Students with Access to Undergraduate Research Experience

Undergraduate research has significant beneficial impacts on students; yet many community colleges struggle to facilitate opportunities for students because of heavy teaching loads; limited infrastructure (lab space, equipment, limited funding for research, dedicated research office); a narrow traditional view of research; and institutional priorities that are focused on transfer pathways and workforce readiness. In this project we will talk about implementing first "Scholars Day", an undergraduate research conference intentionally shaped around the needs and realities of community college students at the Oklahoma City Community College. We are the 4th largest higher education institute at Oklahoma with more than 18,000 students. Many of our students are first generation college students, balance caregiving responsibilities, jobs, and financial stress, and some arrive with internalized beliefs that their voice does not matter. We had more than 60 research and scholarly projects presented at the Scholars Day. This included more than 500 participants for the event. We will outline the steps taken to create Scholar's Day, describe how we addressed the hurdles, and discuss the impacts on students. We will discuss how Using a practitioner action research approach, we designed and implemented Scholar's Day. Preliminary results suggest these types of structured, faculty-supported presentation opportunities, when implemented with the unique characteristics of the community college in mind, can increase community college students' confidence, academic identity, and sense of belonging. Our experience drives our commitment to help community college students develop voice, confidence, and belonging in undergraduate research.

Elizabeth Forrest

Discipline: English and Literature

Authors:
Jack Parker

Abstract Name: "Fled from the Harvester's Feet": Bird Populations and Conceptualizing Extinction Through the Lens of 19th Century Victorian Poetry

This project seeks to examine bird extinction through the lens of Victorian poetic expression alongside statistical data of bird populations in Britain throughout the Industrial Revolution. The literature of the Victorian period offers a unique perspective into thoughts surrounding extinction at its inception. The mid-19th century saw sensibilities of bygone Romantic poets clash with the growing mass of factories and commercial economy in urban British centers. Meanwhile, the new concept of Darwinism brought forth a body of thought around speciation; and the first theories of extinction appeared in Britain in the mid 19th century in relation to bird populations. While few poets were aware of the imminent environmental disaster these early signs heralded, anxieties in the works of poets such as Thomas Hardy, Mathilde Blind, and George Meredith express discomfort with humanity's encroachment on natural processes. The bird is a common subject that suffers at the hands of humans, the poet assuming the perspective of the avian creatures to reflect upon society itself. Alongside literary analysis of Victorian authors' poems, a quantitative analysis of avian extinction data in Britain over the industrial evolution is conducted and compared to awareness of the concept in popular literature to assess correlation between extinction events and awareness of them. Statistical tests are applied to see if a strong correlation between the two exists. We hypothesize that evidence of bird habitat disruption correlates with literary intimations of bird suffering, forming early roots of environmental awareness. Victorian poetry offers a lens through which people could process their changing world, and allows us to identify how species were conceptualized before modern ideas of conservation and extinction.

Alexa Fortu

Discipline: Biology

Authors:
#1 Alexa Fortu
#2 Melissa Plakke

Abstract Name: Associations Between Testes Size and Polyandry in Illinois *Magicicada* spp.

Periodical cicadas (*Magicicada* spp.) are unique insects due to their 13–17-year life cycle and short adult emergence, during which reproduction takes place for 3–4 weeks. While their life cycles and behaviors are well-studied, relatively little is known about whether *Magicicada* have a polyandrous system. This study examined whether testes size in male cicadas reflects reproductive investment consistent with levels of polyandry by measuring absolute and relative testes area and dry mass in male *M. cassini*, *M. decula*, and *M. decim* from the 2024 Brood XIII. Linear regressions assessed the relationship between head width and testes size, while single-factor ANOVAs compared relative testes size among species. Relative testes size did exhibit variation, with *M. cassini* and *M. decim* resulting with proportionally larger testes than *M. decula*, suggesting higher sperm competition in these species. Weak correlations between body size and testes size indicate that reproductive investment is not solely determined by relative body size. These findings suggest that *M. decula* may experience lower levels of sperm competition compared to *M. decim* and *M. cassini*, reflecting potential differences in mating frequency among *Magicicada* species.

John Foster

Discipline: Business

Authors:

#1 John Foster

#2 Cameron Wiley

Abstract Name: Data Breach Effects On Firm Revenue and Consumer Sentiment

Data breaches are cybersecurity incidents where confidential, or at least sensitive, information is accessed without authorization, and are occurring at an increasing frequency across the world's firms. We examine the extent to which these events impact a company's revenue, which may additionally proxy for consumer sentiment. Our unique 15-year sample consists of 50 publicly traded companies that experienced data breaches, with several important industries represented. Methodologies include statistical hypothesis testing, linear regression, fixed effects regression, time series analysis, and (fixed effects) quantile regression. Results suggest that, at most, companies experience a two-quarter period of slower revenue growth following a data breach, with the differential most often being statistically insignificant. Thus, in contradiction to sensational press coverage, stories of boycotting behavior, and general belief, data breaches do not generally appear to have measurable impacts on company revenue or consumer behavior.

Caelyn Fournier

Discipline: Psychology

Authors:

Megan Lynch

Cadence Emerick

Abstract Name: Screen Time and Anxiety in an Understudied Community-College Population

Johnathan Haidt, in *The Anxious Generation*, argues that the rapid digitization of the lives of those in Gen Z (widely understood to be between the years of 1997 and 2012) has contributed to rising anxiety rates. Prior research established a correlational relationship between higher daily screen time and anxiety levels (Twenge, 2019). Community college student bodies are more demographically diverse, with more variations in age, financial backgrounds, and work obligations—yet they remain underrepresented in studies linking the digital behavior of college students to anxiety. This study asks whether total daily screen time predicts higher self-reported anxiety levels in community college students, an understudied group in existing literature. A sample of undergraduate students at Westmoreland County Community College will be obtained through email invitations, social media posts, and physical flyers. A non-diagnostic use of the Generalized Anxiety Disorder questionnaire (GAD-7) will be administered to measure self-reported anxiety levels. Scores will be correlated with participants' reported smartphone screen time data. Researchers will examine whether the relationship between screen time and anxiety found in prior research also appears in community-college students

Caroline Frame

Discipline: Engineering

Authors:

#1 Nastassja Lewinski

#2 Johanna Tsala Ebode

#3 Bridget McInnes

Abstract Name: Leveraging AI in Nanomedicine Design

There is an ever-growing amount of research data available on nanomedicine, and consequently, the assessment of novelty and feasibility of proposed new designs is becoming more difficult. With advancements in performance and accessibility of AI tools, we hypothesize that AI can accelerate the nanomedicine research process by assisting with formulation suggestion, synthesis planning, and dose finding. To test this hypothesis, we used AI tools vetted by VCU, specifically Microsoft CoPilot, Google Gemini, and Google NotebookLM. Between September 2025 to December 2025 all available models within these tools were tested. The use case chosen for testing was the co-encapsulation of methotrexate with another drug in PLGA nanoparticles for treating endometriosis. All tested models had an associated cost (run time – ranging from 1 to 90 minutes, fees – ranging from \$0 to \$20 per month, verification time – ranging from 1 to 8 hours). The quick response required multiple prompts to retrieve the desired information. The deep research provided in-depth explanations and even full literature reviews, yet this led to longer verification time. Because the models save previous searches, the responses become more personalized with prolonged use, making generalization to other users difficult. Synonyms were not recognized unless initially prompted with the synonym first. Overall, the tools could suggest potential drugs to pair in a nanoparticle formulation and provide step-by-step protocols for synthesizing the nanoparticle, as well as reference pharmacokinetic data when the drug has clinical data available. However, additional prompting is needed to clearly link information with its sources due to citations either not associated with the information, not provided for the information, or, in some cases, not real. When the information attribution strategy improves in future versions of AI tools, we anticipate they will truly accelerate the research process in nanomedicine design.

Leo Franck

Discipline: History

Authors:

#1 Leo Franck

Abstract Name: “A Trumpet Call of Victory:” Eleanor Roosevelt, the UDHR, and the Postwar World’s Reckoning with the Holocaust

The Universal Declaration of Human Rights was unanimously adopted by the newly created United Nations in 1948. The document outlined the basic standards of human dignity that the UN would seek to protect. There is great debate among historians and political scientists over the extent to which the violations committed in the Holocaust influenced the creation of the UDHR. Some argue that the horrors of the Holocaust shook the very foundation of the world order in a way that prompted the drafters to include articles in the declaration which were specifically intended to address Nazi atrocities. However, others claim that this narrative was constructed later to give the modern human rights regime legitimacy, and that the UDHR did not respond directly to the Holocaust. This project intended to assess both of these claims, specifically through the work and contributions of Eleanor Roosevelt, who chaired the Human Rights Commission that drafted the document. Through key primary source documents and scholarly critiques, this project re-examined the narrative around the creation of the modern human rights regime. Additionally, this study examined Roosevelt’s engagement with Holocaust survivors and her writings about her time on the commission. Ultimately, based on Eleanor Roosevelt’s work this paper concluded that the Holocaust did play a significant role in shaping the UDHR.

Andrew Franck

Discipline: Computer Science

Authors:

#1 Justin Li

Abstract Name: Fourier Neural Operators for Excitable Media Dynamics in FitzHugh-Nagumo Systems

Fourier Neural Operators (FNOs) provide a strong framework for learning solution mappings of parametric partial differential equations (PDEs) by directly approximating operators between infinite-dimensional function spaces. While FNOs have demonstrated success in modeling of numerous physical systems, their application to reaction-diffusion systems, particularly in neuroscience, remains underexplored. In this work, we develop and implement FNOs for the parametric FitzHugh-Nagumo (FHN) system, a model of excitable media dynamics in neural systems. Our framework learns solution operators mapping initial conditions and system parameters to dynamics of the activator and inhibitor variables. We train the FNO model on a dataset of FHN solutions generated via a traditional numerical solver across a wide parameter space, aiming to create a strong resemblance of the numerical solver while achieving significant speedup in computation time. We evaluate our approach mainly on mean squared error (MSE) and coefficient of determination (R^2) between FNO predictions and ground truth solutions, as well as generalization to unseen parameter combinations and long time rollouts. Our results demonstrate that the FNO accurately captures the spatiotemporal patterns of the FHN system, achieving MSE under 2% for both activator and inhibitor variables, while providing several orders of magnitude speedup in computation time compared to traditional solvers.

Mariluz Franco-Ortiz

Discipline:

Authors:

Carilú Pérez-Caraballo

Carla Diaz-Ramos

Abstract Name: Cultivating Scholars: Coaching and Mentorship for Belonging and Resiliency at a Hispanic-Serving Institution

Students from minoritized backgrounds often face barriers that limit access to advanced degrees and contribute to inequities in STEM and social sciences. Beyond academic preparation, fostering belonging is essential for persistence and success. This presentation highlights two innovative coaching models at the University of Puerto Rico Cayey: METAS+, an NIH-funded program supporting transitions from undergraduate to graduate studies in STEM and biomedical fields, and the Mellon-funded Resiliency Coaching Program, designed to strengthen retention and graduation among undergraduates. Although implemented at different stages of the BA degree—METAS+ during the final undergraduate year and first year of graduate school, and Mellon during earlier semesters—both models share common topics essential for academic and professional success: time management, networking, teamwork, perseverance, mentoring, and structured planning through the Individual Development Plan (IDP), the leadership wheel, and SMART goal-setting techniques. These strategies promote transferable skills while fostering a strong sense of belonging. Coaching sessions provide “acompañamiento” or accompaniment in a safe space that encourages active participation through interactive activities and peer-mentoring by graduate-level students. A distinctive feature of both programs is the creative presentation of each student’s IDP portfolio, which focuses on research opportunities and experiences as developing scholars, serving as a reflective and goal-oriented artifact at program completion. This presentation shares peer-mentorship insights and innovative group coaching practices that illuminate pathways for aspiring student researchers and strengthen professional development readiness. Evaluation results show significant gains in confidence, resilience, and clarity in

academic planning, as well as measurable improvements in NIH Hallmarks of Success for METAS+ participants and high retention and graduation rates for Mellon participants. Together, these initiatives demonstrate how coaching combined with peer mentoring can transform student trajectories by fostering belonging and resilience across critical academic transitions.

Kennedy Franklin

Discipline: Engineering

Authors:

#1 Franklin Kennedy

Richard Gutierrez

Abstract Name: Model Lunar Airlock for Space Training and Simulation

This project is being conducted in collaboration with Space Nation, an organization dedicated to advancing space education, training, and simulation to prepare individuals and teams for future extraterrestrial missions. Space Nation's mission is to make space exploration knowledge and preparedness accessible to everyone by creating realistic, scientifically grounded simulation environments. Our Model Airlock System is being developed as a scalable prototype for Space Nation's simulated lunar station, which forms part of their ongoing Moon Mission Simulation Program. The full-scale station is located at the Midland International Air and Space Port in Midland, Texas. I have personally visited the lunar station simulation site and conducted on-site measurements to ensure that our model fits within the parameters of the site. This collaboration not only strengthens the technical relevance of our project but also provides valuable experiential learning within an active aerospace research environment. The project aims to produce a fully functional, modular airlock system that demonstrates fundamental aerospace and mechanical engineering principles. The prototype will serve as a useful training tool for space and lunar simulation and incorporate many of the sounds, visuals and systems that an astronaut would encounter while operating a lunar airlock. The prototype will feature pressure sensors, temperature sensors, and a vacuum simulation zone. The system integrates sensors such as Pt1000 temperature detectors, VCT pressure transducers, and CDG vacuum confirmation sensors, along with timers, lighting, and onboard cameras for monitoring. Extensive material research led to the selection of aluminum for its durability, structural stability, and vacuum compatibility.

Grace Franklin

Discipline: Political Science

Authors:

Abstract Name: History Curricula in Blue and Red States: How Varying Partisan Ideologies Impact Students' Political Opinion

Political Socialization is the process whereby individuals develop political opinions and affiliations. This results from social, political, and/ or economic values in an individual's environment. The attitudes and beliefs of an individual are most malleable during childhood, adolescence, and young adulthood, and are heavily impacted by social interactions and peer groups. Time spent in school can have a significant impact on political socialization through peer interactions and the inclusion of political ideals, values, or practices in curricula. Because state and local governments have the power to control funding, textbook adoption, and curriculum, and may adopt curricula based on partisan ideology, what is taught in history classes across the country varies state by state. This may suggest variation in how students in states of varying partisan

ideologies will vote in the future. Given their distinct partisan ideologies, Alabama and California differ in how they present the historical topics of Slavery, Reconstruction, and the Civil Rights Movement in late elementary and middle school curricula during the early 2000s. This has implications for millennial voting behavior today. After the review of literature and curriculum guides from each state, Alabama presents these historical topics in a more politically neutral manner, leaving out specific statements that addressed moral faults, and inadequately explaining the extent to which Slavery, Reconstruction, and the Civil Rights Movement negatively impacted Black Americans. In contrast, California adequately addressed these historical events, discussing both positive and negative outcomes. These states still contrast politically today, and millennial voters exhibit the partisan beliefs of the curriculum they were taught.

Rajan Frattare

Discipline: Computer Science

Authors:

#1 Charles McGill

Abstract Name: Optimizing for Multitask Model Capabilities Using Machine Learning

The optimization of any process is an important but tedious task. While exhaustive searches guarantee an eventual set of optimal inputs, as systems become more complex, exhaustive searches lead to exponentially increased testing times and costs. Machine learning is used to try to optimize processes more efficiently. One approach is using a method called Bayesian optimization, which works by balancing exploration and exploitation through a probabilistic model, allowing optimal inputs to be found with far fewer tests than an exhaustive search. In our work, we are looking at multitask Bayesian optimization, optimizing a model to be able to handle multiple possible targets simultaneously. We believe that this will be more efficient than optimizing for individual targets separately. Our test system is quantum dot synthesis, where we're optimizing for being able to target multiple different colors. We are comparing multiple different unique batching methods to see which method converges the fastest. We will discuss the capabilities of each method, where they hit their limits, and how stable and consistent each batching method is. We plan to test all the batching methods over 100 unique runs, with each method having the same initial data points. In our smaller tests we have noticed that one of the methods we are testing did much better than expected. During our large batch testing, we will make sure to remove a potential source of improvement for that specific method that we believe may be the reason that that method did so well. We predict that most, if not all, of our multitask methods will be more efficient than individualized single-target optimization.

Nicolette Frattellone

Discipline: History

Authors:

#1 Joseph Tse-Hei Lee

#2 Nicolette Frattellone

Abstract Name: From Partnership to Estrangement: The Impact of Sino-American Educational Exchange and Changing Diplomacy in Wartime China

Transnational education served as a critical bridge of diplomacy and cultural exchange between China and the United States during the early twentieth century. The Peking Union Medical College (PUMC), established by the Rockefeller Foundation from 1917 to 1951, exemplified how educational collaboration could shape

international relations through shared intellectual and humanitarian goals. Positioned within the broader history of global educational exchange, the PUMC operated not merely as a site of Western medical instruction but as a space of negotiation, adaptation, and mutual influence. Focusing on student perspectives—particularly those of Chinese women in nursing and medicine—this research reinterprets the history of the PUMC, which has long been dominated by Western faculty narratives. Drawing upon archival materials, memoirs, and institutional reports from the Rockefeller Archive Center, the analysis reconstructs how students understood and enacted the college's mission. Their experiences reveal a culture of unity, humanitarianism, and national service that transcended cultural hierarchies and political divisions. During the Second Sino-Japanese War, PUMC students mobilized their training for civilian and military relief, establishing clinics and refugee programs that embodied both professional rigor and transnational solidarity. The findings demonstrate that the PUMC functioned as a non-state instrument of diplomacy, fostering cross-cultural understanding even amid geopolitical conflict. Its legacy underscores the potential of educational exchange to build durable connections between nations—a historical model that illuminates how collaboration in learning can renew dialogue and empathy within contemporary Sino-American relations.

Aliyah Frazier

Discipline: Biology

Authors:

#1 Richard Marconi

#2 Jade A. Smith

Abstract Name: Reevaluation of VlsE based diagnostic assays for canine Lyme disease

Lyme disease (LD), caused by *Borrelia burgdorferi*, is an increasing health concern for humans, livestock, and companion animals across the Northern Hemisphere. *B. burgdorferi* is transmitted to mammals through the bite of infected *Ixodes scapularis* (black-legged) ticks. Dogs are sentinel animals for Lyme disease providing surveillance for local exposure and signaling potential emerging public health risks. Accepted diagnostic testing relies on the detection of antibodies to the conserved C6 peptide region of VlsE. VlsE is a surface protein is a major contributor to the pathogenesis of the Lyme disease spirochetes. Current diagnostic testing presents significant limitations due to sequence variation in the C6 region of VlsE. The purpose of this study was to reevaluate the utility of VlsE and the C6 peptide as diagnostic antigens for Lyme disease in dogs. Towards this goal, we assessed the reliability of VlsE-based diagnostic performance by screening serum from experimentally infected and client-owned dogs. Several different VlsE variants were included in the analysis. The ELISA results revealed significant variability in antibody detection by diverse VlsE variants suggesting that current Lyme diagnostic tests lack specificity and sensitivity.

Timothy Frazier

Discipline: English and Literature

Authors:

Abstract Name: The Hero, the Trickster, and the Shadow: A Jungian Reading of Gun Island

This paper analyzes Amitav Ghosh's 2019 novel, *Gun Island*, by examining the main character Deen's personal journey of self-discovery and growth. Drawing on the ideas of the psychologist Carl Jung, this study looks at the characters through recurring personality patterns, also known as "archetypes," to show the novel's ideas about skepticism, ancient myths, and environmental issues. Using a close look at the text, the paper

argues that Deen embodies the Hero archetype, transforming from a skeptical book dealer into a seeker of the unknown. He is guided by Cinta and Tipu, who act as contrasting guides, or Tricksters, whose different influences push Deen to change. Furthermore, the analysis suggests that Deen's love interest, Piya, represents his Shadow; the purely scientific part of himself that he must overcome, challenging his acceptance of the supernatural and intuitive world that he's newly introduced to. The essay concludes that Deen's personal awakening, rooted in the modern resurfacing of the Gun Merchant myth, highlights a broader need for humanity to re-engage and unite with its ancestral myths to better cultivate the depths of our collective psyche to confront modern ecological and psychological crises.

Kate Frederick

Discipline: Interdisciplinary

Authors:

Abstract Name: Implementing Sustainability and Climate Resilience into the Undergraduate Science Curriculum

Climate and sustainability resilience are some of the most pressing challenges of the 21st-century. The effects of climate change such as higher amounts of extreme weather events, increase in atmospheric CO₂ levels, changes in ocean acidification, rising sea levels, have severe social and economic consequences, disproportionately affecting vulnerable populations and disrupting global economies. Despite this, there is a significant gap in undergraduate college curricula specifically designed around key issues related to sustainability and climate change. To address this gap, this project aims to implement sustainability and climate resilience into the development of scientific activities and laboratories for 5 undergraduate courses at West Chester University (WCU). These activities integrate Student Learning objectives (SLOs) with the goals of the WCU Climate Action Plan (CAP) and Strategic Plan 2025 by using the backwards design curriculum development approach to keep the goals of CAP, Strategic Plan 2025, United Nations (UN) Sustainable Development Goals, and student learning objectives at the center of an environmentally conscious course development project. Through this, our objective is to give students an in-depth understanding of sustainability, and address CAP curriculum goals by increasing sustainability education in general-ed courses by implementing learning objectives related to climate change. To do this, we have developed formative and summative assessments based around topics such as radio frequency interference, light pollution, ocean acidification, and AI model energy consumption to better prepare undergraduate students to drive climate resilience, sustainable solutions, and advocacy in post-graduate environments.

Emmanuel Freduah-Agyemang

Discipline: Engineering

Authors:

Abstract Name: Designing an Affordable Semi-Active EMG-Controlled Prosthetic Arm for Upper-limb Amputees in Ghana

The high cost and limited accessibility of advanced prosthetic devices are significant challenges to upper-limb amputees in low to middle-income regions like Ghana. Studies have shown that in low-resource settings, the number of amputees continues to grow, but the demand for prosthetic devices remains unmet. Amputees encounter daily struggles that are physically, emotionally, and financially draining. Additionally, other studies have demonstrated that electromyography (EMG)-controlled prostheses can achieve high accuracy using

multiple sensors and computational power. However, these studies have little to no focus on individuals in low- to middle-income regions, which calls for an investigation into how low-cost prosthetic devices can be made accessible to such individuals. Therefore, this project investigates whether an affordable, semi-active prosthetic arm can be developed using EMG to restore essential hand functions for such individuals. The methodology integrates hardware and software systems across three core sections: EMG signal acquisition and classification, actuation, and mechanical design. EMG data were obtained from the GRABMyo dataset using only three electrodes that targeted key forearm muscles. Then, a hybrid recurrent neural network (RNN) and long-short term memory (LSTM) model was used to classify four gestures: hand open, hand close, index and middle finger extension, and rest. The model achieved an accuracy of 84.97%, demonstrating that gesture recognition is feasible with limited electrodes. A spring-mass-damper model was applied to simulate finger dynamics and used to predict natural finger movement with less complex calculations. Simulation and experimental results showed responsive finger movement, and the total material cost of the device was approximately \$319.57, supporting the goal of affordability. Collaboration with a local prosthetics manufacturer helped refine weight, usability, and functionality. Hence, this work demonstrates that meaningful prosthetic innovation is achievable using accessible, low-cost technologies and offers a scalable framework for improving mobility for amputees in underserved regions.

Cassie Freedlander

Discipline: Engineering

Authors:

#1 Jonathan Boreyko

#2 Danielle Miller

Abstract Name: Transpiration-Enhanced Condensation Using Synthetic Trees

Natural trees are able to efficiently pump water from the soil to their leaves in a process called transpiration, where negative pressure in the leaves' nanopores suctions water upward through xylem conduits. Synthetic trees mimic this phenomenon, with partially-submerged tubes acting as the "xylem" water conduits and a nanoporous disc acting as the "leaf." This project seeks to investigate the ability of a synthetic tree to enhance the condensation process on a chilled plate in varying environmental conditions. Water condensed in a film on a vertical chilled plate will continue to grow until reaching an equilibrium thickness, which depends on the balance between gravity and water surface tension. The rate at which water vapor can condense on the plate is dictated by the thermal resistance of the system, which is dominated by the conductive losses across the film thickness. The thinner this film is, the lower the thermal resistance will be, resulting in more efficient cooling. The proposed method to reduce this thermal resistance is to use a synthetic tree to passively thin the film from approximately 3 mm to approximately 30 μm . The tree will be oriented perpendicular to the surface of the chilled plate, with the ends of its tubes submerged in the thin water film. As the tree transpires, water will be suctioned from the film, thinning it. At the time of writing, synthetic tree transpiration rates have been measured and experiments within a climate-controlled chamber are ongoing to determine condensation rate. The next phase of the project involves tuning these transpiration and condensation rates when the synthetic tree and chilled vertical plate are set up as described above, then measuring if film thinning occurs as hypothesized. If successful, these results will have exciting implications for reduced-energy cooling applications.

Carter Freeman

Discipline: Biology

Authors:

#1 Hannah Walton
#2 Natalie Harris
#3 Chang-kwon Kang
#4 Brian Counterman

Abstract Name: Deep Neural Network Pose Estimation and Modeling of Butterfly Flight Performance

Seasonal morphological variations in *Zerene cesonia* (the Southern Dogface Butterfly) result in these butterflies having different wing colorations. *Zerene cesonia* exhibits two morphs: a winter morph and a summer morph. When *Zerene cesonia* are reared in winter conditions they have pink coloration on their wings, and when they are reared in summer conditions the entirety of the butterflies' wings are yellow. Moreover, the recent increase in the accessibility of high quality, neural network based, computer vision, pose estimation softwares like DeepLabCut allows novel approaches to animal behavior questions in biology. This research utilizes the novel application of DeepLabCut to assess how seasonal morphology in *Zerene cesonia* impacts flight efficiency. The first objective of this project will assess the ability of DeepLabCut to accurately monitor the climbing flight of *Zerene cesonia*. The second objective of this research is to utilize the pose estimations from DeepLabCut to approximate the flight efficiency of both the cold and warm morphs of *Zerene cesonia* in climbing flight. The third objective is to make a comparison of flight efficiency between the two morphs. Specimens of *Zerene cesonia* have been reared in conditions simulating the summer and winter conditions that naturally produce morphological variation. These specimens were flown in a flight chamber and videoed from two angles using RGB cameras. Then their flight data will be used to train a DeepLabCut model. DeepLabCut can use triangulation to project the butterflies' estimated position into 3-D space, thereby allowing for flight performance analysis.

Spencer Frey

Discipline: Engineering

Authors:

#1 Spencer Frey

Abstract Name: Comparing Consumer Dashboard Metrics to Research-Grade Accelerometry

With running at an all-time high in popularity, many levels of runners want to improve their exercise routines. Numerous companies have started developing running sensors to help analyze performance and identify areas for improvement. One key metric that runners use to monitor their performance is called impact, which an accelerometer can measure. The systems include a web-based dashboard for users to review their running data. However, the system is only reliable if the dashboard data accurately reflects the raw data. Our study aims to evaluate the validity of the dashboard information compared to research-grade sensors. We have been conducting experiments with numerous subjects of varying ages running on a treadmill. We begin by having the subjects, all runners aged 18-80 with no prior injuries, stand or sit so we can attach various sensors to their lower extremities. Next, we calibrate the sensors by having the subjects perform different poses to help the sensors identify their placement. Then, the subjects start running on a treadmill to help warm up. Data is recorded for about a minute during the middle of their run. Our data processing involves writing code to apply to the raw acceleration data from the research-grade sensor, producing raw Y, Z, and YZ resultant data points. We then compare the web-based dashboard data from the commercial-grade sensor with the raw data from the research-grade sensor to analyze differences and assess the validity of the dashboard data. Pearson product-moment correlations will be calculated to evaluate the relationships between the commercial-grade dashboard metrics (braking Gs(Y), impact Gs(Z), and shock(YZ resultant)) and the corresponding research-grade PPA(Y, Z, and YZ resultant)($p < 0.05$). In conclusion, our study aims to establish the validity of commercial-grade sensor dashboard information, helping runners of all levels improve their running more easily.

Yvette Frias

Discipline: Health and Human Development

Authors:

#1 Ana Paula S. Rodrigues

#2 Sandra Soca Lozano

#3 Peter Kanetsky

#4 Marilyn Stern

Abstract Name: Associations of Immigration Stress with Body Mass Index and Food Insecurity Among Rural Latino Adults

Background Earlier studies suggested that high stress levels can contribute to poor eating habits and an increased body mass index (BMI). This study examined whether immigration stress is associated with BMI and food insecurity among rural Latino adults. Methods Preliminary baseline data were analyzed from an ongoing pilot study on a health promotion project aimed at reducing cancer risk in Latinos living in rural and agricultural communities in Florida who have children between the ages of 6 and 12. Twenty participants completed a demographic survey, the Immigration Stress subscale of the Hispanic Stress Inventory v2.; the 2-item food insecurity screener; and had anthropometrics measurements collected (weight and height). Pearson's correlation and Mann-Whitney tests were conducted. Results Participants were all female, with a mean age of 36.4 ± 6.8 years. Nineteen participants (95%) were born outside of the U.S, with the majority

(68.4%) emigrating from Mexico. Eleven participants (55%) had at least some high school education. Seventeen participants (85%) had a household income below \$24,999. The mean time spent in the U.S was 15.0 ± 7.4 years. Immigration stress did not significantly correlate with time spent in the U.S., $r(20) = 0.110$, $p = 0.643$, or BMI, $r(20) = 0.200$, $p = 0.398$. Immigration stress was not significantly different between food insecure (11.2 ± 11.2) and food secure participants (10.8 ± 10.4 , $p = 0.876$). Conclusion Immigration stress was not significantly associated with BMI or food insecurity. These findings suggest that other structural determinants may play a more prominent role in influencing BMI and food insecurity in this population.

Leah Friedman

Discipline: Biology

Authors:

#1 Jaira Ferreira de Vasconcellos

Abstract Name: Characterization of a Novel 3-Dimensional In-Vitro Co-Culture System for Human Secondary Acute Myeloid Leukemia Studies

Secondary AML (sAML) is a form of acute myeloid leukemia that appears in patients with a history of hematological disorders. The overall survival of sAML is 4.7 months in patients ≥ 60 years of age. The discovery of novel treatment strategies for sAML is urgently needed. The goal of this study was to establish and characterize a novel three-dimensional (3D) in vitro model for sAML. Human bone marrow mesenchymal stem cells (BM-MSCs) and SKM1 leukemia cells were co-cultured on 700 nm-diameter electrospun polycaprolactone plates for 96h. Control cells were cultured alone. Gene expression was investigated by q-RT-PCR, and the results were expressed as mean + standard deviation. Our results showed that CXCR1, CXCR2, TGF β , VEGF, ASXL1 and SRSF2 were downregulated in BM-MSCs after co-culture (CXCR1: control: 1.1 ± 0.0 , co-culture: 0.0 ± 0.0 , CXCR2: control: 1.1 ± 0.1 , co-culture: 0.0 ± 0.0 , TGF β : control: 1.0 ± 0.0 , co-culture: 0.1 ± 0.0 , VEGF: control: 1.0 ± 0.0 , co-culture: 0.0 ± 0.0 , ASXL1: control: 1.1 ± 0.1 , co-culture: 0.0 ± 0.0 , and SRSF2: control: 1.1 ± 0.2 , co-culture: 0.2 ± 0.1), while IL6R, SPP1, CCL2 and RUNX1 were unchanged after co-culture. In addition, we observed that IL6R, CXCR2, SPP1, TGF β , RUNX1 and SRSF2 were upregulated after co-culture in SKM1 cells (IL6R: control: 0.2 ± 0.0 , co-culture: 0.9 ± 0.6 , CXCR2: control: 1.0 ± 0.0 , co-culture: 1.8 ± 1.3 , SPP1: control: 1.0 ± 0.0 , co-culture: 3.2 ± 3.2 , TGF β : control: 1.0 ± 0.0 , co-culture: 1.5 ± 0.8 , RUNX1: control: 1.0 ± 0.0 , co-culture: 1.4 ± 0.3 , SRSF2: control: 1.0 ± 0.0 , co-culture: 1.4 ± 0.1), while CXCR1, CCL2, VEGF, and ASXL1 were unchanged after co-culture. Overall, our study supports the notion that a nanofiber-based 3D culture system may be useful for sAML studies. Supported by: NIH (5R25HL106365-13, sub-award#33737-35) and Virginia Academy of Science.

Ngulefeh Fuanyi

Discipline: Computer Science

Authors:

#1 Sreenivasan Ramamurthy

#2 Starfranklyn Olivers

#3 Leslie Afeawo

#4 Moises Granados

#5 Precious Adalakun

Abstract Name: Advancing AI Through Digital Twins and Embodied Intelligence

This work investigates how Large Language Models (LLMs) can be integrated into Digital Twin simulation environments to enhance situational awareness and autonomous decision-making in unmanned aerial vehicles (UAVs) and mobile robots. Although prior research demonstrates that LLMs can generate robotic actions from natural language prompts, performance deteriorates as task complexity increases, raising concerns regarding safety and reliability. Digital Twins provide a controlled, repeatable environment for validating embodied intelligence and supporting simulation-to-real transfer. Building on initial capability tests in Turtlesim, Gazebo, and RViz, we integrated Meta's Llama-3 with ROS2 to produce executable commands and operate in a closed-loop configuration with sensor feedback. Using NVIDIA Isaac Sim, we developed a high-fidelity Digital Twin of the Nova Carter robot, equipped with ROS2-based autonomy, safety interlinks, and multimodal sensing (LiDAR, RGB, IMU). In simulation experiments, Llama-3 successfully generated viable ROS2 scripts for assigned tasks but exhibited inefficiencies and hallucination as complexity increased. These observations informed refinements to our evaluation pipeline and training strategies. The Nova Carter Digital Twin demonstrated repeatable closed-loop navigation, obstacle detection and avoidance, and policy execution in cluttered warehouse environments, supporting transparent, safe, and iterative assessment of LLM-driven reasoning prior to physical deployment. Future work will focus on LLM fine-tuning to reduce hallucinations, improve computational efficiency, and increase dependability in more complex missions. Additionally, we aim to expand ROS2 integration and explore Extended Reality-based human-in-the-loop training to support multi-agent coordination and enable robust, privacy-preserving autonomy for UAVs and mobile robots.

Elizabeth Fuentes

Discipline: Psychology

Authors:

#1 Evan MacLean

#2 Stephanie Hargrave

Abstract Name: Temporal and Contextual Repeatability in a Novel Community Science Dog Cognition Task

Community science, where members of the public contribute to data collection, has the potential to expand the scale and diversity of canine cognition research by enabling participation from a wider range of dogs and owners. However, questions remain about whether tasks conducted in less controlled settings produce data as reliable as those implemented by trained researchers. This project focuses on developing and assessing a spatial reversal learning task designed to be used both by researchers in a daycare setting and by dog guardians at home. The study addresses whether performance on this task is repeatable within a single context and whether such an approach could support larger-scale, owner-implemented testing. Preliminary analyses indicate that dog performance on the researcher-implemented version of the task shows a weak positive correlation across two sessions, suggesting limited retest reliability to date. This may reflect environmental variability in daycare settings, small sample size, and the disproportionate influence of a few individuals whose performance differed substantially between sessions. Continued data collection will allow for stronger estimates and future analyses comparing researcher- and owner-implemented data. Establishing that a brief, accessible community science task produces repeatable results would provide evidence for its validity and contribute to the development of scalable methods for studying behavioral flexibility in companion dogs.

Isabel Fuentes

Discipline: Biochemistry

Authors:

#1 Silas Hortenstine
#2 Emmanuel Adusah
#3 Michael Beck

Abstract Name: Utilizing Generative Artificial Intelligence (AI) to Model Human Carboxylesterase (CES) Interactions with Fluorogenic Chemical Tools

Human carboxylesterases (CESs) are key enzymes involved in the metabolism of various drugs. The methods to study CESs have various limitations. To address this our group has been developing fluorogenic chemical tools to study CES activity in live cells. The development of highly specific and optimized fluorogenic tools typically requires in depth structure-activity relationships requiring the synthesis of large libraries of molecules. Recent advances in generative artificial intelligence (AI) has resulted in the development and release of Alfafold3 and fully opensource implementations including Boltz-2. These approaches allow for more efficient and accurate modeling enabling better understanding of the interactions of molecules with biomolecules. Here we seek to determine if Boltz-2 can be used to model interactions and binding affinities of fluorogenic chemical tools with the two major forms of human CESs. To achieve this, we will model the interactions of CES1 and CES2 with fluorogenic chemical tools that have had their binding affinities determined through experimental methods. Ultimately, successful validation of this approach will allow for in silico screening of chemical tools for CESs resulting in the development of more specific chemical tools for CESs. This will result in better methods to study the roles of CESs in human health and assists in the development of improved therapeutics.

Will Fuerbringer

Discipline: Criminology/Criminal Justice

Authors:

#1 Will Fuerbringer

Abstract Name: A Person or a Criminal? An Autoethnographic Study within a Public Defender Setting

This autoethnographic research examines how environmental, social, and systemic factors shape individuals' involvement with the criminal justice system. The study was conducted during a social work field placement with the Albany County Public Defender's Office and focuses on the lived experiences of people who are awaiting sentencing, on probation, or incarcerated. The project explores how relationships with individuals, families, communities, and systems influence criminal justice system outcomes. Qualitative data was collected through reflective journaling, client mitigation interviews, and informal conversations with public defenders and caseworkers. Data is organized into micro, mezzo, and macro categories, and examined to find how they impact the individual within the system. Preliminary findings indicate that involvement in the criminal justice system is less a product of individual behavior alone and more connected to their environment. Clients' legal challenges frequently intersected with mental health conditions and a lack of access to positive social and family support, stemming from an early age. This study highlights the value autoethnographies have in research focused on criminal justice and social work. By centering lived experiences within an ecological framework, the project emphasizes the need for structural reforms that address environmental factors that contribute to the criminal justice system. Findings will contribute to broader conversations on equity and empathy surrounding people involved with the justice system. By applying social work themes such as the use of self, strengths perspective, and ecological theory, the criminal justice experience can be observed through a lens that puts the person, not the criminal, first.

Heldana Fufa

Discipline: Sociology

Authors:

#1 Heldana Fufa

Abstract Name: No more dead mothers : Bridging the gap between maternal health services and black women in Virginia

The stark reality of maternal mortality rates in Virginia displays a significant disparity and lack of care faced by Black mothers. The maternal mortality rate for Black mothers stands alarmingly high at 47.2 deaths for every 100,000 pregnancies, which is more than twice the rate for white mothers, recorded at 18.1 deaths. This alarming statistic exposes systemic issues in healthcare and highlights the urgent need to address this disparity. My project firstly seeks to demonstrate historically recorded bias amongst physicians, where their racial bias affects their concern for certain patients based on skin color, including an inaccurate but widely held notion that Black Americans have higher pain tolerances than other races. This impacts maternal care for Black mothers, which displays an intersection between the disregard of women's health and antiblack racism. Second, this research will utilize historical data to present the variety of care that can help improve healthcare conditions and, therefore, the outcomes of childbirth for Black mothers in Virginia. For example, Petersburg, Virginia, a Black majority city struggling with poverty, had one of the highest maternal mortality rates in the state until alternative care was established in birthing facilities, like doulas fostered by Black grassroots. Organizations like Urban Baby Project and Birth in Color advocate for Black mothers and more community-centric care, such as opening birthing and postpartum care centers. Such efforts will be recommended as evidence-based interventions, as they have resulted in fewer maternal deaths, with the percentage dropping to a level never seen before in the region. Ultimately, the issue of Black maternal mortality has many layers rooted in racism and misogyny, but to address the current rate, providing attainable and community-oriented care for Black mothers will help Black mothers live after childbirth and further in postpartum.

Iris Fuglie

Discipline: Criminology/Criminal Justice

Authors:

#1 Ryan Larson

Abstract Name: Backlash at the Ballot Box: Race, Framing Effects, and Public Support for Felony Disenfranchisement

One of the collateral consequences of a felony-level criminal record is felony disenfranchisement - restrictions on one's eligibility to vote in political elections. Scholarship has documented the level of support for these policies in the U.S., as well as some of the correlates of public support. However, research has yet to investigate what messages may be effective in altering public opinion of FD policy support. Previous scholarship on death penalty support has shown how racialized messaging frames can influence punitive policy support, and that race and racial attitudes can moderate these effects. Using a nationally representative survey we experimentally examine the effects of different messaging frames (racial, democratic, and partisanship frames) on respondent support for felony disenfranchisement policy. Overall, we find that messaging frames were ineffective in altering support for disenfranchisement policy. However, the effects of the racial and partisanship frames were moderated by racialized crime attitudes and political ideology respectively. Specifically, the partisanship message reduced support significantly amongst liberal respondents, and the racial treatment led to increased punitive support for respondents with high levels of belief that racial differences in arrest are due to dispositional factors. This research highlights the continued racialized foundation of public support for restrictive voting policy, and gives direction as to how social groups may respond in bifurcating ways to messages surrounding disenfranchisement policy.

Saniyah Fullen

Discipline: Chemistry

Authors:

#1 Rocío Pérez

#2 William Russell

Abstract Name: Synthesis of Metformin Organic Salts (GUMBOS) for Enhanced Transdermal Drug Delivery Using Alginate-Chitosan Hydrogel Patches

Metformin Hydrochloride (MTF_{HCl}) is a highly water-soluble, orally administered drug widely used in the management of type 2 diabetes mellitus. Literature has highlighted the potential of metformin to inhibit cancer cell proliferation by targeting the mammalian target of rapamycin complex 1 (mTORC1), a regulator of cellular metabolism. Herein, metformin HCl is utilized alongside six hydrophobic anions to synthesize a group of uniform materials based on organic salts (GUMBOS). Employing chitosan and alginate as principal biopolymers and novel GUMBOS, a proposed system to create MTF-based GUMBOS complexed within chitosan-alginate patches through a gelation process will allow for an extended and increased integration of metformin through a transdermal pathway. These metformin-based GUMBOS will be characterized through FT-IR, ESI-MS, ¹H- and ¹³C-NMR, amongst other techniques. Lipophilicity assessment is employed via a water-octanol partitioning sequence to estimate complexation of hydrophobic anions with metformin. Additionally, evaluation of the complex chitosan-alginate patches were conducted through SEM, TGA, FT-IR, and DSC. The secretion of hydrophobic MTF based drugs from the hydrogel patches will be conducted through an absorbance stepwise system evaluated at varying pH, temperatures, and salinity, among other factors. This will allow for an optimization of the drug encapsulated patches and assess the increased capacity for drug delivery through an in vitro system.

Campbell Fuller

Discipline: Chemistry

Authors:

#1 Campbell Fuller

#2 Susantha Ganegamage

Abstract Name: Design and Synthesis of a Dual-Emission Fluorescent Probe for Early Detection of Amyloid Aggregates in Neurodegenerative Disorders

Neurodegenerative diseases such as Alzheimer's and Parkinson's involve the gradual accumulation of misfolded proteins known as amyloid aggregates, which disrupt neural communication and contribute to progressive cognitive decline. Detecting these aggregates early is challenging, as current imaging tools can be expensive, invasive, or lack the sensitivity needed to identify early-stage pathology. To address this gap, this project focuses on designing a novel dual-emission fluorescent probe capable of selectively binding amyloid aggregates and producing a ratiometric fluorescent signal. Ratiometric probes, which emit light at two different wavelengths, offer significant advantages because they self-correct for environmental factors such as pH, solvent changes, and probe concentration, making them especially useful in complex biological environments. This ongoing study integrates molecular design, computational modeling, and synthetic planning to develop an optimized small-molecule ligand for amyloid detection. Current work includes reviewing literature on fluorophores known to interact with amyloid species and evaluating structural

modifications predicted to enhance selectivity, photostability, and emission behavior. Molecular docking studies using AutoDock and UCSF Chimera are being prepared to model how the designed ligand interacts with amyloid- β aggregates, assess binding affinity, and predict energetically favorable conformations. These simulations will guide refinement of the ligand's structure before laboratory synthesis begins. In parallel, synthetic route development is underway, including selecting commercially available starting materials, outlining protection and coupling steps, and planning purification strategies. Once finalized, future work will involve synthesizing the designed ligand and characterizing its optical properties through absorption and fluorescence spectroscopy. By combining rational design and computational prediction, this project aims to establish the foundation for a next-generation fluorescent tool that can support early detection of amyloid aggregation and facilitate research on neurodegenerative disease progression. This work is conducted under the mentorship of Dr. Susantha K. Ganegamage and supported by the Office of Undergraduate Research at Lamar University.

Alayna Furman

Discipline: Psychology

Authors:

#1 Amelia Brower

#2 Sierra Joseph

Abstract Name: AOC: The Personality Profile of U.S. Representative Alexandria Ocasio-Cortez

This poster presents the results of an indirect personality assessment of U.S Representative Alexandria Ocasio-Cortez from the conceptual perspective of personologist Theodore Millon and the Millon Inventory of Diagnostic Criteria (MIDC), which assesses five personality attribute domains: expressive behavior, interpersonal conduct, cognitive style, mood/temperament, and self-image. The inventory consists of 12 scales congruent with Millon's taxonomy of normal and pathological personality patterns and yields 34 normal and maladaptive personality classifications congruent with DSM-III-R, DSM-IV, and DSM-5. The methodology informing the use of the inventory comprises three phases: data collection, scoring and interpretation, and inference. In the first phase, an indirect, at-a-distance psychological assessment of Ocasio-Cortez—a standard approach to the assessment of personality in politics—was conducted through extracting psychodiagnostically relevant data in the public domain from a broad range of biographic sources and media reports. Once collected, the data were coded to the 170-item MIDC. Each item was then classified as either affirmative (more than sufficient evidence), equivocal/affirmative or equivocal/negative (insufficient evidence to rate with confidence), or negative (no empirical support). Affirmatively classified diagnostic criteria were used to generate a personality profile with quantified scale elevations for each of the 12 personality patterns tapped by the MIDC and based on interpretive guidelines provided in the Millon Index of Personality Styles manual. Ocasio-Cortez's primary personality patterns were found to be Ambitious/self-serving and Outgoing/congenial, supplemented by a secondary Dauntless/adventurous pattern and subsidiary Accommodating/cooperative features. A descriptive label aligning with Ocasio-Cortez's personality composite is "Authentically Outgoing Challenger," largely based on the prominence of the Ambitious and Outgoing patterns. An individual with this personality configuration is self-confident, daring, cordial, and considerate. They may be prone to pursuing leadership positions, seeking attention, and taking calculated risks, which could lead others to view them as entitled and needlessly impulsive.

Trinity Gabreylski

Discipline: Philosophy, Ethics, and Religious Studies

Authors:

Abstract Name: The Therapy and Medicalization of Native-Hispanic Healing Practices

Many families of Native or Hispanic/Latino background seek the works and resources that come from healers. Healers have helped people heal from problems that have affected their mental and physical health by utilizing their knowledge with religious traditions, culture, energy work, spiritual understanding, their gifts, and natural resources from the Earth. Healthcare professionals can learn how to work with healers and clients to meet treatment goals. Those in our society can learn cultural competency and how to better understand how culture and medicine can be more effective. Based on interviews with healers, their clients, and a health provider in Texas, this paper argues that there is potential to incorporate culture into a clinical setting.

Anya Gada

Discipline: Exercise Science and Nutrition

Authors:

#1 Li Zhang

Abstract Name: The Association Between Ultra-Processed Foods and Chronic Kidney Disease in U.S. Adults From NHANES, 2001–2018

Ultra-processed food (UPF) consumption has been rising in the US and globally in the past decade and linked to a wide range of chronic diseases. UPF intake can contribute to the development of chronic kidney disease (CKD); however, the population level data remains limited. The objective of this study was to examine the association between UPF consumption and CKD among U.S. adults using the National Health and Nutrition Examination Survey (NHANES) (2001 – 2018). UPF intake was estimated using the NOVA classification system based on up to 2 days' 24-hour dietary recalls. CKD was ascertained using the recognized criteria for estimated glomerular filtration rate (eGFR) (based on the 2021 CKD-EPI creatinine equation) ≤ 60 mL/min/1.73 m². The association of UPF consumption and CKD was examined with reported odds ratios (aORs), and 95% confidence intervals using the weighted multivariable logistic regression models adjusted for demographic, lifestyle, and clinical covariates. We evaluated 39,512 U.S. adults (≥ 20 y, mean age = 50.3 $\pm$ 17.9), and found that the highest quartile of UPF, relative to the lowest quartile, is significantly associated with 40%-60% increased odds of CKD (aOR = 1.4 ~ 1.6, all $p < 0.05$) across all models. The dose-response relationship has been determined between higher UPF intake and higher CKD risk (ptrend = 0.0103), after adjusting for all covariates. These findings suggest that reducing UPF consumption is critical in CKD prevention.

Hannah Galletti

Discipline: Biology

Authors:

#1 Gregory Ruthig

Abstract Name: Invertebrate Host Species Shed Infective Zoospores Into Aquatic Environments at Varying Rates

Multihost pathogens are important in the spread of infectious disease. Using microwell enumeration, we

measured the rate at which invertebrate hosts release infective propagules into bodies of water, known as their shedding rate. We found that the mean shedding rate varies between species. Aquatic sowbugs were the most competent hosts in the shed of infective propagules. Frequency distributions showed a right skew, meaning some individual hosts contribute more to transmission than others. By exploring the relationship between shedding rate and invertebrate hosts, we can formulate an epidemiological model to predict the spread of infectious disease involving water-borne pathogens.

Benjamin Gallion

Discipline: Biology

Authors:

#1 Sandra McLellan

#2 Maria Steadmon

Abstract Name: Evaluating the effectiveness and viability of *E. coli* as a Marker of Sewage Contamination in Freshwater Beach Environments

Escherichia coli is a gram-negative, motile bacterium commonly found in gut microbiomes of warm-blooded animals and is routinely used as an indicator of sewage pollution in recreational freshwaters. However, *E. coli* is not always a reliable indicator of human health risk because it is abundant in environmental reservoirs (i.e., wildlife, sediments), making it difficult to determine potential sources. This uncertainty complicates beach management decisions, especially following precipitation events when fecal inputs originate from multiple sources. To better characterize origins of fecal contamination across beaches in the Milwaukee metropolitan area, a total of 221 water samples were collected from five beaches during the summer of 2025, targeting periods immediately following precipitation events. Samples were analyzed using standard microbial culturing methods to quantify *E. coli*. To identify potential fecal sources and compare alongside *E. coli* distributions, microbial source tracking (MST) assays were performed for the human-associated *Bacteroides* marker pBI143 and the gull-associated marker *Catellibacterium marimammali* (gull2). *Escherichia coli* concentrations across all sampled beaches ranged from 0 – 6,000 CFU/100 mL, with nearly 40% of measurements exceeding the beach action value (BAV) of 235 CFU/100 mL. During BAV exceedances, 75% of samples were positive for the gull2 marker, whereas 50% were positive for pBI143. Average *E. coli* and gull2 marker concentrations were highest at Harrington Beach, a site characterized by agricultural land use while average pBI143 concentrations were highest at Bender Park Beach, which is located ~2.3 km south of a wastewater treatment plant. pBI143 levels were also highest following combined and sanitary sewer overflow events, consistent with human wastewater contributions. These findings suggest that elevated *E. coli* levels at freshwater beaches are driven by bird-associated contamination rather than human sewage. Incorporating human-specific markers, such as pBI143, into routine monitoring could improve identification of sewage impacts to better inform beach management decisions.

Julianne Gallo

Discipline: Economics

Authors:

Abstract Name: Decomposing the Post-Pandemic Gender Wage Gap in Finance: the Role of Work-from-Home

Despite substantial gains in women's human capital and wages since 1970, the gender wage gap remains, and

is the highest in finance among sectors. Contemporary research shows that the gap is driven by differences in job flexibility, specifically duration, particular timing, and location of work. Because women traditionally shoulder greater caregiving responsibilities, they place a higher value on job flexibility and sort into more flexible, lower paying jobs. The rise of Work-from-Home (WFH) policies during the COVID-19 pandemic improved flexibility in high paying sectors like finance, suggesting a potential link between working from home and the gender wage gap. This study investigates the post-pandemic gender wage gap in finance by assessing the effect of working from home and decomposing the gap. I use repeated cross-sectional data from the 2021-2023 American Community Survey (ACS) for individuals in finance aged 22 to 64, merged with O*Net occupational characteristics. I estimate a pooled log earnings model including a gender indicator and a gender-work-from-home interaction term with relevant controls to produce the conditional gender wage gap. I hypothesize that working from home narrows the gap, which would be represented as a positive interaction coefficient. I perform an Oaxaca decomposition through estimating separate log earnings equations for men and women and decomposing the mean gender wage gap into explained and unexplained components. This approach identifies the share of the gap attributable to working from home, and evaluates whether differences in average characteristics or market returns to those characteristics play a larger role. My findings will inform policy on work arrangements aimed at promoting gender equality in finance.

Ariel Galor

Discipline: Engineering

Authors:

#1 Ariel Galor

#2 Leonardo Miranda

Leonardo Miranda

Abstract Name: Optimization of a Low-Cost Wildlife Surveillance Camera based on Raspberry Pi Technology

This study investigates the optimization of an existing Raspberry Pi-based camera system as a low-cost alternative for documenting predation of selected butterfly species in Miami, Florida. A significant challenge in this work is developing surveillance solutions that balance high-resolution image capture with affordability. Commercial outdoor videography systems are often expensive and designed for general use, making them unsuitable for applications requiring the successful recording of very small targets such as caterpillars. The system, built on a Raspberry Pi 5 with a compatible high-definition camera module and interchangeable CS-mount lenses, includes a customized Python code for camera control and data logging, along with ongoing evaluations of its thermal behavior to determine whether cooling solutions may be needed for continuous operation. Its performance will be assessed through controlled trials involving the capture of images of target species, or representative models, under daylight, dusk, and infrared-illuminated nighttime conditions at fixed distances while maintaining consistent camera placement. Metadata, including environmental conditions and internal enclosure temperatures, will be collected to support analysis. The evaluation focuses on three primary objectives: assessing the system's ability to capture clear images at multiple distances, comparing the sharpness and field coverage of different lenses, and determining the effectiveness of IR illumination for night-vision applications. Analysis will examine image quality, the feasibility of nocturnal monitoring, and thermal stability relative to manufacturer specifications. Ultimately, this work aims to refine and validate a cost-effective camera system capable of supporting extended field research within practical budget constraints. The results will be discussed in the context of improving wildlife-monitoring tools and identifying practical design considerations for low-cost surveillance systems.

Al Hassan Gamal El-Din

Discipline: Biochemistry

Authors:

Abstract Name: Fluorescence Spectroscopic Study of the Mechanism of HIV Replication

Untreated replicating HIV is the only way a patient may develop AIDS, a prominent disease taking approximately a million lives annually. It is proposed that the mechanism of HIV replication can be further understood when studying the interactions of the HIV Matrix protein (MA) with cellular proteins. MA has two binding sites for Calmodulin (CaM), and when CaM binds to MA it causes a conformation in the structure of MA, allowing it to become active and bind to other cellular sites. Research has shown that it is likely that decreasing the availability of active MA binding sites would decrease HIV replication in the cell. To further understand the interactions between CaM and MA, fluorescence spectroscopy was used on different CaM and MA solutions in various buffering systems.. At specific wavelengths of light, amino acids become excited and emit light themselves i.e. fluoresce. Tryptophan has the capability of being excited and fluorescing a certain wavelength of light, and this amino acid is found at the CaM binding sites of the MA structure. Since research has shown MA and CaM interactions are Ca^{2+} dependent, by studying the emission spectrum of the tryptophan as MA binds with CaM in different buffering solutions, a better understanding of HIV replication can be grasped. Understanding the mechanisms of HIV replication will be a step closer to treating millions of patients around the world.

Sean Gamche

Discipline: Exercise Science and Nutrition

Authors:

#1 Sean Gamache

#2 Mya Lee

Mya Lee

Abstract Name: The Effects of Pre-exercise Feeding on Gastrointestinal Integrity Following Acute Resistance Exercise

Resistance exercise (RE) elevates intra-abdominal pressure, reducing splanchnic blood flow and weakening the gastrointestinal (GI) barrier, causing an increase in permeability and translocation of lipopolysaccharide (LPS), a common bacteria component. Previous studies have only examined these effects in fasted conditions. Our goal was to compare how fed vs fasted conditions influence GI distress and permeability. By using a randomized counterbalance crossover design, 10 recreationally trained subjects (5 males and 5 females, age = 20.7 ± 2.4 years, height = 171.6 ± 7.7 cm, mass = 80.3 ± 9.8 kg) underwent both fasted (8 hr overnight fast) and fed conditions on separate days. In each condition, they performed 5 compound RE at a load of 70% 1-repetition maximum for 3 sets of 10 repetitions. For the fed condition, participants consumed a standardized meal 30 minutes before the RE. Blood samples were collected before a standardized meal and RE (PRE), immediately after RE (POST), and 30-minutes after RE (P30). The samples were analyzed for intestinal fatty acid-binding protein (I-FABP) and LPS-binding protein (LBP) by ELISA. Markers were compared using two-way repeated measures ANOVA (condition x time). Our results indicated that I- FABP increased significantly from PRE to POST ($p = 0.009$) and P30 ($p = 0.048$), whereas no significant changes were observed in the fed condition. LBP displayed no significant condition x time interaction ($p = 0.81$) or main effect of condition ($p = 0.17$). However, there was a significant main effect of time ($p = 0.014$), with LBP decreasing from PRE (19.1 ± 1.5 $\mu\text{g/mL}$) to P30 (15.8 ± 1.3 $\mu\text{g/mL}$) across all conditions. This suggests that a pre-exercise meal may reduce exercise-induced GI epithelial damage, indicating a potential protective effect on eating before RE.

Discipline: Exercise Science and Nutrition

Authors:

#1 Rajiv Ranganathan

Abstract Name: Segmentation strategies in motor sequences: A real-world example using sewing

Motor sequence research has largely relied on tasks composed of brief, fixed-order events (e.g., keypress paradigms), which limit the ability to study how people flexibly organize longer, real-world actions. This project asked two linked questions: (1) Does increasing task complexity lead to more segmentation in a state-based motor sequence, and (2) does segmenting a sequence more finely actually make people faster, or can different strategies yield similar performance? To examine this, we used an industrially relevant sewing context that constrains the order of actions but still allows multiple temporal solutions. Participants were employees at an apparel manufacturing plant and were asked to perform two standardized sewing tasks using an industrial sewing machine - a straight stitch and a curved stitch. Performances were video-recorded, and the temporal sequence was coded into three different behavioral categories (Preparation, Alignment, and Execution) using BORIS. From these annotations, several strategy metrics were computed. The more complex curved stitch elicited reliably greater segmentation than the straight stitch, confirming that task demands push performers to interleave Alignment and Execution more frequently. However, segmentation was only weakly correlated with total completion time, indicating that operators could reach comparable performance through distinct strategy profiles, either with fewer, longer segments or more, shorter segments, provided their per-step pace was high. We argue that this sewing-based paradigm broadens sequence-learning research to behaviors with finite-duration states and demonstrates that variation in segmentation is not merely “noise” but a meaningful expression of individual constraints and trainable skill, with implications for adaptive instruction in industrial settings.

Harrish Ganesh

VA - Virginia Commonwealth University

Discipline: Biochemistry

Authors:

#1 LaMont Cannon

Abstract Name: Designing the Next gp120 Inhibitors: How Pocket Electrostatics Shape HIV Entry Blockade

HIV entry inhibitors targeting the envelope glycoprotein gp120 represent an important approach to block the virus attachment and fusion, but structural and electrostatic features of gp120 that enable small molecules to potently inhibit gp120 are poorly defined. gp120 undergoes a major conformational transition upon CD4 engagement, creating binding pockets of distinct local chemistry and residue composition. To evaluate how pocket electrostatics shape inhibitor activity and can guide future inhibitor design, molecular docking with AutoDock Vina was combined with electrostatic surface analysis and amino acid propensity mapping for residues within 5 Å of docked inhibitors. Two crystallographically validated Env states were considered: (i) the attachment inhibitor pocket in the closed gp120 trimer (PDB 5U7O), which is the reported target of temsavir and BMS-806; and (ii) the CD4 mimetic pocket captured in PDB 8FLY, modeling small molecules designed to interfere with gp120 engagement mediated by CD4 receptors. The ligand panel included the approved attachment inhibitor temsavir (-13.05 kcal/mol), the prototype inhibitor BMS-806 (-10.85 kcal/mol), and three experimental small molecules for which gp120 activity has been reported: FD028 (-8.07 kcal/mol), Compound 5660386 (-6.44 kcal/mol), and ARM-H (-6.11 kcal/mol). Amino acid propensity analysis revealed that the 5U7O pocket is strongly enriched in aromatic and hydrophobic residues, such as

phenylalanine, methionine, isoleucine, valine, and tryptophan, forming a packed non-polar cavity. The 8FLY pocket contained a higher proportion of acidic and basic residues that create a polarized electrostatic surface. These results align with generated electrostatic surface maps, indicating that next-generation gp120 inhibitors may need to reproduce the packed interactions with hydrophobic aromatics in 5U7O and engage acidic and basic residues in 8FLY. This suggests that matching local amino acid chemistry is a key requirement for next-generation entry HIV inhibitor design.

Himank Gangwal

Discipline: Mathematics

Authors:

#1 Himank Gangwal

Abstract Name: Scalable Computing With Low Precision Floating Point Algorithms

The rising cost of artificial intelligence training and inference is projected to outpace our nation's energy supply. Current algorithms typically rely on full-precision floating-point arithmetic (FP32, 32-bit) on CPUs and GPUs. However, GPUs have begun supporting low-precision floating-point formats such as FP16 (16-bit), FP8 (8-bit), and FP4 (4-bit). These low-precision operations reduce energy consumption and improve execution speed but require careful use to preserve numerical accuracy. This paper explores mixed-precision floating-point data types in numerical methods for solving high-degree polynomials and transcendental equations. We implemented Newton's method using FP32, FP16, and FP8 for different steps of the algorithm. We hypothesize that the derivatives can be computed in lower precision as quantization errors tend to average out over iterations, but residuals should be kept in high precision because they directly determine the convergence criteria through delta updates, avoiding premature termination. Our experiments demonstrate that using lower precision (FP8 or FP16) for derivative calculations while maintaining higher precision for residuals (FP32) and medium precision for root updates (FP16) achieves accurate results with 33% less computation and 35% less energy consumption per iteration. One key finding is that stochastic rounding is essential to prevent oscillations when converting data to lower-precision FP8/FP16. Additionally, we applied the Ehrlich-Aberth (E-A) method, which adds a correcting term to the derivative, to compute all roots including multiple roots simultaneously, yielding significant improvements in convergence and accuracy. Our results for four equations from different fields show that FP8 is sufficient for derivatives with scaled coefficients in equations having real roots. However, FP16 is necessary for derivatives to maintain accuracy while still reducing energy and computation costs for equations whose roots are complex or when using the E-A method. These results confirm that mixed-precision floating-point methods are a promising approach for scalable computing.

Zhu Gao

Discipline: Linguistics and World Languages

Authors:

Xiaoyi Zeng

Abstract Name: Relative Clause Structure in Chuj: Headed RCs, Headless Relatives, and Free Relative Constructions

This study examines the internal structure of relative clauses (RCs) in Chuj, specifically a dialect of this Mayan language spoken in San Sebastián Coatán in the Huehuetenango region of Guatemala, focusing on

headed RCs, determiner-headed headless RCs, and three types of free relatives. While Chuj RCs are post-nominal and formed without relative pronouns, little prior work has compared headed RCs, determiner-headed headless RCs, and the three types of free relatives found in this dialect. Through elicitation sessions with a native consultant, we constructed controlled RC pairs that varied subject type (full DP subjects vs. subjects expressed only through verbal agreement), WH-forms, determiners, and clause layering, while keeping tense, animacy, and lexical items constant. For headed RCs, we find a strong tendency for SVO word order when subjects are overt noun phrases, whereas RCs with agreement-only subjects surface as verb-only predicates that lack internal nominal structure. In multi-clause RCs, higher clauses pattern as SVO while lower clauses allow verb-initial alternations, suggesting structural compression in embedded domains. For headless and free relatives, determiner-headed forms behave like definite noun phrases (“the one that...”). WH-headed free relatives fall into three semantic types: maximal free relatives receive definite, uniquely identifiable interpretations; existential free relatives arise only under existential predicates such as *jax*; and free-choice relatives uniquely employ the operator *jalaaxa*. These findings clarify how Chuj uses WH-forms, determiners, and subject realization to encode meaning in different RC constructions, contributing to a broader understanding of how Mayan languages structure complex sentences.

Martina Garbutt

Discipline: Physics and Astronomy

Authors:

#1 Rachel Cueva

Abstract Name: Constraining Tidal Parameter of Binary Asteroids

This purpose of this research is to better understand and constrain characteristics of asteroids, specifically their tidal parameters. Studying asteroids is key step in understanding the formation/evolution of the solar system, developing planetary defense technology and using resources from bodies other than Earth. Tides arise from the gravitational interactions between bodies in close proximity to each other, potentially causing physical distortions to the surface of asteroids and energy loss. Tidal parameters consist of two values, Q and K , which determine the efficiency of energy loss and the internal structure of the body, respectively. Tidal parameters are a key component of small body dynamics and long-term asteroid evolution, yet we are still lacking information about this property. This property is relevant to all asteroids, but this research looks at binary asteroids, which is when two asteroids are in orbit around each other. Being able to better constrain such a vital property can help improve future telescope technology as well as spacecraft navigation by advancing our understanding of how asteroids move in space. By utilizing observational data of certain binary asteroids, as well as existing models for these types of small bodies, we create and code a numerical function to emulate how the behavior of binary asteroid systems changes with different Q and K values. The results from this research can examine the effects of current tidal models to derive measurement requirements needed for future telescopes and spacecraft to effectively constrain these values. Currently, there is no way to constrain tidal parameters of asteroids when conducting observational research, relying on crude estimations of what the parameters should be. Ultimately, this helps to better understand a key property in asteroid dynamics as well as improve upon future technology.

Guadalupe Garcia

Discipline: Chemistry

Authors:

#1 Jon Vander Woude

#2 Michael Bosscher

#3 Samantha Wind
#4 Ardelle Garcia

Abstract Name: Optimizing a Green Anti-Convulsant Synthesis with Safe and Accessible Materials

Phenytoin was discovered in 1908 by Heinrich Blitz and has been used to treat epilepsy since the 1930s. It is on the World Health Organization list of essential medicines. There are several routes to phenytoin and phenytoin derivatives, but yields are typically low. By experimenting with different published experiments in lab and in research, we found that we can make phenytoin without solvent and with a variety of bases including sodium carbonate and calcium oxide. As we continue to optimize this green synthesis, our hope is that the milder conditions used in our synthesis can help make a wider variety of phenytoin derivatives easily accessible.

Jaqueline Garcia

Discipline: Health and Human Development

Authors:
#1 Maria Reyes

Abstract Name: Impact Of Maternal Drug Use On Fetal Development And Newborn Dependence Timeline

Maternal use of opioids, alcohol, cocaine, and methamphetamine during pregnancy can disrupt fetal growth and brain development, resulting in complications such as low birthweight, preterm birth, congenital abnormalities, and long-term neurodevelopmental delays. This study aimed to examine the effects of maternal drug use on fetal development across pregnancy stages and to identify the timeline for potential newborn dependence and withdrawal. A systematic review of peer-reviewed journal articles, government health reports, and medical guidelines published between 2020–2025 was conducted using databases including PubMed, Google Scholar, and ScienceDirect. Keywords included prenatal drug exposure, fetal development, and Neonatal Abstinence Syndrome (NAS). Data were organized into summary tables illustrating fetal vulnerability, dependence onset, and newborn withdrawal risk by drug type. Results indicate that fetal susceptibility to drug-induced harm is highest during the first and third trimesters, when organ systems are forming and later maturing for life outside the womb. Early exposure is linked to structural defects, neural tube abnormalities, miscarriage, and Fetal Alcohol Spectrum Disorders (FASD), while late exposure is associated with NAS, low birthweight, preterm birth, and early developmental delays. Opioids carry the highest risk of neonatal withdrawal, often appearing 24–72 hours after birth and requiring pharmacologic intervention. Stimulants such as cocaine and methamphetamine cause neurobehavioral dysregulation and cognitive impairments, whereas alcohol primarily results in irreversible neurodevelopmental damage rather than acute withdrawal. These findings emphasize that the timing, dosage, and type of drug significantly shape fetal outcomes and newborn dependence patterns. They support the need for early prenatal screening, nonjudgmental counseling, accessible treatment for substance use disorders, and long-term developmental follow-up for exposed children. By clarifying critical periods of vulnerability and drug-specific risks, this research provides actionable guidance for clinicians, public health professionals, and policymakers to improve outcomes for both pregnant people and their infants.

Anahi Garcia

Discipline: Architecture, Construction Management, and Interior Design

Authors:

Abstract Name: Pearl Coffee Table for Luxury Modern Apartments That Integrate Sustainable Design Principles to Support and Raise Awareness of Ocean Health

Plastic pollution in the ocean is one of the most urgent environmental issues today, with millions of tons of waste entering marine ecosystems each year. Research shows that microplastics, chemical runoff, and degraded plastic particles directly harm oysters by clogging their filtration systems, reducing reproduction, and weakening the reefs they naturally build. As oysters struggle to survive, coastal ecosystems lose a key species responsible for filtering water, removing pollutants, and protecting shorelines. These impacts highlight the need for greater awareness of how everyday plastic use affects fragile marine organisms. This project explores how reclaimed materials, repurposed plastics, and low-emission finishes can be used to create a functional product that promotes sustainability and ocean protection for modern luxury apartment owners on the East Coast of California. The design centers on an oyster-inspired coffee table that symbolizes restoration and marine care. Soft curves and layered forms reflect the structure of oyster shells, while repurposed plastic components underscore the urgent need to reduce ocean pollution. Reclaimed materials and low-VOC finishes further reduce environmental impact and support healthier indoor air quality. By combining sustainable materials with symbolic, ocean-focused design elements, this project encourages responsible living and reminds users of the essential role oysters play in cleaning and protecting marine environments.

Isabella Garcia

Discipline: Nursing and Public Health

Authors:

#1 Isabella Garcia

#2 Avery Armstrong

#3 Jean Kerver

Abstract Name: Evaluating the Utility of the Family Nutrition and Physical Activity Screening Tool for Predicting Childhood Obesity in a Mid-Michigan Pregnancy Cohort

Childhood obesity can lead to serious long-term health consequences, including type 2 diabetes and cardiovascular disease (CDC, 2023). In 2020, 19.7% of children and adolescents were classified as obese, underscoring a critical public health concern. Early identification of at-risk children is essential for timely prevention. However, the influence of the home environment on obesity-related health behaviors remains unclear (Lindsey et al., 2006), and healthcare clinics currently lack standardized tools to assess these risks (Taveras et al., 2011). This study examined home environment risk factors associated with children's health behaviors using the Family Nutrition and Physical Activity (FNPA) screening tool. Our research question was: What is the association between FNPA risk scores and childhood obesity? We hypothesized that higher FNPA scores would be associated with lower BMI. We conducted a cross-sectional analysis using data from the Archive for Research in Child Health (ARCH), a prospective pregnancy cohort in Lansing, Michigan. FNPA scores were collected for 52 children aged 4–6 and 35 children aged 10–12. The tool assessed 10 subdomains of family routines and behaviors on a four-point scale, with higher scores indicating healthier environments. Child height and weight were measured, and BMI was calculated. Linear regression models evaluated associations between FNPA subscores and BMI, adjusting for sex, race, and age. Results showed that in 4–6-year-olds, the child activity subscore was significantly associated with BMI. Among 10–12-year-olds, both the healthy environment subscore and the overall FNPA score were significant predictors of BMI. These findings suggest that promoting physical activity, limiting screen time, and fostering supportive home environments may help prevent obesity. Incorporating family-based risk assessments, such as the FNPA, into

pediatric primary care could inform early prevention strategies. Future research should examine these associations longitudinally and across diverse populations to strengthen generalizability and causal inference.

Esteban Garcia

Discipline: Physical/Occupational Therapy and Speech Language Pathology

Authors:

#1 Esteban Garcia

#2 Melanie Ibarra

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Melanie Ibarra

Emily Saucedo

Abstract Name: The Effects of Repeated High-Intensity Aerobic Exercise on Pain Sensitivity: A randomized control trial

Pain is a prevalent and complex condition that substantially affects quality of life, highlighting the need to better understand mechanisms that can inform chronic pain treatments¹⁻². Athletes typically demonstrate higher pain thresholds and tolerance, often attributed to repeated high-intensity training and the resulting exercise-induced hypoalgesia (EIH)³⁻⁵. However, the effects of high-intensity exercise on pain sensitivity in non-athletic populations remain unclear. This study tested the hypothesis that multiple high-intensity aerobic exercise sessions would reduce pain sensitivity more than a single session through enhanced descending pain inhibition. Twenty pain-free participants aged 18 to 50 were randomly assigned to either a Multiple Exercise Session (MES, n=8, 4 high-intensity interval training (HIIT) sessions) or a Single Exercise Session (SES, n=12, 1 HIIT session) over two weeks. Exercise intensity was individualized using a graded exercise test (GXT) performed at 90% of the participant's peak power output. Changes in pain sensitivity were evaluated pre- and post-exercise using Quantitative Sensory Testing (QST), including conditioned pain modulation (CPM), Heat Tolerance (HTO), and Heat Threshold (HT). ANOVA revealed significant main effects of time for Heat Tolerance ($F = 5.66$, $p = 0.022$, $\eta^2 = 0.130$), Heat Threshold ($F = 6.56$, $p = 0.015$, $\eta^2 = 0.143$), and CPM Efficiency ($F = 4.41$, $p = 0.042$, $\eta^2 = 0.104$). However, no significant group $\times$ time interactions emerged (all $p > 0.05$), indicating MES and SES resulted in similar changes across all QST measures. Conclusions: This pilot study, part of an ongoing clinical trial (NCT07083219), suggests that high-intensity aerobic exercise can acutely modulate pain sensitivity and enhance endogenous pain inhibition in non-athletic adults. Contrary to our hypothesis, a single session produced similar effects to multiple sessions, suggesting that acute bouts may effectively modulate pain sensitivity. These findings warrant further investigation with larger samples to inform exercise-based interventions for chronic pain management.

Lluvia Garcia

Discipline: Education

Authors:

#1 Lluvia Garcia

#2 Ashley Villanueva

Abstract Name: Exploring the Impact of JSTEM on Mentors' Self-Efficacy and Self-Concept

In STEM mentoring, high self-efficacy and self-concept predict persistence in facilitating complex, inquiry-based learning. Self-efficacy refers to an individual's belief in their ability to successfully perform specific tasks, while self-concept reflects an individual's perception of themselves within particular domains. The Journalism, Science, Technology, Engineering, and Math (JSTEM) program is a month-long experience in which high school students design and conduct college-level research projects to address real-world problems. Mentors serve as facilitators, supporting students' project development, guiding inquiry processes, and encouraging connections between research and authentic contexts. This mixed-methods study included surveys and interviews to assess the impact of JSTEM participation on mentors' self-efficacy and self-concept. Quantitative analyses (survey) revealed self-concept was approaching significance ($p=0.08$), and while self-efficacy increased by 0.17 points, we found it was not statistically significant ($p=0.526$), likely due to the small sample size ($n=5$). However, qualitative data (interviews) revealed meaningful growth in mentors' perceived self-efficacy and self-concept. A chemistry mentor reflected, "I had to teach them that right then and there... I knew the content already, but I wasn't so sure if I [would] be able to teach it, and it worked out; in the end, they were able to understand." This demonstrates increasing confidence in her ability to apply prior knowledge in real teaching scenarios. An engineering mentor described a shift in understanding the nature of science, "science is not right or wrong. It's a process." This indicates growth associated with a stronger self-efficacy. A mathematics mentor shared, "And I want to keep on learning as well, because I know after this summer, I learned a lot, including science and its mathematics." This illustrates their emerging confidence outside of math, prompting a growth in self-concept. Mentors showed shifts in self-efficacy and self-concept through JSTEM participation, despite the small sample size.

Jeremie Garcia

Discipline: Biology

Authors:

#1 Julio Diaz-Perez

Abstract Name: Role of Extra-Erythrocytic Bodies as Metabolic Suppliers of Cartilaginous Tumors

Zhang et al. recently described a mechanism for O_2 delivery to cartilaginous tissue, independent of blood supply, via endogenous cytoplasmic hemoglobin bodies that act as oxygen carriers (1). This mechanism permits the survival of chondrocytes in their avascular environment. Chondrocytes persist in an oxygen-deprived niche, requiring continuous O_2 delivery from surrounding tissue. In our practice as bone and soft tissue pathologists, we observe these eosinophilic hemoglobin bodies in cartilage-forming tumors, which are among the most common neoplasms arising in bone. These tumors develop through cellular reprogramming that results in reacquisition of proliferation and chondrogenic differentiation potential. Like benign cartilage, cartilaginous neoplasms lack the blood vessel-rich microenvironment seen in other tumors (2). As they grow, they recapitulate embryonic intramembranous or endochondral ossification, making extrapolation from embryonic to neoplastic tissue plausible. We report eosinophilic cytoplasmic bodies across benign and malignant cartilage-forming tumors. These hemoglobin bodies were present in tumor types recognized in the current World Health Organization Classification for Tumors of Bone and Soft Tissue (3). Across tumor subtypes, the bodies show similar spherical morphology, ranging from 5 to 20 μm . Although not widely emphasized, eosinophilic bodies in cartilage-forming tumors are not new in diagnostic pathology. Del Rosario et al. first noted these structures as "hyaline bodies" in the cytoplasm and occasionally the extracellular matrix (4). Their study did not include embryonic or proliferative tissues, which may explain their reported absence in normal cartilage. While the origin and function were not established, the authors proposed possible sources, including accumulated secretory products or red blood cell-derived proteins, the latter aligning with

current findings (1). These eosinophilic bodies represent endogenous hemoglobin complexes that provide oxygenation in neoplastic cartilage. Targeting these structures may offer therapeutic potential, supported by Lucas et al. (5), who showed that polymerized hemoglobin co-administered with cisplatin attenuated tumor growth.

Alexia Garcia

Discipline: Biology

Authors:

#1 Meriem Bendaoud

Abstract Name: Unknown Microorganism from NJ Urban Runoff Exhibits Antibiofilm Hemolytic and Bactericidal Properties

Biofilms, communities of bacteria encased in an extracellular matrix, contribute to persistent infections and antibiotic resistance, posing significant challenges in healthcare. Identifying new antibiofilm agents is essential to address the growing problem of biofilm-associated infections. Natural antimicrobial compounds have been isolated from diverse environmental sources, including marine and soil bacteria. This study aimed to isolate microorganisms from urban runoff waters and evaluate their potential antimicrobial properties. Several unknown microorganisms were isolated, and antimicrobial activity was initially screened using the streak inhibition assay. Screening revealed one microorganism, designated N2, with notable antimicrobial properties. The streak inhibition assay showed variable inhibition of growth against several pathogenic bacteria, including *Staphylococcus aureus*, *Staphylococcus epidermidis*, and *Bacillus cereus*. N2 also displayed strong beta-hemolysis on blood agar plates, indicating the production of hemolytic factors. A cell-free extract of this isolate was further tested using a 96-well plate growth assay and antibiofilm assay. Results showed that N2 inhibited biofilm formation in *S. epidermidis* and *P. aeruginosa*, but enhanced biofilm formation in other bacteria. These findings suggest that N2 produces compounds with both inhibitory and stimulatory effects on biofilm development, along with hemolytic activity that may contribute to its pathogenic potential. Future studies will focus on identifying and characterizing this microorganism, as well as isolating the active compounds responsible for its antimicrobial activity.

Erika Garcia

Discipline: Architecture, Construction Management, and Interior Design

Authors:

Abstract Name: The Natures Nurture - Home Design for the Visually Impaired

Retinitis pigmentosa is part of a large group of hereditary retinal conditions involving one or several layers of the retina, causing progressive degeneration. The condition which involves both eyes is inherited and is generally diagnosed later in life. People with this progressive degeneration of the retina usually retain central vision until late in the disease, as the periphery slowly constricts. Individuals with RP will start to notice an increasing difficulty in night vision with progressive constriction of the visual field to tunnel vision of 20 degrees or less in the better-seeing eye, and total blindness eventually. When designing a home for those individuals with retinitis pigmentosa it is essential to consider wayfinding, contrast, lighting strategies, as well as how to create non-hazardous spaces with finishes and furniture placements. A great example of designing for visual impairment is the So & So Studio architects home design for their visually impaired client. Material options were taken into deep consideration with the play of different textures and how that

can help with wayfinding. The goal of this project is to create an environment where wayfinding and contrast serve as the top two foundational elements which guide all major design decisions for individuals with rp. A carpet tile and laminate flooring are used so the user can make her way through the home by feeling the different textures between the carpet and laminate. All finishes contrast within each other by using darker elements against lighter so the user can differentiate everything while navigating through her home. This design is meant to create a comfortable and safe space for the user. It will help them adapt to the new space which if they are led into legal blindness, they will know the space using materials.

Anahi Garcia

Discipline: Architecture, Construction Management, and Interior Design

Authors:

Abstract Name: Supported Apartment Living for Individuals with Epilepsy to Enhance Independence and Safety

Epilepsy affects millions of people nationwide, and many young adults struggle with daily challenges such as stress, transportation barriers, and limited access to specialists. These issues can increase seizure risks and make independent living difficult. This project explores how a supported residential apartment community can create a safer and more stable living environment that promotes comfort, independence, and emotional well-being for young adults living with epilepsy. By understanding the spaces and services that best support their needs, the project seeks to provide a reliable and uplifting alternative to traditional housing options. This research draws on case studies of supportive living campuses, a literature review on living environments for people with neurological conditions, and an interview with a young adult who has epilepsy. Together, these methods highlight the daily experiences, common triggers, and safety concerns that shape the direction of the design. The project uses these insights to guide the development of an environment that strengthens independence while reducing triggers. The design focuses on creating a calm, safe, and supported environment. Soft flooring, rounded furniture, dimmable lighting, and simple pathways help reduce injury risks during seizures. Natural light, indoor plants, and outdoor walking areas support relaxation and lower stress. On-site services such as medical help, therapy rooms, fitness areas, recovery rooms, and private housing units give residents the support they need while still allowing them to stay independent. A dedicated nursing staff area supports continuous monitoring, quick response to medical needs, and consistent care for residents. A pool, small grocery store, and social areas support daily routines and offer safe places to relax and build community. By including supportive services, natural elements, and community-centered spaces, this project creates a living environment that builds independence and helps young adults with epilepsy live with more confidence, safety, and a better quality of life.

Bethany Garcia-Cortez

Discipline: Nursing and Public Health

Authors:

#1 Michael D. Laiosa

Abstract Name: B-Cell Activation is Increased Following Exposure to Freshwater Algal Toxin Microcystin and Anabaenopeptin-B

Cyanobacteria naturally occur in freshwater lakes; however, in recent years, increased climate change and excess nutrient runoff have led to uncontrolled growth of these organisms, resulting in harmful algal blooms.

When a cyanobacterial harmful algal bloom (CHAB) forms, there is a high potential for toxin release into the lake, which could harm people and the environment. The only algal toxin regulated by the EPA is microcystin. However, this toxin is just the tip of the iceberg of what we know exists in our freshwater ecosystems. Therefore, this study aims to understand better the potential human health impacts of these non-regulated toxins, starting with a toxin called anabaenopeptin. Our research focused on the immune cell activation effects of these toxins, using a B cell line maintained in the lab with sterile techniques. Maintaining cell health involved microscopy and other lab tools. We grew the cells in nutrient-rich media and split them every two days. Then, we exposed them to the algal toxins for two hours and proceeded to stain and record B-cell activation. Initially, we tested both microcystin and anabaenopeptin-B in a controlled environment to define the effects of these toxins on the B cell antigen receptor signaling threshold. The doses of the toxins tested were below the levels of the EPA intervention for adults. Dosages used to conduct the experiments were 100 mg/L, 10 mg/L, and 1mg/L. We found that B-cells exposed to anabaenopeptin-B and microcystin were overly activated compared to the control B-cells. In the context of human cells, if these results occurred in people, it could potentially reduce the threshold necessary for normal B cells to become activated. The consequences of such a state might be higher levels of inflammation and potentially an elevated risk of developing an autoimmune disease.

Maria Garcia-Moya

Discipline: Chemistry

Authors:

#1 Maria Garcia-Moya

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Abstract Name: Exploring Chalcone Scaffolds as Sunscreen Candidates: Undergraduate Synthesis and Spectroscopic Analysis

Chalcones are highly conjugated molecules with strong UV absorption, making them promising candidates for the development of more effective sunscreen agents. Because UV radiation contributes to skin damage, ideal sunscreen molecules must absorb efficiently in the UV region; therefore, Lambda max (λ_{max}) values and molar extinction coefficients are key indicators of a compound's protective potential. In this project, we explored how structural changes influence these photophysical properties by proposing and synthesizing our own chalcone derivatives using the Claisen–Schmidt condensation. Each compound was characterized by melting point and UV-Vis. spectroscopy to assess its UV-absorbing ability. We observed that electron-donating substituents, particularly methoxy groups, increased absorbance intensity and shifted λ_{max} to longer wavelengths. Our findings support chalcone scaffolds as promising UV- protective molecules and demonstrate the value of connecting organic synthesis with functional molecular design.

Alexandria Gardner

Discipline: Art History

Authors:

Abstract Name: Saul Bass and the Art of Simplicity

This paper discusses the design legacy and cultural impact of Saul Bass, a designer whose philosophy of “less is more” reshaped both film intro sequences and corporate branding. Beginning with his introduction to European modernism in the 1940s, Bass developed a style rooted in strong symbolism, simplified forms, and mixed-media experimentation. Influences from Cubism and Neoplasticism helped him find the visual language he became known for, with clean shapes that he intentionally “roughed up” to create something powerful and memorable. Bass carried this approach into film, where he completely changed the purpose of the title sequence. Before Bass titles were often simple typography slapped onto the screen, and he saw this as an opportunity to make them great. His collaborations with directors like Otto Preminger, Alfred Hitchcock, and Martin Scorsese led to iconic openings that are still widely remembered to this day. Outside of film, he brought this straightforward way of thinking into corporate branding, creating well-known logos for AT&T, United Airlines, and Warner Bros., and more. It also examines Bass’s quite flawed personality, as he could be stubborn, self-focused, and unwilling to credit the people who worked with him, while also recognizing how important his wife, Elaine, was to his work. Even with these flaws, Bass’s dedication to his craft shines in his work, inspiring both designers and filmmakers alike. In the end, the paper argues that Saul Bass did more than influence film and branding; he also changed the way designers understand visual storytelling as a whole.

Michael Gardner

Discipline: Biology

Authors:

#1 Michael Gardner

Abstract Name: Wee Beasties: The Evolution of Tyrosine Kinase Activity and Chance, Contingency, and Necessity in Evolution

A central question in biology is the extent of predictability in evolutionary outcomes and the relative roles of chance and contingency on this predictability. Since we cannot directly observe the past, the effects of chance and contingency are unknown. However, we could infer their effects by comparing the outcomes of repeated evolutionary events. Chance predominating would cause independent evolutionary events to produce variable outcomes, while contingency predominating would cause variable outcomes to depend on where evolution started. If the outcomes of evolution were always the same, there is evolutionary necessity (the absence of chance and contingency) and there was a single route available to evolution. Unfortunately, most traits evolved once and this analysis has been inapplicable. The repeated and independent evolution of tyrosine phosphorylation activity offers an exception. Here, we determine the genetic and molecular basis for tyrosine kinase (TK) activity for one instance: the Wee kinase family. Using maximum likelihood analysis, we reconstructed a phylogeny of related kinases and mapped known phosphorylation capabilities onto it, determining when and how the Wee family gained TK activity. We refined our analysis using structurally validated sequence alignments. Future work will use this phylogeny to reconstruct the last common ancestor of Wee and related kinases and identify the genetic changes that conferred kinase activity. We will then compare the sequences and evolutionary mechanisms against those of TK activity in other kinase families, allowing us to determine the relative roles of chance and contingency in the evolution of acquired function for the first time.

David Garey

Discipline: Biochemistry

Authors:

Abstract Name: Increasing Sorafenib Efficacy in Hepatocellular Carcinoma via ECT2 siRNA Knockdown

This project evaluates if short-interfering RNA (siRNA) targeting the ECT2 oncogene can increase the vulnerability of hepatocellular carcinoma (HCC) cells to sorafenib (FDA-approved chemotherapy for liver cancer), thereby reducing the effective dose of the drug required for treatment. HCC is one of the most common and deadly liver cancers with only a 22% 5-year survival rate. Not only are the survival rates dismal, but chemotherapy treatment results in many side effects. Lowering the effective concentration of sorafenib required for treatment could greatly improve patient outcomes. siRNA provides a highly-specific mechanism for silencing the expression of unwanted genes by targeting only the mRNA it is programmed to bind to. ECT2 is an oncogene that is commonly overexpressed in liver cancers, causing tumor growth by inhibiting natural cellular processes like apoptosis and increasing cell proliferation. PP5 cells, a commonly studied liver cancer cell line, were grown and seeded into two 96-well plates. One of these plates was treated with ECT2 siRNA and one was left as a control. Then, a series of chemotherapy dilutions were used to treat individual columns in the plate. An MTS Assay was used to determine the concentrations of viable cells left in each well. Initial data shows that treatment of cells with combined sorafenib and siRNA significantly reduces the IC50 compared to treatment with sorafenib alone, indicating improved drug effectiveness at lower concentrations. Future experiments will test the treatment across multiple HCC cell lines to determine consistency of the treatment in a variety of genetic environments.

Tanisha Garg

Discipline: Biology

Authors:

#1 Krithika Iyer

#2 Driti Patel

#3 Karianne Zamiar

#4 Jaydeepbhai Patel

#5 Devon Winchester

#6 Sidney Rippey

#7 Hiroshi Saito

#8 Samir Patel

Abstract Name: Hematological and Cytokine Changes in a Rat Model of Spinal Cord Injury Post-Sepsis Survival

Spinal cord injury, also known as SCI, is a serious condition that leads to paralysis of both motor and sensory parts of the body. As time goes on, SCI will impact one's quality of life, as well as a decreased life span. Systemic infections, more commonly known as sepsis, is an infectious dysregulated inflammatory response, potentially leading to organ failure, tissue damage, and in severe cases, death. Populations of SCI had worsened symptoms due to a primary complication of sepsis, increasing the mortality rate. However, there is no experimental model studying the complications of post-sepsis spinal cord injury, which is what this study is aimed towards. Rats were divided into four experimental groups: sham, SCI, sepsis, SCI+sepsis. Spinal cord was contused at the T10 spinal level at 200 kDyn using an Infinite Horizon (IH) Impactor. At 15 minutes post-injury, sepsis was induced through injection of 3ml cecal slurry (i.p.). Animals were properly monitored, treated with antibiotics and resuscitated with fluids starting at 8 hours post-SCI/post-sepsis, continuing twice daily for the next five days. CBC analysis revealed a decrease in red and white blood cell counts, along with reduced hemoglobin levels, indicating impaired oxygen-carrying capacity following SCI, Sepsis, and SCI+Sepsis in a time-dependent manner, with a more pronounced effect in the SCI+Sepsis group. These findings align with increased inflammation observed in cytokine analysis of serum samples, which showed elevated levels of IL-6 and TNF- α . A detailed analysis of differential blood parameters is ongoing.

Sanjana Garlapati

Discipline: Political Science

Authors:

#1 Eric Chan

Abstract Name: Lost in Translation: The Hidden Gaps in ACS Data

Researchers frequently rely on the American Community Survey to study how the Affordable Care Act shaped health insurance coverage, particularly through Medicaid expansion, yet recent work shows that respondents do not always report their Medicaid coverage accurately and sometimes skip the question entirely. These gaps matter because missing or inconsistent data can distort estimates of coverage changes after major policy reforms. Despite extensive research on the ACA, no study has examined whether Medicaid expansion itself influenced missing Medicaid coverage data in the ACS. This project addresses that gap by asking how Medicaid expansion affected the likelihood that respondents left the Medicaid coverage question unanswered. Using ACS microdata from 2011 to 2018, I begin with descriptive visualizations comparing missingness trends in expansion and non-expansion states and then assess how missingness varies across groups defined by employment status, race and ethnicity, and citizenship. I then employ a difference-in-differences approach to estimate the causal effect of Medicaid expansion on missingness, taking advantage of variation in when states adopted the policy. Preliminary results show clear and consistent differences after 2014: missingness rises more sharply in expansion states, particularly among unemployed adults, individuals not in the labor force, and several Hispanic subgroups. These patterns suggest that Medicaid expansion may have changed how respondents interpreted or reported their coverage as eligibility rules and enrollment processes shifted. The findings point to an important but understudied consequence of major health policy reforms: they may reshape not only who becomes insured but also the quality of the survey data used to measure those outcomes.

Lee Garman

Discipline: Chemistry

Authors:

#1 Julie Pigza

#2 Francis Kekessie

Abstract Name: Synthesis of α -Substituted β -Nitroalkene Scaffolds for Use in Organocatalyzed Reactions

Chiral α - and β -amino acids and esters are widely found in nature and in pharmacological or biologically relevant molecules. Due to their importance, versatile and efficient syntheses of these chiral building blocks are of great interest in the pharmaceutical industry. Squaramide organocatalysts are alternatives to metal catalysts that can catalyze a wide range of reactions by taking advantage of noncovalent interactions to activate one or both substrates stereoselectively. We previously developed an enantioselective organocatalyzed reaction of masked acyl cyanides (MAC) to β -nitrostyrenes as a complementary method towards the synthesis of chiral β -amino acids and esters. Based on the high yields and high enantioselectivity of the prior reaction, we propose to extend this chemistry to α -substituted β -nitrostyrenes to probe the diastereoselectivity. Preliminary investigation using MAC addition to a cyclic α,β -nitrostyrene substrate favored one major diastereomer. We propose to study the applicability of this reaction through the synthesis of various cyclic and substituted nitroalkenes as scaffolds. These include the nitration of alkenes such as

cyclohexene, benzofuran, indene, 1,5-cyclooctadiene, norbornene, annulene, and 1,4-dihydronaphthalene. The future work will be to explore the conjugate addition of MAC to these scaffolds as a route to access chiral amino acids.

Shamari Garnett

Discipline: Nursing and Public Health

Authors:

#1 Sara Moyer

Abstract Name: Postpartum Mental Health and Wellness in African American Women

Postpartum mental health conditions (such as postpartum depression) affect up to 15 % of mothers. Rates in the United States are higher for African American women. Additionally, African American women are less likely to be screened for symptoms, less likely to have their symptoms identified even when they do complete a screening and therefore are less likely to receive care. This literature review and annotated bibliography focuses on postpartum mental health and specifically hones in on how it affects African American Women with the goal of exploring out what was causing that gap in the statistics, and to figure out how it could possibly be addressed in the future to impact positive change in these outcomes. The most important key findings of this research experience highlighted three themes that may contribute to these high rates and gaps in the statistics: historical trauma, superwoman phenomenon, and representation and shared identity. I plan to continue to further this research with Dr. Sara Moyer through the Spring 2026 semester putting to use training in qualitative research methods. After that, I plan to attend graduate school to become a Women's Health Nurse Practitioner and elaborate even further on this research in the role of a Women's Health Nurse Practitioner caring for postpartum women.

Jessica Garoutte

Discipline: English and Literature

Authors:

#1 Jessica Garoutte

Abstract Name: How Lollard Theology Challenged the Church's Community in Early 15th-Century England

In this paper I will explore how Lollard theology, in the 15th century, challenged how the everyday person was expected to engage with their local community according to the standards defined by the medieval English church. Specifically, I will answer this question: how did Lollard theology create an alternative way of thinking about community in medieval England, and particularly in the Diocese of Norwich? The Lollards set themselves apart from societal normality with their radical (and therefore heretical) views resulting in some of their members facing an inquisition c. 1428-1431 held in the Diocese of Norwich; thus, providing documentation of particular theological views that they held. This paper will include the views and writings of John Wyclif, but not in exclusivity; therefore, expanding the scope to include the Lollard peoples once they had the opportunity to standardize their theology. Through this research, I show that the Lollards were able to challenge the community framework that the Church had established through their own theology. Through a comparative analysis of church court records, Lollard sermons, and key Lollard theological tracts, I will demonstrate core Lollard beliefs and the impact that they had on their community life. By concentrating on how the Lollards' views on the Church's sacraments differed with respect to their impact on community routines, I show how the Lollards' actions shaped behavior around baptism, marriage, and the annual cycle of

lent, confession, and participation in the Eucharist. In addition, I demonstrate how the Lollards' ideas of priesthood challenged the Church's sense of the community hierarchy, which they (the Lollards) deemed too worldly and too focused on ostentatious ceremony and earthly concerns.

Albany Garrido

Discipline: Biology

Authors:

#1 Sabyasachi Moulik

Abstract Name: Integrating Social Determinants of Health in Undergraduate Medical Education: A Systematic Review of Teaching Approaches

Social determinants of health (SDOH) “are the conditions in which babies are born, grow, live, work, and age – including the wider set of forces and systems shaping the conditions of daily life,” as defined by the World Health Organization (WHO). These determinants have the greatest impact on a patient’s health and are responsible for most population-wide disparities in health, but undergraduate medical education has been slow to integrate these SDOH into its curriculum. This systematic review of the literature adhered to Preferred Reporting Items for Systematic Reviews and Meta-Analyses (PRISMA) 2020 criteria while searching for successful teaching strategies that prepare medical students to address SDOH in patient care. A thorough search of the scientific databases PubMed and Scopus was carried out, resulting in 1,049 records. Out of the peer-reviewed publications within the last 15 years on medical students, with quantifiable outcomes related to SDOH and that met inclusion criteria ($n = 10$), all were included in the final synthesis. From this analysis, four teaching approaches are emphasized: experiential learning, longitudinal integration, interprofessional and reflective practice, and institutional capacity and faculty development. Data showed that multi-year, hands-on programs truly helped students build empathy, systems thinking, and advocacy skills. However, most medical schools still rely heavily on short, lecture-style SDOH teaching, despite its clear limitations. National survey data from Lewis et al. and Campbell et al. support that SDOH instruction continues to be predominantly lecture-based, variably integrated, and inconsistently evaluated throughout medical education. These results emphasize that ongoing, reflective, and institutionally sustained frameworks are necessary to adequately equip future physicians with the tools needed to address SDOH and promote health equity in clinical settings.

Kalleigh Garrison

Discipline: Environmental Science and Sustainability

Authors:

#1 Kalleigh Garrison

Abstract Name: Nurse Sharks’ Captive Care: How Changes to the Care Plans of Nurse Sharks May Increase the Suitability of Captivity for Marine Life in Commercial Aquariums in the United States

Ginglymostoma cirratum (nurse sharks) are one of the most prominent species of elasmobranchs kept in captivity due to the general notion that they are lower maintenance and more suitable for a captive environment. Given the diminishment of the natural habitat for many elasmobranch species, the research on sharks in captivity has become imperative to the understanding of their physiological make-up as well as the functions of their biological systems. This comprehensive review analyzes peer reviewed sources on the reproductive, dietary, and movement habits of nurse sharks in captivity and how it reveals aspects of their

physical and cognitive health. The health of species in captivity is important to be able to maintain them safely and with as much accuracy to their natural habitat as possible, in order to ultimately gather accurate data on their habits and their inhibitions to proper flourishing. This detailed analysis displays that more research is being conducted on the reproductive capabilities of sharks in captivity and how their diet and movement affects their ability to execute their natural physiological functions. This data may be able to exhibit how to properly feed sharks in captivity as well as what to feed them in order to optimize their livelihood and capabilities. These studies are additionally collecting data on more abstract ideas of care in captivity including sense stimulation and habitat construction that are new concepts within this field of study that could potentially further our understanding of the needs of an imperative but under-researched population. This thorough review studies the research on nurse sharks and other small, benthic sharks in captivity and develops a construct of how animal care experts could include new and different methods of care in order to best study and care for the sharks in their institutions.

Candice Garwood

Discipline: Interdisciplinary

Authors:

Abstract Name: Milk Teeth (A Vignette Collection on Loss & Coming of Age)

The loss of milk teeth, otherwise known as baby teeth, is often associated with a transition from childhood to adolescence. Milk Teeth is a coming of age text centered on the reflections of a young Jamaican girl, Ciara, as she traverses childhood and adolescence. Milk Teeth serves to creatively highlight social issues impacting the lives of children within the Caribbean, particularly in Jamaica. The work explores prominent Black and Global Studies themes such as family dynamics, loss, identity, socioeconomic disparities and migration. A vignette (short literary passage) structure is utilized to encourage the reader to analyze the narrator's personal experiences and draw parallels between said experiences and broader ones within the Afro-Caribbean context. Vignettes in Milk Teeth are interrelated, with each one consisting of unique memories and observations, through which the main themes are reflected.

Leah Gashaw

Discipline: Chemistry

Authors:

#1 Malak Abdelaziz

#2 Pabitha Gnanamani

#3 Deana Jaber

Abstract Name: Integrating Case-Based Learning into NMR Instruction with Real Antibiotic Examples

Rising antibiotic resistance underscores the urgent need to develop therapeutics effective against drug-resistant bacteria. Antibiotic misuse-particularly in low- and middle-income countries has accelerated the spread of antimicrobial resistance (AMR), rendering many once-manageable infections increasingly difficult to treat. Lolamicin, a recently developed Gram-negative antibiotic, exhibits potent activity against more than 130 multidrug-resistant clinical strains. Its pyridinepyrazole and pyridineimidazole scaffold, along with its unique mechanism of action, contribute to its selective activity and make it a compelling example for students learning how chemical structure relates to biological function. Following the discovery and synthesis of antibiotics like lolamicin, chromatography and spectroscopy techniques are essential for confirming structure

and purity. Although undergraduates are typically introduced to NMR as a tool for identifying unknown structures, they often lack exposure to the real-world examples used in the pharmaceutical industry. To address this gap, we developed a case-based learning activity designed to help students connect foundational NMR spectroscopy concepts to drug characterization encountered in research. In this case study, students use a benchtop NMR to collect and interpret spectra of lolamicin and levofloxacin, identifying functional groups, splitting patterns, integration values, and chemical shifts. The activity encourages students to apply chemical reasoning, compare structural features of two clinically relevant antibiotics, and explore how structural differences relate to mechanism and activity. In addition, the case study aims to strengthen students' understanding of antibiotic misuse and AMR, reinforce core NMR concepts, and highlight the interdisciplinary nature of drug discovery at the chemical biology interface. By analyzing spectra of both drugs, students determine key structural features and gain hands-on experience with techniques routinely used in modern pharmaceutical research, equipping them with skills that support undergraduate research and strengthen their overall career readiness in scientific and biomedical fields.

Leila Gautier

Discipline: Biochemistry

Authors:

#1 Leila Gautier

Abstract Name: Analyzing the Proteolytic Activity of the SPRTN-Nudix Domain

DNA-protein crosslinks (DPCs) is a common form of DNA lesions, which proteins covalently crosslink to DNA due to exogenous factors such as radiation or a chemotherapy drug, or as a by-product during DNA metabolism. Removal of DPCs is essential for cell survival as the blockages caused by DPCs can interrupt DNA activities such as replication and gene expression. SprT-like N-terminal domain or SPRTN (also known as Spartan or DVC-1) is a mammalian metalloprotease that selectively targets DPCs. Mutations in SPRTN are often deadly, leading to diseases such as Ruijs-Aalfs, a rare condition that causes early aging and hepatocellular carcinoma. Despite the critical role of SPRTN in cells, the regulatory mechanism that enables SPRTN to specifically target DPCs remains to be further studied. SPRTN has been found to contain a NUDIX Homology Domain (NHD) that is structurally related to the NUDIX motif but lacks ADP-ribose hydrolase activity. In this study, we examine the 4 specific amino acid sites within the NHD domain on poly-ADP-ribose (PAR) cleavage and its proteolytic activity on DPC removal. To study this, we aim to 1) introduce point mutations within the NUDIX domain via site-directed mutagenesis, 2) optimize expression and purification of the recombinant SPRTN wild-type, NUDIX, and four NUDIX mutants in E.coli, 3) conduct in vitro PAR degradation assays to examine the impact of the NUDIX mutant on PAR degradation compared to the NUDIX, and wild-type. Overall, this project provides insight on the biochemical mechanisms of SPRTN, potentially leading to new opportunities for researchers in the field and potentially life-saving treatments and technologies to be developed.

Elise Gaymon

Discipline: Art History

Authors:

Abstract Name: Tibor Kalman: Hazard or Hero?

Tibor Kalman was celebrated as the “bad boy” of graphic design, with his striking, activism-driven works that set him apart as an influential designer, as well as a leader in activist movements against corrupt actions in the corporate world. This paper explores his journey, from his beginnings as a Hungarian immigrant, through his rise to the top through his very own magazines, M&Co. and Colors. The paper also explores how Kalman broke away from traditional design principles, taking a more radical approach for global awareness and critique of what he stood against, even going as far as rejecting unethical clients and directly confronting consumerist values and ideas. Tibor’s commitment to criticizing unethical and corrupt business practices earned him respect from fellow designers and activists alike, who admired how he used his work as a means for change. However, Kalman’s actions also caused him to be seen as a threat in the eyes of the companies he criticized, as their reputations relied on how the public saw them. This paper demonstrates Kalman’s design practices and how it worked as both activism and provocation of corporate entities, and ultimately argues that these practices are where Tibor Kalman’s legacy lies.

Jose Gaytan

Discipline: Biology

Authors:

#1 Sean Schoville

Abstract Name: Evolution and Conservation of Ice Crawlers

Ice crawlers are a rare group of cold specialized insects that inhabit montane areas, caves, lava tubes and canyons. These areas are typically characteristic of colder regions, which makes these environments and ice crawlers particularly vulnerable to past and present climate change. The goal of this proposal is to understand how climate change has historically affected the genetic differentiation of the ice-crawlers in the family Grylloblattidae through population genetics. Historical glacial periods have been hypothesized to have a significant effect on the biodiversity of ice crawler populations and contributed to present day levels of genetic diversity. Glacial expansion resulted in ice crawlers dispersing to higher altitudes. Due to their low vagility, isolation was prominent and is what likely resulted in the biological diversity of current Grylloblattidae populations. This study focuses on reconstructing responses of ice crawlers to glacial cycles in the vicinity of the southern Cascades Range. Samples will go through a reduced representation genome sequencing process to measure variation, estimate relationships and reconstruct demographic changes. The results will be correlated with glaciation events to understand the effects of past changes in climate on genetic diversity among ice-crawler populations. If speciation in phylogeny aligns with historical glacial cycles with low levels of efficient dispersal, then it can be concluded that glaciations impacted the diversification of Grylloblattidae populations. Understanding historical climate effects can provide insight into ice crawler genomics and would help to make predictions about the impact of future climate changes.

Tsegay Gebremeskel

Discipline: Computer Science

Authors:

Abstract Name: Evaluating Machine Learning Approaches for Safer and More Reliable Autonomous Driving

Machine learning and deep learning have now become central in how an autonomous vehicle views the road, makes decisions, and communicates with other cars and infrastructure. Recent work has demonstrated strong progress in areas such as lane detection, object detection, trajectory prediction, traffic forecasting, and vehicle-to-vehicle communication, using models such as U-Net, YOLO, and CNN-based lane detectors, Deep Q-Learning, CNN-LSTM traffic models, and Random Forest-based security frameworks. When looking more closely across these studies, a number of consistent gaps appear. First, most of the models are trained on narrow datasets from specific cities, highways, or weather conditions, which makes it difficult to trust their performance on unstructured roads, developing regions, or under adverse environments, including heavy rain, fog, or night driving. Many studies focus on accuracy scores but give limited evidence of how the models perform in real time on vehicle hardware, how they cope with sensor faults, or how they respond to corrupted or malicious data. Perception, planning, connectivity, and security are also often treated as separate rather than as parts of one system that needs to work together in real time. To address these issues, this project examines a wide range of recent research and compares how different approaches tackle perception, control, communication, and safety. The aim is not only to summarize what the field has achieved but also to clarify where current methods fall short when applied outside controlled datasets and simulation environments. This project reviews recent research across these areas, identifies common limitations, and outlines directions for more generalizable, multi-sensor, and security-aware models that respect real-time constraints. The goal is to highlight what is missing today and what is needed next for safer and more reliable autonomous driving.

Ava Geer

Discipline: Business

Authors:

#1 John O'Neil I

Alyssa Ramundo

Abstract Name: Optimizing Health Insurance Costs through Quantitative Data Analysis for a Nonprofit Organization

Identifying and understanding the underlying factors that drive rising health insurance costs is essential for effective cost management, particularly within the nonprofit sector. Many nonprofit organizations lack the capacity to conduct in-depth analyses of health insurance claims data, which can hinder their ability to make informed decisions. This research, conducted collaboratively within a data analytics team, sought to determine the most significant cost drivers within a comprehensive insurance cost claims dataset through a structured process of data cleaning, data mining, and cost driver assessment. The analysis began with an extensive data cleaning phase to remove duplicate entries and claims containing missing or inconsistent values. Addressing these inaccuracies was critical, as such discrepancies could distort mean cost estimates, trend analyses, and subsequent interpretations. After establishing a reliable dataset, data mining techniques were applied using both Excel and RStudio to perform exploratory data analysis from multiple perspectives. Data mining served as a foundational step in uncovering hidden patterns, relationships, and anomalies that could suggest potential cost drivers. To further refine these insights, regression tree modeling—a recursively partitioning statistical method—was employed to identify and visualize the key variables most strongly associated with insurance claim costs. This model provided a clear structure of influential factors, enabling a deeper understanding of how specific variables interact to shape overall cost trends. The combined approach of data cleaning, exploratory data mining, and recursive partitioning produced data-driven insights highlighting the primary contributors to the nonprofit's health insurance expenditures. By integrating these

findings into strategic decision-making, nonprofit organizations can more effectively allocate resources, negotiate insurance plans, and enhance long-term financial sustainability.

Ellen Geis

Discipline: Psychology

Authors:
#1 Ellen Geis

Abstract Name: Improving Confidence and Self-Efficacy with the Unsung Creatives Project

This research investigates if completing and sharing creative work publicly can improve confidence and self-efficacy. Research was conducted through a literature review and a quantitative and qualitative study on the Unsung Creatives Project (UCP) – an original eight-week participatory arts program (PAP) created by the researcher to coach participants in completing a creative project, culminating with them sharing their work at a public showcase. Existing research on the relationship between sharing creative work and confidence and self-efficacy was limited, but did show that effectively designed PAPs and group coaching programs with an emphasis on creativity can improve confidence in participants. Further research into strategies to improve confidence and self-efficacy correlated with the qualities of effective PAPs and were integrated into the design of the UCP curriculum, which aimed to support participants in improving their confidence and self-efficacy through the creative process. The UCP strategies included cultivating a supportive group atmosphere, targeting “inner critic” thoughts with self-compassion and mental reframing, strengthening participants' relationships to their creative instincts as a way to build trust and belief in themselves, project management techniques, and more. The seven participants were given quantitative and qualitative surveys during weeks one, five, and eight to track their progress. Observational field notes were taken after each meeting to further record efficacy. The quantitative and qualitative data showed significant improvements in participants' confidence (+45%), self-efficacy (+28%), self-compassion (+43%), relationship to creativity (+63%), and mental well-being (+72%), and a significant decrease in self-doubt (-24%). The results of this study suggest that completing a creative project and sharing it publicly can improve confidence and self-efficacy, with additional transformative changes that support quality of life beyond the creative work. The quantitative findings will be presented alongside excerpts from the curriculum and film clips, participant quotes, and photos from the showcase.

Emma Gendreau

Discipline: Education

Authors:
#1 Edward Carter

Abstract Name: Family Engagement for Culturally Diverse Families in Special Education

Family engagement is a critical factor in supporting students with disabilities during the transition from high school to adult life. However, families from culturally and linguistically diverse (CDL) backgrounds often face barriers that make it difficult to stay involved during this process. This research answers the question “How can teachers’ improve family engagement with parents of students with special needs from multicultural backgrounds when transitioning from post-secondary school?” by exploring how educators and parents in New Bedford Public Schools (NBPS) experience family engagement during secondary transitions and how it might be improved. Fifteen educator interviews and fourteen parent interviews were conducted,

alongside surveys of post-school outcomes for students exiting special education. Interviews were transcribed, coded, and analyzed for themes. Results showed that both groups identified barriers such as language differences, communication that often only focused on problems, lack of training for educators, and time constraints. Parents also reported feeling unclear about their role in engagement. Both groups emphasized the need for more consistent, positive, and culturally responsive communication. Based on these results, a five-factor Family Engagement Model was developed: (1) Culturally & Linguistically Responsive Communication, (2) Balanced Communication Practices, (3) Shared School-Wide Responsibility, (4) Family Education & Empowerment, and (5) Student-Centered Engagement. This model provides realistic strategies to strengthen collaboration between schools and families, ensuring transition planning is more inclusive, empowering, and effective.

Isabella Gensler

Discipline: Gender, Ethnicity, Diversity, or Cultural Studies

Authors:

#1 Isabella Gensler

#2 Cathleen Rhodes

#3 Kenny Wilcox

Kenny Wilcox

Abstract Name: Zodiac, Knights, and Miss Gay America: Discovering Queer History in the Coastal South

This research project examines the historical significance and cultural impact of House of Camelot, a Norfolk, Virginia based drag organization active from 1974 through the late 1990s and foregrounds the challenges of researching understudied queer histories. Although House of Camelot played a pivotal role in shaping the region's queer social landscape, it has received minimal scholarly attention, reflecting a pattern in which local queer communities, particularly outside major metropolitan areas and in the South, remain under documented. Consequently, this project reconstructs the story of House of Camelot and positions the research process as a case study in recovering local queer pasts. Methodologically, the project draws on community-based archives that recognize the fragmentary nature of queer material culture. Primary sources include Our Own Community Press, Norfolk's gay newspaper that publicized House of Camelot events, as well as surviving flyers, correspondence, photographs, and audiovisual materials from personal collections and informal archives. Since much of the group's documentation has been dispersed, damaged, or never formally preserved, the project relies on close reading of event descriptions such as the Miss Zodiac Pageant, benefit gong shows, and the Miss Gay USA pageant, to piece together the organization's cultural presence. This approach highlights both the limitations and the unique interpretive opportunities in researching marginalized histories whose traces persist in community memory and transient media. Preliminary findings indicate that House of Camelot functioned as a vital hub for creative expression, mutual support, and queer visibility during a period of intense social stigma. By documenting these histories, the project demonstrates that recovering local queer archives not only preserves overlooked narratives but also reshapes broader understandings of drag culture and queer community formation in the late twentieth century. Ultimately, this study underscores the importance of locally grounded research in illuminating the interconnected, community-centered nature of queer cultural production.

Neil George

Discipline: Engineering

Authors:

Abstract Name: Creating an Affordable Bioreactor to Expand Access to Cell-Based Treatments and Biomanufactured Medicines

This project aims to design and construct a low-cost, small-scale bioreactor using engineering components, including an Arduino control system and a culture vessel. Bioreactors are essential tools in biotechnology for growing cells, yeast, and bacteria for purposes such as creating enzymes or vaccines. Commercial systems are usually too expensive for students, early-stage researchers, and community laboratories. This project addresses that gap by developing an affordable yet efficient reactor that maintains sterility, provides controlled air flow, and enables monitoring of conditions necessary for cell growth. The overarching objective of this project is to streamline a process for creating transportable bioreactors that can be outfitted for different purposes. Although the initial prototype focuses on organisms like yeast and chlorella, the same framework can be applied to support other cell types grown, such as mammal cells used in manufacturing antibodies, insect cells used for producing vaccines, or engineered bacteria used for producing therapeutic proteins. Developing a reproducible, affordable system for growing and harvesting diverse cell systems contributes to a plethora of goals in biotechnology accessibility. Specifically, simplified bioreactor designs have the potential to reduce the barrier to producing materials like viral vectors, weak viruses used to deliver therapeutic genes in a harmless manner, and recombinant proteins, which are useful proteins made by genetically modified cells. This can make gene therapy research and training more attainable for smaller institutions. The methodology includes iterative prototyping, performance testing, and comparison of oxygen-transfer efficiency between bubble-column and airlift configurations. Expected results include demonstrating that a reactor, with a budget of \$500, can reliably sustain microbial cultures, achieve meaningful mixing, and support applications such as biomass production, wastewater nutrient removal, and preliminary biomedical research. This work will be presented in the context of expanding accessibility in biotechnology education and creating flexible tools for future bioengineering applications.

Allisa George

Discipline: Biology

Authors:

#1 Kawsar Chowdhury

#2 Abhinav Yenduri

#3 Erica Holliday

#4 Vishnu Suppiramaniam

Abstract Name: Glutamate Receptor Modulation by Polysialic Acid in Hippocampal Synaptic Plasticity and Cognitive Function

Glutamate receptors, including the α -amino-3-hydroxy-5-methyl-4-isoxazole propionic acid (AMPA) and N-methyl-D-aspartate (NMDA), are essential mediators of excitatory neurotransmission and underlie synaptic plasticity, the fundamental cellular process that supports learning and memory. AMPA receptors generate rapid synaptic responses, whereas NMDA receptors serve as key modulators of activity-dependent synaptic strengthening. The neural cell adhesion molecule (NCAM), a transmembrane glycoprotein involved in neurite outgrowth, cell migration, and synapse formation, acquires enhanced functional capabilities when modified by polysialic acid (PSA), a negatively charged carbohydrate polymer. Although previous studies suggest a role for PSA in glutamatergic neurotransmission, its precise contribution to hippocampal long-term potentiation (LTP) and long-term depression (LTD) remains insufficiently defined. Methods: This investigation assessed the concentration-dependent impact of PSA on hippocampal synaptic plasticity. Field Electrophysiological analyses were performed to determine the effects of PSA on LTP and LTD induction, and single-channel recordings were used to quantify changes in synaptic AMPA receptor-channel function. Results: Our data demonstrate that PSA significantly enhanced LTP and decreased LTD. These effects were associated with a dose-dependent increase in the probability of synaptic AMPA receptor-channel function,

indicating a critical role for PSA in modulating synaptic strength. Conclusion: These findings position PSA as a key regulator of neuronal plasticity and highlight its potential as a novel therapeutic for enhancing cognitive function. By elucidating the molecular mechanisms that support learning and memory, this work underscores PSA's promise for treating cognitive impairments and other disorders characterized by synaptic dysfunction.

Alayna George

Discipline: Communications

Authors:

Abstract Name: The Ethical Dilemma of AI Sex Bots and Artificial Intimacy on Interpersonal and Human Relationships

Artificial Intelligence is one of the most controversial topics of the last several years, and those who defend it plead that AI isn't going anywhere or that it's simply a helpful tool for tedious tasks. But what happens when that "helpful tool" turns into a replacement for physical and emotional intimacy? With the rise of more sophisticated AI tools created by companies like Realbotix, AI is no longer just a software that creates outlines and solves equations— it can serve as an interactive, customizable sex robot. In the last 10-15 years, AI algorithms have been combined with life-sized sex dolls to create interactive AI "sex bots." Through an analysis of the history of sex dolls, the current state of more evolved sex dolls, and the algorithms used in AI sex bots, I examine whether these technologies pose a threat to human intimacy and the other ethical issues that arise within the domain. Additionally, I look at the underlying ideologies that current sex devices elicit about gender roles and the fetishization of underage women. My research consists of a literature review of several texts, including *The Desirable Body: Cultural Fetishism and the Erotics of Consumption* by Jon Stratton, *AI Love You* by Yuefang Zhou and Martin H. Fischer, and an examination of user reviews for AI sex bots. I also reference a study titled "Are We Ready for Sex Robots?" conducted by researchers in the Human-Robot Interaction Laboratory at Tufts University. Through the desirable traits that are embedded in the algorithms of AI sex bots, I also dissect the concept of whether pedophilia is subliminally encouraged by the intense customization of a manufactured sexual partner. With the historical context of sexual devices and the future of AI, it is crucial to understand the threats it may pose to our interpersonal relationships.

Elina Georges

Discipline: Biochemistry

Authors:

Abstract Name: Rapid Screening of Dirhodium Complexes for Biomolecule Binding

One important and interesting chemical property of transition metal complexes is their ability to bind biological molecules and affect the growth of cells. Cisplatin, a simple transition metal complex with a platinum ion at its center, is a widely used anti-tumor drug that is known to bind to DNA as part of its mechanism of action. Cisplatin, however, is not effective against all cancers and has some severe side effects. In an effort to identify new transition metal complexes that can affect cancer cell growth, this work focuses on complexes with rhodium atoms at their core which have potential for anti-tumor activity. To screen multiple metal complexes for their ability to interact with biomolecules, we have streamlined a method to measure the interactions of rhodium complexes with either double-stranded DNA or the serum albumin protein. Reactions were monitored in 1 mM sodium phosphate buffer, pH 6.8, with 3.0 mM NaCl, in the dark at 37° C. Filtering devices were used to separate a portion of each reaction, allowing the small transition

metal complexes to filter through but retaining the much larger biomolecules. The volume of reaction that was allowed to filter through the devices was at or below 10% of the total portion volume, such that the concentration of the reaction was not significantly affected by the filtration. The concentration of rhodium metal in retentate (top) and filtrate (bottom) layers was measured using an atomic absorbance spectrometer (AAS), and differences in these concentrations indicate rhodium interaction with the biomolecule. The expected result is that some transition metal complexes may bind to the biological molecules within the first 24 hours of reaction, perhaps indicating potential for better antitumor activity and leading to more rapid identification of promising cancer cell killing compounds.

Taylor Gepes-Carroll

Discipline: Psychology

Authors:

#1 Martin Wiener

#2 Tutku Öztel

Abstract Name: Influence of Domain-Specific Working Memory Load on Temporal Error Monitoring Abilities

Error monitoring involves the ability to keep track of one's own errors without receiving external feedback. This ability is often investigated within perceptual decision-making tasks where performance takes binary correct/incorrect forms. Recent studies demonstrated that error monitoring ability can be observed in metric domains capturing temporal, spatial, and numerosity errors, where errors have both a magnitude and direction with respect to a target. Albeit distinct from perceptual decision-making, error monitoring abilities are correlated across these metric domains, suggesting a domain-general mechanism consistent with A Theory of Magnitude (ATOM). Previous findings demonstrated that increased WM load in a dual-task paradigm, where the secondary task involved mental alphabetization, impaired error monitoring in a perceptual decision-making task. However, this effect did not extend to temporal error monitoring (TEM). This result may be due to domain-specific WM load effects, where the mental alphabetization task may not have engaged the metric characteristics required for a diminishment in TEM abilities. We investigated this possibility in two separate dual-task experiments. In both experiments, participants performed temporal reproduction as the primary task, where they evaluated their own performance in terms of magnitude and direction relative to a target duration on a trial-by-trial basis. Depending on the experiment, the secondary task involved alphabetization of a letter sequence (mental alphabetization, Experiment 1) or calculating numerical equations (mental arithmetics, Experiment 2). Experiment 1 showed that magnitude monitoring ability depends on the WM accuracy, where the secondary task was alphabetization. However, this effect did not apply to other WM load indices, including the number of letters or sorting difficulty. Interestingly, this diminishment was not observed in Experiment 2, where metric characteristics of WM load matched TEM. Together, these results indicate that the sensitivity of TEM to WM depends on relative load indices that selectively capture magnitude monitoring.

Favour Gerald-Ugwu

Discipline: Health and Human Development

Authors:

#1 Kasey Boehmer

#2 Karem Manresa Cumarin

#3 Megan Branda

Abstract Name: Capacity Coaching and Its Effect on Patients with End-Stage Kidney Disease

Patients with end-stage kidney disease (ESKD) undergoing dialysis face substantial treatment burden, major life disruptions, and emotional distress. Capacity Coaching is a supportive intervention that helps patients build the abilities needed to adapt, endure, and function well alongside illness and demanding treatments. We hypothesized that patients with ESKD who completed at least three Capacity Coaching sessions would experience reduced treatment burden and less anxiety/depression compared with those completing fewer sessions. We conducted a pilot randomized controlled trial with 33 adults receiving in-center or home dialysis, randomized to Capacity Coaching or usual care. The intervention was considered complete when participants attended at least three coaching sessions. Participants were followed for six months, with treatment burden, anxiety, and depression assessed at baseline and every three months. No statistically significant differences were observed between groups for treatment burden, anxiety, or depression. However, a downward trend in treatment burden was noted in the intervention group compared with controls. As a pilot study, the limited sample size prevented a full assessment of efficacy, and a larger, adequately powered trial is planned. This study demonstrates the feasibility of integrating Capacity Coaching into dialysis care, even within a highly complex clinical population. Future research with larger samples, longer follow-up, and standardized post-intervention protocols is needed to determine whether Capacity Coaching can meaningfully reduce treatment burden and improve emotional well-being among patients living with ESKD.

Clover Gerber

Discipline: Psychology

Authors:

Abstract Name: Early Maladaptive Schema (EMS) Formation in Transgender Women: A Diathesis-Stress Application

This study proposes an application of the diathesis-stress model to examine early maladaptive schema (EMS) formation in transgender women to elucidate psychopathological precursors in queer populations. Though researchers frequently explore EMSs' ability to predict various psychological disorders, few studies utilize a diathesis-stress lens to examine EMS development. The diathesis-stress model is chosen to achieve a baseline understanding of both preexisting vulnerabilities (diatheses) and environmental variables (stressors) responsible for EMS formation in transgender women. Following a semi-meta-analytic review of EMS literature, several thematic areas are identified then categorized as either diatheses or stressors. The analysis classifies personality traits of neuroticism, low agreeableness, negative affectivity, psychoticism, and detachment as diatheses alongside the stressors of interpersonal problems, abuse, trauma, depressive symptoms, and minority stress. Scholarly findings based on Hankin & Abramson's (2001) cognitive vulnerability-transactional stress theory are also employed to highlight the bidirectional relationships between EMSs, depressive stressors, and depressive symptoms. Lastly, Ilan H. Meyer's (1995) minority stress theory is applied to contextualize the model within queer and minority-focused literature. Overall, the aforementioned stressors identified by the study are numerous and varied while only select personality traits are identified as diatheses. This finding suggests the formation of EMSs in transgender women may be tied to a wider variety of environmental variables, though it should not be assumed a larger number of stressors equates to greater predictive validity. Further research should include an evaluation of resilience factors in EMS formation, potentially utilizing diathesis-stress expansive models, to further inform schema therapy interventions.

Melanie Gerner

Discipline: Environmental Science and Sustainability

Authors:

Abstract Name: Preventing Green Gentrification in Frederick County: Policy Strategies for Equitable Urban Greening

Minority communities have historically been excluded from green amenities, prompting the movement of environmental justice by expanding access to green space and environmentally sustainable infrastructure. However, green space creates a green gap in which developers can capture increased rent, displace long-term residents, and lead to gentrification, excluding the very people these projects were aimed to include. Therefore, it is important that policymakers are conscious in their decisions to not only improve environmental justice through increased accessibility but also to mitigate and prevent the effects of green gentrification in plans and policies. This project examines Frederick County as a case study, which has a strong initiative to improve environmental justice through new and renovated parks, sustainable buildings, and other green amenities. However, nothing is being done to prevent the gentrification that may come from this. By reviewing past literature on green gentrification in combination with Frederick County's plans and policies, this study identifies opportunities to improve environmental equity through conscious urban planning. It argues that meaningful community engagement, implementing anti-displacement policies, and coalitions among nonprofits, the municipality, and private stakeholders are vital to ensuring that greening efforts reach all residents of Frederick County. This work calls for deliberate decisions to be made surrounding urban greening in Frederick County to create a more socially and environmentally sustainable county.

Seamus Gerner

Discipline: Computer Science

Authors:

#1 Steven Fernandes

#2 Jessica Cumber

#3 Kevin Fuji

#4 Halie Erwin

Abstract Name: Enhancing pharmacy student skills through AI-driven patient counseling simulations

AI chatbots can be trained on a variety of user-provided materials for specific interactions across a range of settings. The goal of this project is to develop and assess an AI-based chatbot designed to support pharmacy students in building essential patient counseling skills within the three-year Dispensing and Patient Care (DPC) course series. The pilot text-based chatbot will initially be created for third-year (P3) students in PHA 489 Dispensing and Patient Care III to simulate a realistic patient interaction and provide objective feedback based on the course patient counseling rubric to help students improve communication skills and patient counseling proficiency. Data collection will include chatbot session transcripts, rubric scores, and self-assessment surveys, and will be compared across all pharmacy pathways (Omaha, Distance, and Phoenix). Results will inform the potential expansion of chatbot-based practice opportunities across all levels of the DPC course series. Expected outcomes include increased student confidence in patient counseling, greater readiness for fourth-year experiential rotations, and potentially a broader adoption of AI tools in the pharmacy program.

Leana Geronimo

Discipline: Environmental Science and Sustainability

Authors:

#1 Leana Geronimo

#2 Noel Welday

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Noel Welday

Luigi Salcedo

Abstract Name: Do Freshwater Turtles Stabilize Maryland Wetlands?

Given the dire situation of turtles - over 60% of species are either threatened or recently extinct – it is vital that we understand their impacts to ecosystem functioning and advocate for increased protections. Omnivorous, freshwater turtles can reach high densities and biomass/hectare (among the highest ever recorded for vertebrates) and therefore, may be particularly impactful to their wetlands, pond, and lake food webs around the world. Here, we posit that omnivorous turtles increase the stability of freshwater food webs through several mechanisms: 1) by subsidizing their diet with terrestrial foods, 2) by relying on both green and brown food webs within water bodies, and 3) by undergoing ontogenetic diet shifts and distributing predatory and herbivory pressure among many species. We test these predictions using a community of six turtle species captured in ponds and wetlands of Bowie State University and the nearby Patuxent Research Refuge in 2021-2025. Terrestrial food consumption was quantified using metabarcoding of eDNA and d34S in turtle claws, while participation in brown vs. green food webs was inferred from stable d13C. We used a regression of turtle claw d13C and d15N against straight carapace length to detail a potential shift in turtle diet with age. Overall, we found support for two of our three predictions. While we observed no evidence of ontogenetic diet shifts in three turtle species, we found that the most abundant turtle at our sites - painted turtles (*Chrysemys picta picta*) - frequently fed off both green and brown aquatic food webs as well as from terrestrial food webs. Overall, our study suggests that painted turtles have broad diets that likely increase stability of their food webs.

Fenet Getachew

Discipline: Computer Science

Authors:

Eliana Assefa

Abstract Name: Detecting Deepfakes Using Machine Learning: A Comprehensive Literature Review

Deepfake technology, which uses machine learning to synthesize and manipulate audio, video, and images, poses escalating threats to media authenticity, identity security, and public trust through political misinformation, financial fraud, and non-consensual synthetic media. As generative models evolve rapidly current detection systems frequently overfit to legacy benchmarks and fail under real world conditions, which in turn create a critical gap between laboratory performance and practical deployment. This literature review looks at how effective current machine learning approaches are for deepfake detection across different modalities and whether they can perform reliably in real world settings. We synthesized recent benchmark studies (2022-2025) examining machine learning approaches for deepfake detection across image, video, audio, and multi modal modalities. These include classic machine learning algorithms, deep learning

structures, specific detection approaches, and modern assessment methods. Key findings show that, while traditional machine learning has high interpretability and Vision Transformers excel at global feature capture, multimodal audio-visual fusion consistently outperforms single modality approaches, and specialized methods using biological signals perform exceptionally well in controlled settings. However, a critical gap emerges when models encounter modern deepfakes with diffusion artifacts, selective manipulations, and diverse linguistic content, with commercial detectors showing only marginal improvements over open source baselines and human listeners demonstrating unreliable detection abilities. This research concludes that achieving reliable real world deepfake detection requires substantial advancement beyond controlled laboratory settings toward strong, broad architectures and layered human-in-the-loop verification protocols that acknowledge the limitations of both automated systems and human judgment.

Sofia Gevorgian

Discipline: Linguistics and World Languages

Authors:

Abstract Name: Lost in Translation: Linguistic Barriers to Nagorno-Karabakh's Lasting Ceasefire

Stability of interstate agreements hinges not merely on geopolitics but also on language itself. While translations of such documents aim to bridge cultural barriers to a comprehensive understanding, translation itself can also serve as an impediment to agreement. This article seeks to better understand the role of translation in the stability of interstate treaties, specifically investigating how discrepancies between state-sanctioned and independent translations of the 2023 Nagorno-Karabakh ceasefire declaration challenge its interpretation and hence implementation. Following scholarly traditions in the lineage of Skopos and translation studies, the paper applies close reading and source analysis—comparing the Armenian and Azerbaijani translations against the original Russian document—and explores blind spots, biases, and linguistic limitations that may distort the peace process. The research on hand aims to bridge the gap between translation studies and the understudied Nagorno-Karabakh conflict. Current literature discusses the Russian language as a post-Soviet tool of subjugation, and this paper aims to expand that scholarship by presenting the Russian language, mediating the precarious Nagorno-Karabakh ceasefire, as an imperial one in the South Caucasus. This research ultimately concludes that the inability to adequately translate semantics directly from Russian to either Armenian or Azerbaijani results in a final text not entirely reflective of the original terms agreed upon by the parties. Furthermore, the article highlights that a translator's personal background and intended audience heavily impact the document's interpretation in translation, demonstrating how translation may be distorting the peace process between Armenia and Azerbaijan. "Lost in Translation: Linguistic Barriers to Nagorno-Karabakh's Lasting Ceasefire" has been recently published in the 22nd volume of Aleph, UCLA's Undergraduate Research Journal for the Humanities and Social Sciences.

Feven Ghiday

Discipline: Computer Science

Authors:

Abstract Name: Machine Learning Analysis of Maternal Health Risk Factors

This Research uses machine learning to study maternal health risk factors and predict whether a pregnant woman is at risk of complications. The purpose of the study is to explore how clinical data can support early detection and better decision making in maternal health care. The dataset includes 1,015 records collected

from hospitals, community clinics, and maternal health centers in rural Bangladesh. It contains six clinical features age, systolic blood pressure, diastolic blood pressure, blood sugar, body temperature, and heart rate which were used as coding categories for model development. The study is guided by the research question: How can machine learning techniques be applied to maternal health data to accurately predict risk levels and support early intervention? This project connects to earlier research by Sheakh et al. (2023) and Efeoğlu (2023), who showed that machine learning models such as Random Forest, Decision Trees, and Adaboost can successfully identify risk patterns in maternal datasets. Their findings support the use of technology to help improve maternal health monitoring, especially in underserved rural areas. In this analysis, five models were tested: Logistic Regression, Decision Tree, KNN, Random Forest, and Gradient Boosting. The Random Forest model achieved the strongest performance, with an AUC of 0.945 and the highest precision recall score. Gradient Boosting also performed well. Confusion matrices showed that these two models produced the fewest misclassified cases. Feature importance analysis revealed that blood sugar was the most influential risk factor, followed by systolic blood pressure and age. The results show that machine learning can effectively identify high risk pregnancies using simple clinical measurements. These findings may help support the development of low-cost decision-support tools to improve early intervention and reduce maternal health complications in low resource communities.

Saad Ahmed Khan Ghori

Discipline: Mathematics

Authors:

#1 Kumudu Gamage

#2 Saad Ahmed Khan Ghori

Abstract Name: Physics-Informed Neural Networks To Estimate Soil Thermal Properties

Accurate estimation of soil thermal properties is critical for sizing ground heat exchangers in ground-source heat pump (GSHP) systems. At a Lexington, Virginia research site, temperature sensors were installed at multiple depths (surface to 10 meters) and logged at 15-minute intervals, yielding a detailed dataset of subsurface temperature dynamics. This study compares two approaches for inferring soil thermal properties from these data. The traditional method uses a one-dimensional heat equation model, where layer-specific thermal parameters are calibrated by minimizing the error between simulated and measured temperatures through sequential numerical optimization. While effective, this approach is computationally intensive and can struggle to uniquely identify all relevant parameters. In contrast, we implement a physics-informed neural network (PINN) that embeds the governing heat equation into the training process, allowing simultaneous estimation of specific heat capacity and thermal conductivity for each soil layer. The PINN leverages automatic differentiation and combines data-driven and physics-based losses to improve efficiency and enforce physical consistency. Our preliminary results indicate that the PINN can recover plausible layer-specific properties and temperature profiles. This work presents the PINN formulation, training strategy, and early comparisons with the benchmark numerical approach, with a focus on exploring the opportunities and potential of state-of-the-art AI for subsurface thermal characterization in GSHP applications.

Debopriyo Ghosh

Discipline: Interdisciplinary

Authors:

#1 Laura Hosman

#2 Rachel Nova

#3 Debopriyo Ghosh

Abstract Name: A Three-Year Study of Offline Digital Library Use in Lesotho Schools: Extending Behavior Change Theory From COM-B to COMBO

This study introduces COMBO: a practical framework for understanding how educational interventions create lasting change, particularly in low-resource settings where evidence of long-term impact is critical. COMBO expands upon the COM-B behavior change model by incorporating Outcomes to support post-implementation evaluation. While COM-B identifies Capability, Opportunity, and Motivation as drivers of Behavior, COMBO captures the resulting impacts of that behavior change. Over a three-year period, we applied this framework to a qualitative study of an offline digital library intervention in rural Lesotho. Drawing on 60 participant interviews, we found that changes in teacher behavior were enabled by increased digital and information literacy capabilities, supportive environments, and both reflective and automatic motivation. These shifts led to observable student outcomes, including academic gains, digital skill development, and increased engagement. As positive outcomes reinforced motivation, a feedback loop emerged, deepening and sustaining teacher behavior change.

Daniela Giammattei

Discipline: Engineering

Authors:

#1 Jessica Ramella-Roman

#2 Junzhu Pei

Abstract Name: Improving Deep Tissue Imaging Through Dye-Enhanced Polarization Imaging

This project aimed to enhance deep tissue imaging through polarization imaging combined with absorbing dye molecules, like tartrazine, to enhance penetration depth. Current optical imaging methods, like Mueller Matrix Imaging, are affected by light scattering, which reduces imaging depth and resolution. By combining polarization imaging with dye, light scattering was reduced, which improved tissue transparency and increased the imaging penetration depth. The study used an experimental approach, using biological tissue samples, such as chicken breast or ex vivo mice tissue, treated with tartrazine and imaged using a polarization-sensitive camera system built in-house at 605 nm. We analysed the polarized-light data by breaking it into four parts: how much the tissue favored one polarization state (diattenuation), how much it shifted it (retardance), which way the fibres pointed (orientation) and how much the polarization was lost through the tissue (depolarization). Comparative analysis with other, more common imaging methods assessed how image quality improved tissue visibility. The biomedical significance of this research lies in its ability to enhance non-invasive medical imaging techniques used for diagnosing. By improving imaging depth and contrast, this approach was able to improve the diagnostic capabilities of different medical instrumentation, particularly in prenatal healthcare, which is explored through MPL's Portable Preterm Imaging System (PPRIM). The ability to assess cervical collagen networks and their integrity with greater accuracy facilitated the detection of pregnancy complications, leading to better maternal and infant health outcomes. If successful, this technique contributed to the broader field of biomedical and clinical diagnosing and enhanced medical diagnostics technology.

Francesca Giardini

Discipline: Environmental Science and Sustainability

Authors:

#1 Francesca Giardini
#2 Grace Wright
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Abstract Name: Testing the Plant Vigor Hypothesis on Oak (*Quercus* spp.) and Heath (*Ericaceae*) Leaves in the Pinelands National Reserve, New Jersey

Fires are becoming more frequent and severe due to anthropogenic climate change. The Plant Vigor Hypothesis predicts that after fires, plants will invest more energy into growing rapidly, and subsequently, will invest less energy into their structural and chemical defenses making them more vulnerable to herbivore attack. Therefore, we predict that oak and heath leaves from our fire sites will (1) grow more rapidly and (2) have more insect herbivore damage compared to our unburned sites. We collected 20 oak (*Quercus* spp.) leaves and 20 heath (*Ericaceae*) leaves from wildfire, prescribed fire and unburned sites every week throughout the season between May to September in 2018, from the Pinelands National Reserve (PNR), New Jersey. We then measured the leaf area and counted various insect herbivore damage from each leaf to collect data to test our hypotheses. Next, we used a Generalized Additive Model (GAM) and a Generalized Linear Model (GLM) to test if the Plant Vigor Hypothesis will be supported from the PNR. In total, we collected 1,904 oak leaves and 1,902 heath leaves from our study sites. We found that the fires significantly affected the leaf growth rate, however, leaves from our fire sites were smaller than leaves from our unburned sites. Additionally, we found that there was significantly more insect herbivore damage on oak leaves, but there was significantly less insect herbivore damage on heath leaves. Therefore, our first hypothesis was rejected and our second hypothesis was supported for oaks and rejected for heaths. Our findings suggest that fires affect plant-insect interactions differently between taxonomic plant families and functional feeding groups of insects. Our current research is now testing the structural and chemical (tannin) defenses of our leaves.

Carson Gibbs

Discipline: Chemistry

Authors:

#1 Vahid Lotfikalajahi
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#4 Svetlana Tikunova

Abstract Name: Development of Novel Small-Molecule Calcium Sensitizers for Cardiac Troponin C

Currently, congested heart failure is one of the leading causes of death globally. Even though it has a high mortality rate, current medicines are ineffective due to mobilizing the calcium in the system causing hypocalcemia and other side effects. Calcium sensitizers solve this problem through increasing the hearts sensitivity to calcium versus taking in more calcium into the system. Our research builds on the work of [1] where a possible small molecule calcium sensitizer was found to have a more effective calcium binding affinity of $1.45 \pm 0.09 \mu\text{M}$, which is the highest at the time of the study. Our objective was to synthesize a small molecule with a lower binding affinity. This was done by modifying the base small molecule and changing the functional groups. The current best small molecule synthesized has a calcium binding $\sim 0.5 \mu\text{M}$ which is 3-5 times more effective compared to the original small molecule that the new molecule is based on. If the small molecule is implemented in new medicine, it would make the current inotropes more effective in preventing heart failure in patients. However, continued synthesis of new compounds are needed to continue increasing the effectiveness of the calcium binding affinity.

Eden Gibson

Discipline: Nursing and Public Health

Authors:

Abstract Name: Earth's Epidermis & Ours: CFC-Driven Ozone Depletion & Its Health Implications in Northern Spain

Stratospheric ozone depletion driven by chlorofluorocarbon emissions has intensified the penetration of ultraviolet radiation at Earth's surface, generating growing public health concerns. This research analyzes how heightened ultraviolet exposure has influenced population health in Northern Spain, focusing on Santander, a mid latitude coastal region where climatic conditions, tourism dynamics, and behavioral patterns converge to shape UV vulnerability. Positioned at the intersection of climate science and public health, this interdisciplinary study investigates how ozone-driven increases in ultraviolet radiation have affected vitamin D status, skin cancer incidence, and broader health indicators. The project integrates quantitative datasets, including ultraviolet index records from AEMET, long range projections from the IPCC Sixth Assessment Report, and national epidemiological trends in melanoma and non-melanoma skin cancers. Qualitative analysis draws on national sun exposure surveys and peer reviewed research in UV photobiology, enabling a comprehensive assessment of shifting environmental pressures and human behavioral responses. Findings indicate a multifaceted health burden. Although summer UV levels are high, winter irradiance remains inadequate for vitamin D production, contributing to widespread deficiency among Spanish adults. Concurrently, melanoma incidence has risen steadily from 1990 to 2019, with the most pronounced increases in older populations. Additional evidence suggests that individuals with higher serum vitamin D levels, often linked to high sun exposure, may exhibit increased susceptibility to non-melanoma skin cancers. Behavioral surveys reveal frequent exposure during peak UV hours and inconsistent sunscreen use, amplifying cumulative risk. Conclusively, it was illustrated how climatic change and human behavior jointly influence UV related health outcomes. These results underscore the need for integrated public health strategies that balance safe sunlight exposure with effective photoprotection as environmental conditions continue to evolve.

Laila Gibson

Discipline: Biology

Authors:

Dr. Clayton Carlson

Abstract Name: The Sun's Influence: Exploring Vitamin D's Role in Paclitaxel and Menadione Sensitivity in Breast Cancer Cells

The most common cancer in women is breast cancer. In the U.S, it is the second leading cause of death in women after lung cancer. 1 in 8 women in the U.S will develop breast cancer in their lifetime. MDA-MB-231 is a triple-negative breast cancer cell line that lacks estrogen and progesterone receptors, while MCF-7 is estrogen-positive and has estrogen and progesterone receptors. Studies have shown that there could be an association between higher vitamin D levels and increasing breast cancer survival rates. Cholecalciferol (vitamin D3) is linked to cancer prevention because of its ability to promote apoptosis and regulate cell growth. In order to evaluate the successes of chemotherapy with Vitamin D, Paclitaxel, and Menadione will be tested. These Results will be measured using Alamar Blue assay to track cell survival.

Monica Giglio

Discipline: Interdisciplinary

Authors:

Abstract Name: Why Parental Alienation Studies Should Be Taught at U.S. Universities

Parental alienation (PA) is a silent epidemic with devastating consequences. It is a form of psychological abuse and maltreatment of children in which one parent manipulates children through lies, false allegations, and manipulation, to fear and hate their non-abusive, non-violent, emotionally available, other loved and loving, parent and entire side of family with whom they have had always a healthy relationship. Despite its documented history dating back to the 1800s, PA remains under-recognized in legal and mental health fields. PA studies are urgently needed in U.S. university curricula, particularly within counseling, psychology, social work, family law programs, and careers that will interface with children and families. My research details the devastating emotional toll of PA on children, targeted parents, and extended family members and how PA can lead to real-world tragedies which culminate in murder-suicide by a parent with child victims. Educational reform and awareness are essential steps toward early recognition, trauma-informed care and preventing family tragedy. Currently, professional gaps in knowledge, empathy, and understanding are retraumatizing parents seeking help. This perpetuates cycles of grief, misdiagnosis, and systemic failure, while delaying justice for children who lose a major attachment figure, and for parents whose children are abruptly taken from their lives, causing generational chronic traumatic stress and long-term, ambiguous grief without closure. Educating professionals on the Five-Factor Diagnostic Model will help Professionals identify PA and prevent parents from mistakenly being accused of PA. Universities must lead the way in educating future professionals, validating lived experiences, and fostering early intervention. Once this education is in place, lives may be saved, loving parents will remain together and much-needed policy reform can begin.

Sydney Gilbert

Discipline: History

Authors:

Abstract Name: Shepherds in the Great War: The Evolution of the U.S. Army Chaplaincy and the Service of Malcolm Taylor in World War I

From its beginnings in 1775, the U.S. military chaplaincy has been a vital but often overlooked component of the American military experience. Though the specific duties and regulations for U.S. chaplains have evolved over time, the heart of the chaplaincy is rooted in sacrificial service, a ministry of presence, spiritual leadership, and moral guidance. The American entrance into the Great War in 1917 marked a period of exponential growth for the military chaplaincy as it faced unprecedented demand and growing professionalization. In this paper, I examine the professional development of the U.S. Army chaplaincy during World War I, focusing on the growth of standardized qualifications for chaplains, the establishment of chaplain training schools, the creation of the General Headquarters Chaplains' Office, and the ways individual chaplains fulfilled their duties by embracing muscular Christianity and interfaith cooperation. The personal letters of Chaplain Malcolm S. Taylor further illuminate the everyday conditions and forms of service chaplains provided to American troops overseas. The personal accounts and correspondence of American chaplains, like Chaplain Malcolm S. Taylor, reveal how chaplains navigated their newly expanded roles as they conducted professional spiritual leadership within the U.S. military and provided a ministry of service within the demands of modern warfare.

Leonardo Gill

Discipline: Economics

Authors:

#1 Leonardo Gill

Abstract Name: Increasing Inflation, a Regressive Tax structure, and Globalization: Dollarization in the 1970s and Increased Housing Costs for the Middle Class

The root cause of the housing crisis currently faced by the United States middle class needs a proposed potential solution that may successfully mitigate the symptoms of the problem. Rising housing prices and housing inequality are currently a significant problem faced by the middle class in the entirety of the United States and the present analysis is an examination of the potential root causes of this problem. A comprehensive review of sources relating to rising housing inequality, rising wealth inequality, rising inflation, the effects of currency pegging, and the effects of a progressive taxation system on wealth inequality were explored to determine the root cause of rising housing inequality and a potential solution. The results suggest that the root cause of the current housing crisis is the United States global economic strategy relating to dollarization which led to a large amount of inflation, increasing inequality, and as a result, increasing housing inequality. The implementation of a progressive taxation system can offset wealth inequality and as a result offset housing inequality between wealth levels. A progressive taxation systems has may have the potential to offset the root causes of wealth inequality and as a result afford the middle class the ability to buy homes at previous home buying levels.

Claire Gillaspie

Discipline: Engineering

Authors:

#1 Scott Taylor

#2 Ayush Upadhyay

#3 Bridget McInnes

#4 Jae Skeete

Cyd Oldham

Nigel Uson

Abstract Name: Emotion-Aware Speech Analysis for Mental Health Support Using Whisper

Emotional Self Awareness (ESA) refers to a person's ability to understand and identify their own emotions. Low ESA is associated with depressive and anxiety disorders, while increasing ESA is associated with a reduction in symptoms of these disorders and greater emotional regulation. Depression and anxiety are widely experienced, debilitating conditions that represent leading causes of disability and reduced quality of life worldwide. Methods to reduce the symptoms of these disorders have critical impacts on public health and individual well-being. Self-monitoring approaches for emotional states are often used with other psychotherapy techniques to treat mental health disorders with the intention of increasing ESA. However, many people struggle to pinpoint exactly how they feel, when those feelings started, and why. Manual self-monitoring imposes a daily obligation onto the user and is limited by the individual's own self-awareness and ability to reflect honestly. Providing continuous, automatic, and objective emotion tracking would address these shortcomings, yet no current methods to do so exist. In this work, we developed a system to solve this problem using automatic, AI/ML powered emotion monitoring through speech and textual emotion classification. The privacy module continuously transcribes a user's speech while removing all other speakers from the analysis. Within the classification module, OpenAI's Whisper is used to perform a multi-modal

analysis using both audio and text to classify the user's emotions and produce daily emotion tracking reports. Automatic tracking removes the individual's responsibility of logging entries, creating accurate and consistent mood trends. This system will increase ESA by allowing users to better recognize emotional triggers and long-term patterns without relying on subjective self-reporting or burdensome questionnaires. By analyzing the user's day and transforming everyday speech into data driven insights, this project demonstrates a novel and cost-effective approach to improving emotional well-being.

Emilia Gillen

Discipline: English and Literature

Authors:

Abstract Name: How the Page Remembers: Written Monuments of Forgotten Pasts

This project examines how literature and novels manifest as a counter-monument of cultural memory. The landscape of monuments we see focuses on a fixed and unyielding perspective where voices and histories are censored from public view, leaving them erased in public spaces. Cultural memory, a collective possession of memories relating to past events that transmit through generations, serves as another form of public space within historical knowledge, wherein literature creates a different form of monumentality that contrasts rigid structures, leaves emotional residue, and uncovers unwritten pasts. This study offers a subversive perspective on how literature questions and challenges dominant historical ideologies unlike static, fixed, and structural monuments. As traditional monuments reinforce hegemonic narratives, I investigate how literature provides a defiant, intimate, and dynamic space to preserve suppressed histories and reconceptualize the perspective of our memory by challenging what is remembered and why. This project illuminates how literature serves as a form of resistance and rebellion against oblivion for marginalized voices. Through close readings of *Beloved* by Toni Morrison, I re-examine how literature offers a critical reimagination of erased pasts by reshaping the architecture of memory. *Beloved* examines the devastating trauma and horrors of slavery through Margaret Garner's infanticide and the haunting legacy it imprints on familial history, which confronts erasure within racist and colonial histories by reclaiming silenced perspectives, and traces cultural memory across time and place. I examine how literature functions as a living and haunting archive for cultural memory and how these works become counter-monuments through emotional residue. I research monuments as cultural repositories and explore how symbolic power in historical monuments is reframed in literature. I study this phenomenon to emphasize the importance in the everlasting emotional impact of counter-monuments, to reconsider storytelling's role within the construction of memory, and to uplift marginalized voices through cultural memory.

Catherine Gillespie

Discipline:

Authors:

Abstract Name: Successes and Challenges of an Emerging Undergraduate Research Program: Developing a Community College Research Culture

Truman College, a small community college within the City Colleges of Chicago, is in its third year of developing an undergraduate research and creative activity initiative, SERCA @ T (Student Experience in Research and Creative Activity at Truman). As faculty director, I will discuss the mentoring approaches, faculty initiatives, and cross-departmental collaborations SERCA @T has developed to offer students,

particularly from underrepresented backgrounds, access to academic mentoring and opportunities for research and creative activity. From these efforts, a small but thriving research culture is emerging; I will also share plans to overcome obstacles and actualize new goals. The key to SERCA @T's initial success lay in weaving together strong resources already in place Truman: partnering with existing campus centers; harnessing a group of professors and departments already practicing undergraduate research, particularly in Chemistry and Biology; and coalescing multidisciplinary faculty who are eager to explore inquiry-based learning in their classrooms. As a result, SERCA @ T has helped expand the number of independent research courses offered in various departments and the number of faculty mentoring students to create independent research and creative projects. In addition, this emerging research culture has led some faculty to fund or enhance their work with students through grants or partnerships with NASA Community College Network, the National Endowment for the Humanities, the Pulitzer Center, and the Alliance for the Great Lakes. Showcasing this research culture through student presentations has generated interest among students, faculty, and staff: SERCA @T has hosted two college-wide annual student symposia, featuring projects from the laboratory sciences and computer science to art, English, theater, and music. These symposia, in turn, have stimulated further teaching innovations. Through dialogue with session participants, I hope to generate ideas for building upon these activities and setting future directions for SERCA @T.

Haley Gilley

Discipline: Communications

Authors:

#1 Haley Gilley

#2 Joseph Wirgau

#3 John Brummette

Abstract Name: Understanding Career Readiness in Public Media: A LIWC-22 Analysis of NACE Career Readiness Competency Language

As career readiness skills become an increasingly visible expectation for higher education, there remains limited evidence about how these competencies surface in large-scale public and online discourse. Many colleges and universities have adopted the National Association of Colleges and Employers (NACE) eight Career Readiness Competencies: Communication, Critical Thinking, Teamwork, Equity & Inclusion, Professionalism, Technology, Leadership, and Career Self-Development. Existing analyses of career readiness language have largely focused on student services interactions, institutional messaging, or demographic subgroups, leaving large-scale public discourse unexamined. To address this gap in knowledge, we used automated linguistic inquiry and word count (LIWC-22) to analyze large datasets from traditional news, blogs, and social media. We constructed a custom dictionary for LIWC-22 by transforming NACE's definitions into keyword stems and supplementing them with high-frequency terms drawn from workforce-readiness discourse. The presentation will report patterns in the frequency and distribution of NACE competency language across media sources. Additionally, we will highlight emerging relationships among the eight competency categories within the corpus. Overall, the study provides a large-scale linguistic profile of how career readiness is represented in the public and online media. The resulting dictionary offers a replicable and scalable method for measuring the presence of career readiness constructs in natural language. This work demonstrates the potential of computational text analysis to enhance our understanding of workforce preparation narratives and provides a methodological foundation for future studies examining career development.

Madison Gillman

Discipline: Health and Human Development

Authors:

#1 Maddie Gillman
#2 Marylan Davison
#3 Meredith Braskie
#4 Zoe Tsokolas

Abstract Name: Association between TNF- α and hippocampal volume in overweight cognitively unimpaired adults and Amyloid- β status

Introduction: Obesity is a risk factor for Alzheimer's disease (AD), though mechanisms remain unclear. Higher body mass index (BMI) is linked to hippocampal atrophy and chronic inflammation. TNF- α , an inflammatory plasma biomarker often elevated with higher BMI, has been associated with brain atrophy and amyloid-beta (A β) accumulation. We hypothesized that higher plasma TNF- α in cognitively unimpaired older adults would be associated with smaller hippocampi, particularly in those with higher BMI. Methods: We analyzed data from 1,580 cognitively unimpaired adults from the HABS-HD cohort. Linear regressions were conducted to examine the associations between plasma TNF- α and 3T MRI-derived hippocampal volume, covarying for age, sex, education, and intracranial volume. Analyses were stratified by BMI category and A β status (florbetaben PET), correcting for multiple comparisons (false discovery rate; FDR). Mediation analysis assessed whether TNF- α mediated the BMI-hippocampal volume relationship in overweight/obese adults. Results: TNF- α levels were not related to hippocampal volume in the full sample (β = -0.050; FDR p = 0.246) or among underweight/normal participants ($BMI < 25$; β = 0.010, FDR p = 0.863). Among overweight/obese participants ($BMI \geq 25$; $n = 1,228$), higher TNF- α was linked to smaller hippocampal volume (β = -0.060; FDR p = 0.019). This persisted in the A β subgroup ($n = 762$), with A β positivity included as a covariate (β = -0.067; FDR p = 0.072). Among A β + individuals ($n = 141$) the association was stronger (β = -0.160; FDR p = 0.084) than in A β - participants ($n = 619$; β = -0.047; FDR p = 0.172). The interaction was not significant ($n = 777$; β = -0.050; FDR p = 0.152). TNF- α did not mediate the BMI-hippocampal volume relationship (ACME p = 0.172). Conclusions: In cognitively unimpaired overweight/obese participants, higher TNF- α levels were linked to smaller hippocampal volume, particularly in A β + individuals, suggesting inflammation may contribute to early AD-related atrophy.

Noah Gilman-Morgan

Discipline: History

Authors:

Abstract Name: Tikkun Olam and La Causa: The Impact of American Jews on the United Farm Workers Union

Throughout its most successful years, the United Farm Workers (UFW) union, headed by a Mexican-Catholic named Cesar Chavez, was deeply pluralistic. While most of the farmworkers that the UFW represented were Hispanic, and largely Mexican-Catholic, supporters and leaders of the union came from a diversity of ethnic and religious backgrounds. In particular, Jewish Americans propelled the union's success. This fact is apparent throughout the literature on the UFW, as examples of Jewish involvement and support have amassed in great numbers. However, scholars have almost always compiled these examples in pursuit of some other, broader analysis of the UFW or a related topic. As such, no scholarly work analyzes Jewish Americans' impact on the union's success for its own sake. This paper begins to fill this gap in the literature by asking the question, "What was the unique impact of Jewish Americans on the success of the UFW from the mid 1960s through the late 1970s?" Pulling from archival sources from Wayne State University, Yale University, Hebrew Union College, and Amherst College, as well as online repositories hosted by the University of California San

Diego, oral histories with former UFW leadership, and the existing scholarly literature, this paper argues that American Jews contributed most to the UFW's success over the period in question in three respects. First, American Jews had a strong presence throughout the union's ranks, with Jewish support playing an especially outsized role in union leadership. Second, Jewish support provided important institutional backing for the union, which was especially crucial through the mid 1960s, when such institutional support was needed to sustain the union through its infancy. Third, Jewish growers were key to the union's success, as Jewish leaders in agriculture were consistently the most willing to stray from their fellow producers and sign breakthrough contracts with the union.

Jacob Given

Discipline: Chemistry

Authors:

#1 Daniel Metz

#2 Cole Swade

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#4 Rangika Hikkaduwa Koralege

Abstract Name: Synthesis and characterization of β -mannanase and α -galactosidase encapsulated PLL-g-PEG nanoparticles as an efficient viscosity breaker in fracturing fluids used in oil reservoirs

Hydraulic fracturing is a key technique used to extract oil from low permeability reservoirs. This process involves injecting highly viscous fluids containing guar gum polymers at high pressure to fracture rock formations. It is essential to remove or degrade these highly viscous fluids to allow efficient oil or gas flow. Controlled release of enzyme breakers is crucial to avoid premature degradation or formation of filter cakes in oil wells. This research focuses on developing an efficient enzymatic breaker for guar gum-based fracturing fluids by utilizing α -galactosidase and β -mannanase encapsulated poly-L-lysine graft poly(ethylene) glycol (PLL-g-PEG) co-polymer nanoparticles (NPs). PLL-g-PEG copolymers were synthesized using various grafting ratios of PEG including 2%, 5%, 10%, and 15%. Proton NMR and FTIR data confirmed successful co-polymer synthesis and PEG grafting onto PLL. Dynamic light scattering data showed the appropriate size of NPs for oil field applications. The encapsulation efficiency of α -galactosidase and β -mannanase within NPs was evaluated using sodium dodecyl sulfate–polyacrylamide gel electrophoresis (SDS-PAGE) and the data confirmed both enzymes were successfully encapsulated, though not at 100% efficiency. Preliminary rheometric studies on guar gum solutions in PBS buffer were performed to determine the zero-shear viscosity of guar gum using the Carreau-Yasuda regression model. Our ongoing work focuses on the ability of encapsulated enzymes to degrade guar gum polymers. Rheometric measurements are used to monitor time-dependent viscosity changes in guar gum treated with nanoparticles containing β -mannanase and α -galactosidase.

Garrett Gladem

Discipline: Psychology

Authors:

#1 Meghan Farrar

#2 Erin Worgan

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#4 Sophia Rankin

#5 Kathleen Jocoy

#6 Christopher Masciocchi

Abstract Name: Comparison of Borderline Personality Disorder Symptom Severity Between Male and Female College Students.

Borderline personality disorder (BPD) is a severe and poorly understood disorder that is often associated with women in clinical samples. However, in community samples, recent literature conflicts with this finding, with varying rates of prevalence in community samples ranging from equivalence between genders to higher relative prevalence in men. Presentation of BPD shows differences in gender, with relative rates of alexithymia being higher in women, and alcohol abuse and impulsivity in men. This study aims to provide additional data on the prevalence and severity of BPD symptoms in men and women, along with an investigation of whether alexithymia, alcohol abuse, and depression are predictive factors of BPD symptom severity in a community sample. A community sample of college students from a Maryland university will be asked questions regarding BPD symptoms & behaviors, alexithymia, alcohol abuse, and depression in an online survey. Students will also be questioned about additional comorbidities and any family mental health history. We expect to find a rate of 9.7% above the cutoff point for presenting BPD symptoms. Regression analyses will be used to create separate predictive models of symptom severity for both men and women. For men, we expect alcohol abuse to be particularly predictive, while for women, we expect alexithymia to be predictive. We anticipate depression scores will positively predict BPD symptom severity in both men & women.

Grace Gleisner

IN - University of Evansville

Discipline: Anthropology and Archaeology

Authors:

Abstract Name: What the Amphorae Tell Us: Mapping Transport Amphorae from the Bay of Cádiz to Study Food Movement in Roman Maritime Trade

This research uses a Microsoft Access database and Google Earth Pro to synthesize the published amphorae from the area of Roman Gades (modern Bay of Cádiz) and create a queryable mapping tool for analyzing amphorae spatial distribution around the area's harbors. Amphorae were among the most common transport vessels for food used in maritime trade in the Roman empire, and by drawing on data such as vessel forms and residue analysis it is possible to identify an amphora's date and food contents. Archaeologists have excavated the many harbors and neighborhoods surrounding the Bay of Cádiz throughout the past century, documenting their work through brief excavation reports, individual residue analysis studies, and regional pottery catalogues. This project compiles this information into a database and creates a map of amphora find spots in order to situate excavated amphorae in their broader context and search for trends. The author anticipates that filtering the database and map by various amphora contents, dates, and shapes will reveal diachronic trends and patterns of spatial distribution, which the paper will illustrate using Google Earth mapping software. More broadly, by showing how these theories and methods can be applied to a single Roman port area, this project seeks to demonstrate the potential for these types of amphora databases and maps to answer complex research questions and provide a holistic view of food networks. Conducting and integrating similar studies at other locations has the potential to create more accurate reconstructions of ancient food networks and expand archaeology's understanding of maritime trade.

Grace Gleisner

Discipline: Anthropology and Archaeology

Authors:

Abstract Name: The Evolution of Organic Residue Analysis and its Applications for Studying Maritime Trade in the Context of the Theoretical and Scientific Development of Archaeology

What drives theoretical and methodological innovation in archaeology, and how do these changes impact research into ancient human food networks? This study found that as archaeology increasingly aims for a holistic view of the past, progressively sophisticated research questions necessitate new forms of data and drive scientific and methodological innovation; these developments steadily push organic residue analysis (ORA) toward actualizing its potential to revolutionize our understanding of ancient food production and trade through reconstructing food networks. In the absence of a comprehensive, comparative history of ORA's use in archaeology, this study constructed one, evaluating ORA case studies from England to Egypt from the past 150 years to examine the nature of theoretical and scientific development in classical archaeology. This analysis illuminates areas of past growth, those needing further development, and those holding exciting possibilities for the future of the field. ORA opens new avenues of inquiry for studying trade and reconstructing food networks by fostering interdisciplinary collaboration and a more holistic understanding of history, but such complex research questions necessitate vast amounts of consolidated, searchable data. Therefore, the author calls for the creation of a largescale, diachronic ORA research database which archaeologists could query to map food distributions and suggest trade routes for past civilizations such as Rome. As society increasingly questions the value of historical research and archaeology becomes ever more interdisciplinary, this sort of digital humanities project could facilitate data-driven discussions about food production and access in the past as well as ideas for the future.

Gezelin Go

AL - University of Alabama at Birmingham

Discipline: Psychology

Authors:

#1 Stephanie Wilson

#2 Greta Valenti

Abstract Name: Reacting to Another's Feelings: The Association of Cognitive and Affective Empathy with Emotional Reactivity

Both empathy and emotional reactivity play important roles within couples' interactions. Empathy aids in understanding another's situation and partaking in their feelings. Emotional reactivity is the spontaneous reaction to good or bad stimuli, including social ones. However, there is little literature on whether two types of empathy, cognitive and affective empathy, relate to emotional reactivity to a partner's distress. The present study aims to determine whether cognitive and affective empathy independently relate to emotional reactivity in the context of couples listening to each other's troubles. By exploring this impactful facet of couples' interactions, this study can provide insight for interventions seeking to improve couples' everyday lives. 204 participants (N = 102 couples) were recruited online using social media, community events, and flyers. Each completed the 14-item Interpersonal Reactivity Index, which operationalized cognitive and affective empathy. Both before and after listening to their partner's disclosure of a distressing event, each participant indicated their emotional state via a mood scale. Emotional reactivity was operationalized using the changes between the baseline emotional state and the emotional state at post-task. Currently, data analysis is still in progress. However, given the findings in previous literature, we expect to find that cognitive empathy will have a negative relationship with emotional reactivity. Conversely, we expect that affective empathy will be positively related to emotional reactivity. Multiple regressions will be performed to control for demographics and analyze the hypothesized relationships. In the first regression model, cognitive empathy will predict emotional reactivity, controlling for age, gender, and baseline negative emotion. In a second model, affective

empathy will predict emotional reactivity and control for the same covariates. In the third model, both cognitive and affective empathy will be included along with the covariates.

Gaege Gobezie

Discipline: History

Authors:

#1 Gaege Gobezie

Abstract Name: Adwa and the Awakening of Ethiopianism: Resistance and the Birth of a Collective Consciousness

The Battle of Adwa is one of the most consequential events in African history. In the late nineteenth century, the Italian monarchy, ruled by Umberto I, attempted to invade Ethiopia and subdue Emperor Menelik II. Ethiopia remains one of the only nations on the African continent to successfully avoid colonization by a European power. However, Italy's desire for global legitimacy and territorial claims to the Suez Canal prompted the nation to invade. Many scholars believe that Ethiopia was successfully able to repel the invasion only because of an innate territorial and geographical advantage. However, there are many emerging perspectives of the Battle of Adwa that challenge this narrative and attribute Menelik II's victory to superior strategy and execution. Italy's defeat sent shockwaves through nations in both Europe and Africa. Menelik II's victory challenged European imperialism and invited African's to resist subjugation. Following the Ethiopian's victory, leaders around the world called into question their imperial ambitions, with some claiming that establishing new colonies in Africa would be impossible. Adwa also inspired an intellectual movement in the United States among Pan-Africanists, who paid homage to Menelik II. Prominent activists like Marcus Garvey and Dr. Benito Sylvain relied heavily on Ethiopia's victory to develop their Pan-African ideology and invite the African diaspora to resist imperialism. Ethiopianism specifically has a connection to scholars like W.E.B. Du Bois and Booker T. Washington. While Adwa was not the end of a long saga of conflict on the African continent, it ignited an intellectual movement and demonstrated that resistance to subjugation was possible.

Navya Gobinathan

Discipline: Biology

Authors:

#1 John Ryan

#2 Hadi Hamze

Mahamed Abdulkadir

Abstract Name: Sex-Specific Differences in P2X7-Mediated ATP Responses in Mast Cells

Allergic diseases like asthma are more common and often more severe in females than males. One cause of these disparities can be how the immune system responds to common inflammatory stimuli. Extracellular ATP is increased by cellular damage, including damage caused by allergens. Once released from cells, ATP functions as a damage associated molecular pattern (DAMP), causing inflammation by coordinating an immune response. We used mast cells, a key immune cell involved in allergic inflammation, to investigate sex differences in ATP-mediated inflammation. After ATP stimulation, we used ELISA to measure cytokine secretion and flow cytometry to analyze cell-surface receptor expression. We find that female mouse mast cells release more inflammatory cellular granules and greater amounts of inflammatory cytokines in

comparison to males. Our results showed consistent female-dominant responses to ATP across two genetic backgrounds. We found that the ATP receptor, P2X7, is necessary for both male and female mast cell responses and that females do not express greater amounts of P2X7 than male cells. Work in progress will help understand the underlying mechanisms for female-dominant ATP effects. This work reveals fundamental differences in inflammatory diseases that exhibit sexual dimorphism and could lead to better interventions.

Victoria Goddard

Discipline: English and Literature

Authors:

#1 Victoria Goddard

Abstract Name: Til Death Do Us Part: Narrative of Death in Jane Austen's Marriage Plots

The works of Jane Austen are hardly known for their portrayal of death. On the contrary, many critics of Austen's work have focused on the "light, and bright, and sparkling" stylistic elements that attract readers some two hundred years after publication. While Austen's works are far more light-hearted than those of many of the women authors who came before her, death exists in everything Austen writes, even though scholars of Austen's work have tended to overlook this darker side of Austen's writing. In this paper, I show how the many instances of death in Austen's juvenilia and novels work to underscore the overarching theme of their respective works. Building on the scholarship of Gillian Dooley, I show how death in Austen's novels and juvenilia are also used to speak to instances of character reform and as tools of satire. Both death through the inheritance plot and death as satire, I argue, present death rather unseriously even as these same instances speak to major thematic strains. It is only the inclusion of death as character reform that tends to receive serious treatment by Austen's narrators, serving to reinforce gentility. This paper focuses on these three delineations of death and their connections to the texts' larger themes, demonstrating how an author best known for her marriage plots covertly handled more somber material to a variety of narrative ends.

Reyvadee Godehn

Discipline: Biology

Authors:

#1 John Cheadle

#2 Nathan Crook

Abstract Name: Exploring Maize Root Microbiome Engineering by Optimizing *Bacillus Subtilis* for Metagenomic Library Expression

As populations rise and new environmental stressors negatively impact plants, food security will become one of the world's largest obstacles in the future. Plant root microbe engineering enhances certain plant functions and may help increase crop yields. Despite the potential to revolutionize treatment of crops, this approach remains complex with vast knowledge gaps. Metagenomic libraries allow for expression of DNA sequences from microbes that are not culturable and discovery of genes critical to plant function. Plasmid libraries carrying unique DNA fragments are transformed into bacteria, and grown on plant roots. Functional screening identifies which sequences of DNA confer advantages or are important to microbial interactions on plant roots. *Bacillus subtilis* is a Gram-positive bacterium commonly found in soil. As a metagenomic library host, it could broaden heterologous gene expression, increasing chances of discovering novel interactions between microbes and maize. Initial research shows *B. subtilis* strain 168 has high potential in transformation,

however, lacks the ability to produce tryptophan, and cannot persist upon maize roots. Our goal is to optimize *B. subtilis* strain 168 for metagenomic library expression by engineering the strain, optimizing the library plasmid, and improving the transformation process. Using technologies such as molecular cloning, DNA sequencing, and bacterial transformation we will hope to use an integrative vector to stably express the *trpC* gene in *B. subtilis* 168, remediating tryptophan auxotrophy, and testing in minimal media with appropriate controls. We will use molecular cloning techniques to optimize our library plasmid, by testing different components such as promoters, origin of replication, and plasmid size, and evaluating effects on bacterial transformation efficiency. By varying electroporation variables like buffers, wall weakening agents, voltages, and recovery times, we will optimize our transformation method. Our results will aid in the discovery of novel genes significant to plant microbiome engineering applications.

Kemi Godo

Discipline: Computer Science

Authors:

#1 Krishnapriya Kottakkal Sugathan

Abstract Name: Simulating a Presentation Attack Using a Fake Finger to Evaluate Spoofing Detection and Prevention Capabilities of Digital Persona Fingerprint Reader

Fingerprint authentication, a widely used biometric security method, is vulnerable to presentation attacks (spoofing). These involve an attacker using a fake finger to trick the sensor into granting unauthorized access, raising concerns about the security, privacy, and reliability of biometric systems. This research project investigates the spoofing resistance of the Digital Persona U.are.U 4500 fingerprint reader. The study will test whether a fabricated fingerprint is rejected or authenticated, while documenting the fabrication process and evaluating the ridge-level quality (L1–L3 features) of the fake print. It will also compare similarity scores between real and spoofed fingers using fingerprint recognition software. The goal is to analyze not only whether spoofing is possible but also how effectively the sensor detects or prevents such attacks. This work will provide evidence about the strengths and weaknesses of consumer-grade fingerprint readers and create a reproducible framework for studying spoofing in academic settings. By relating results to prior literature, the findings will offer practical insights into biometric system security.

Ashley Godwin

Discipline: Biology

Authors:

#1 Andrea I. Hernandez Valente

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Yingzi Luo

Abstract Name: The Influence of the axis of astigmatism on stereopsis across spatial frequencies

Purpose. Uncorrected astigmatism can profoundly reduce stereoacuity. However, previous studies have used tests that are broadband in their spatial frequency content. Here we developed a new stereoacuity test using

narrowband Gabor stimuli to evaluate depth perception at different spatial scales, ranging from coarse to fine stereopsis. This study aimed to characterize how the axis of astigmatic blur alters the spatial frequency tuning of stereopsis. **Methods.** Stereoacuity was measured across spatial frequencies (1.25-20 cpd). Binocular disparity was introduced by shifting the two Gabor targets in opposite directions, and a haploscope was used to enable binocular fusion. The visual task was to determine the stereoscopic depth of the Gabor target relative to four Gabor references. Four young adult observers with normal vision were tested. Positive cylindrical lenses were used to induce various types of astigmatism in each of the two eyes: +1.00 DC x 180 for with-the-rule astigmatism, +1.00 DC x 45 for oblique astigmatism, and +1.00 DC x 90 for against-the-rule astigmatism. **Results.** In general, stereoacuity was more severely degraded by against-the-rule astigmatism than by oblique astigmatism across spatial frequencies, while with-the-rule astigmatism had the least effect. Inducing astigmatic blur degraded stereoacuity more selectively and substantially at higher spatial frequencies for with-the-rule astigmatism and at medium-to-high spatial frequencies for oblique astigmatism. Stereoacuity at lower spatial frequencies was also reduced by against-the-rule astigmatism - the optimum frequency tuning gradually shifted to lower spatial frequencies as the power meridian of astigmatism rotated from 0° to 45° and then to 90°. Notably, stereopsis for low spatial frequency targets was relatively less affected in all three astigmatic conditions. **Conclusions.** Using a narrowband stereoacuity test, we characterized the effects of astigmatic axis on depth perception across different spatial scales. These findings provide new insights into the stereopsis deficits in amblyopia associated with different types of astigmatism.

Molly Goecker

Discipline: Nursing and Public Health

Authors:

Abstract Name: Psilocybin Treatment for Alcohol Addiction and Reduction of Harm: Implementing Treatment for Low Socioeconomic Status Individuals in the United States

Alcohol Use Disorder (AUD) is a continuing problem in the United States that causes a high number of deaths and harm but lacks sufficient treatment methods, resulting in individuals with the disorder having an inability to receive treatment or experiencing high rates of relapse following treatment. Individuals at a lower socioeconomic status are currently facing the highest amounts of negative consequences, including, but not limited to, mortality, liver issues, and psychological issues, creating an alcohol harm paradox. In this review, the use of psilocybin in AUD treatment was evaluated to assess its effectiveness in remediating the disorder, and it was found that psilocybin treatment significantly reduces heavy drinking days, drinks consumed per day, and likelihood of relapse while increasing the likelihood of abstinence, most notably through the similarities in neurotransmitter pathways between psilocybin and alcohol and the mystic effects of psilocybin, including ego-dissolution. The factors that contribute to the inability of individuals at a low socioeconomic status to receive treatment were studied, including insufficient funding, lack of insurance, and lack of resources. Using this information, a plan was drafted that utilizes government grants to bring psilocybin treatment to areas of low socioeconomic status to alleviate the harm paradox.

Gabriella Goff

Discipline: Business

Authors:

#1 Gabriella Goff

Abstract Name: Apple Versus Spotify

The focus of this project was to analyze consumer preferences between Apple Music and Spotify to help improve each platform's online marketing strategy. Our survey included both Likert-scale and demographic questions to better understand how users perceive each service based on key features such as Spotify Wrapped, AI driven recommendations, podcast availability, pricing, and overall functionality. The goal was to prove that users preferred Spotify over Apple Music and why, and to identify what featured mattered most when choosing a music streaming service. Using Qualtrics and in person distribution, we collected 290 usable responses from our target population. We analyzed the data using SPSS to identify patterns in user preferences and develop meaningful conclusions and recommendations. Approximately 69.4% of respondents Agreed or Strongly Agreed that Spotify Wrapped is a feature they look forward to at the end of each year. This led to a recommendation that Spotify continues their 'Wrapped' feature. T-Tests showed that female respondents showed a significantly higher score than male respondents on the importance of a free- with ad version of Spotify. Spotify should continue to emphasize the free version with ad features they offer to the public. Regression analysis showed that overall satisfaction of Spotify's music streaming platform was dependent on the importance of the Spotify Wrapped feature, how knowledgeable the respondents are of Spotify's platform, and the number of hours a week used. Another regression showed that respondents would recommend Spotify over Apple Music due to the importance of the "jam session" feature, the \$5.99/month Student Plan pricing, and the importance of having the Apple logo on their music app. Recommendations included that Spotify make more marketing efforts towards males. Spotify should extend their efforts to catch males' attention in the Spotify Wrapped feature, the variety of podcasts, and the free with ad version.

Naime Gokce

Discipline: Chemistry

Authors:

#1 Tanya Garain

#2 Rawda Ikbariah

#3 Souvik Banerjee

Abstract Name: Design, synthesis, and biological evaluation of novel quinoline-based colchicine-binding site inhibitors

Cancer remains a major health problem worldwide, driven by genetic changes that disrupt normal cell growth and spread. Advanced cancers are often treated with drugs like paclitaxel and docetaxel, which target microtubules. Microtubules are components of the cytoskeleton that are required for maintaining cell shape, intracellular transport, and, most significantly, chromosomal segregation during mitosis. Their ability to switch between polymerization and depolymerization, known as dynamic instability, is closely regulated in healthy cells. Cancer disrupts this regulatory balance, causing malignant cells to divide uncontrollably. Because microtubules are essential for mitotic spindle formation, compounds that disrupt their function have emerged as an effective treatment for cancer. However, many existing microtubule-targeting drugs, like paclitaxel, have major drawbacks, such as off-target toxicity, low solubility, metabolic instability, and multidrug resistance. These shortcomings highlight the need for novel scaffolds that can bind tubulin more selectively, overcome resistance, and sustain potent antiproliferative activity. We report that the initiative attempts to overcome some of these challenges by developing a new class of phenyl(quinoline)methanone analogs designed to bind to the colchicine-binding site (CBS) at the interface of $\alpha\beta$ -tubulin, a well-established groove that inhibits tubulin polymerization when occupied. The quinoline core provides a versatile foundation for synthetic modification, allowing for comprehensive adjustment of electronic, steric, and hydrogen-bonding properties to increase tubulin binding and improve the potency of the molecules. Using structure-based molecular modeling, ten compounds were synthesized that could potentially optimize interactions with CBS and ensure drug-like properties. These compounds were then tested on cancer cells to determine their potency. A few of these compounds proved to have IC₅₀ values below 1 μ M, indicating that further modifications can lead to more potent and selective compounds. These molecules would be further

evaluated for their mechanism of action studies and their ability to induce apoptosis (programmed cell death) in cancer cells.

Chloe Goldberg

Discipline: Health and Human Development

Authors:

#1 Chloe Goldberg
#2 Kari Brossard Stoos
#3 Anushri Sukumaran
#4 Brianna Jankowski
#5 Léanne Desjardins
#6 Harper O'Neill

Abstract Name: Undergraduate Public Health Facilitation of Open Airways for Schools: Educational Benefits for Children and College Students

This project examines how a college student-led implementation of the American Lung Association's Open Airways for Schools (OAS) program can strengthen asthma management education for elementary-aged children while simultaneously building professional skills for Public and Community Health undergraduates. OAS has been implemented by nursing students and school nurses, this project is the first to train undergraduate Public and Community Health students to deliver the program. We sought to determine whether this model created reciprocal learning benefits for both the children receiving instruction and the college students facilitating it. Childhood asthma remains a major public health concern, and education-focused interventions consistently improve symptom management, self-efficacy, autonomy, and long-term health outcomes. OAS is an evidence-informed curriculum that has demonstrated past success. School nurses in Ithaca face increasing demands that limit their capacity to implement such programs. Training Public and Community Health students offers a practical solution: children continue to receive high-quality asthma education, college students gain hands-on experience, and school nurses experience reduced burden. Limited research has explored how non-nursing undergraduate health students can effectively deliver asthma education, making this project a unique contribution to community health pedagogy and school-college partnerships. Selected Public and Community Health students were supported by a student ambassador and faculty. The ambassador coordinated OAS training with the American Lung Association, scheduled school sessions, prepared instructional materials, and supported classroom management. Caregivers completed consent and asthma surveys prior to participation. Children completed pre-tests and post-tests measuring asthma knowledge. Data was collected over two years in two schools. Findings showed improvements in children's post-test scores, increased confidence in asthma self-management, and anecdotal reports of calmer responses during asthma episodes. College students demonstrated growth in behavior management, professionalism, and confidence in program delivery. Results suggest that Public and Community Health students can effectively implement OAS while gaining valuable experiential learning.

Kelsey Golden

Discipline: History

Authors:

#1 Kelsey Golden

Abstract Name: New Crusades, Old Problems: Crusade as Cognitive Space in the Billy Graham Library

From 1949 to 2005, American evangelical preacher Billy Graham led more than 400 multi-day revivals around the world, reaching more than 200 million people. He called these events "Crusades," drawing upon language that had long been used among early 20th-century American evangelical Christians. Among those

living in historically Christian countries, “the Crusades” are typically understood as a series of military campaigns led by European Christians from the 11th to 14th centuries in Asia and the Middle East. The use of “Crusade” by Graham evokes this medieval history and the popular notion among some evangelical Christians that their faith needs to be defended against ethnic or religious “others” (i.e., Muslims, Jews, liberal Christians). In this presentation, I explore what, if anything, Graham's twentieth-century Crusades have to do with their medieval predecessors. I argue that these Crusades function as a recontextualized conceptual space through which evangelical Christians imagine their work in terms of journeying to exotic places to fight for their faith and bring about the reign of Christ as described in the Book of Revelation. I demonstrate this through an analysis of the Billy Graham Library, focusing on exhibit captions and spatial layout. This paper contributes to a longer project on the use of crusades by White Christian Nationalists (WCN), a religious-political movement that incorporates crusader imagery into new calls for Christians to take up arms against Muslims and other imagined opponents. The larger project analyzes the way two sites, the Billy Graham Library and Rosslyn Chapel in Scotland, employ Crusade language or history and how these sites are interpreted by WCN.

Sara Goldin

Discipline: Political Science

Authors:

#1 Sara Goldin

Abstract Name: The Humane Finish Line: Fixing the Horse Racing Industry

The cruelties plaguing the United States' racehorse industry are deep-rooted, fueled by systemic and ethical failures that profoundly affect equine athletes' well-being. This paper examines the industry's inhumanity, focusing on the story of CeCe, a retired Thoroughbred who, due to industry abuses, lost her left eye. It presents statistics from October 17, 2025, showing that since 2014, the on-track death count has reached 11,671. I drew on veterinary medicine and welfare research, highlighting critical deficiencies within the industry. The first study reviewed was a collaborative effort by Colorado State University, the University of Sydney, and the One Welfare Institute. Their research reveals how high-concentrate, low-forage diets contribute to an 80-100% prevalence of gastrointestinal diseases. It also discusses how close confinement in small stalls for 23 hours daily leads to bone density loss and psychological distress. Additionally, the study shows that intensive training before full musculoskeletal maturity is associated with a higher injury rate. The industry's dependence on cruel behavioral-modifying equipment and medications to mask pain is also highlighted. I then examined a study by the UC Davis School of Veterinary Medicine and the University of Melbourne's School of Veterinary Medicine, which assesses the risk of Catastrophic Musculoskeletal Injuries (CMIs) associated with preexisting medical conditions, indicating that horses with multiple preexisting conditions face a high risk of CMIs, with a history of lameness being the most significant predictor. Based on research, I developed a comprehensive five-domain solution including: improving the living conditions of racehorses, banning drugs and prosecuting those who administer them, delaying training until musculoskeletal maturity, ensuring access to quality, independent veterinary care, and establishing a Federal Racehorse Cruelty Prevention Law providing legal protection and ensuring accountability across the industry. This law would mandate end-of-career options, dismantling the devastating race-to-slaughter pipeline and ensuring a humane finish line for all.

Patrycja Goloszewski

Discipline: Social Work and Human Services

Authors:

Abstract Name: The Impact of Social Use and Cognitive Factors on Language Learning, Retention, and Attrition in Multilinguals

Language attrition refers to the gradual loss of language proficiency that may occur after a language has been acquired. Attrition can occur with an individual's first language (L1) or second language (L2), and it is typically not a process that individuals plan or desire to experience. Language attrition in multilinguals is shaped by social factors, including patterns of language use, cultural values, and emotional identity, as well as cognitive factors related to memory, attention, and neurological processes. The purpose of this research was to explore how these factors contribute to language attrition. This research entailed examination of scholarly research from academic databases on themes such as language attrition, language loss, language maintenance, language retention, and language preservation. This research allowed for the comparison of theoretical perspectives and identified common patterns across age groups, environments, and cultural contexts. It was expected that these findings would provide insight into how multilingualism is acquired and supported, offering strategies for supporting language preservation through educational opportunities and sociocultural experiences. Language preservation holds significance in our society as it strengthens individuals' language skills, which allows linguistic communities to maintain their culture and collective identity. This promotes diversity and inclusion of people from a variety of backgrounds and supports the transmission of cultural knowledge across generations. Strengthening language preservation also enhances society's capacity for cross-cultural communication and to meaningfully interact with others. Overall, the findings may help deepen our understanding of social and cognitive factors that impact multilingualism to inform education and efforts for supporting language preservation in our global society. By recognizing the importance of linguistic diversity, this research aims to build this skill in our global multilingual population and deepen understanding of how these processes occur.

Priscilla Gomes

Discipline: Biology

Authors:

#1 Natalia Magnusson

#2 Aurelie Pala

#3 Adriana Galvan

Abstract Name: Quantification of the Collaterals Originating from the Corticospinal Tract to the Subthalamic Nucleus and Zona Incerta: A Comparative Study Between Mouse and Monkey

The corticospinal tract (CST) is the major neuronal pathway that travels from the primary motor cortex (M1) to the spinal cord (SC) and allows for voluntary muscle movement of the body and limbs. On their way to the SC, CST neurons are known to send collaterals, side branches of axons, to subcortical structures of the brain. These structures include the subthalamic nucleus (STN) and zona incerta (ZI), which are involved in movement modulation and integration of different information modalities, respectively. Importantly, collaterals from the CST transmit efferent copies of outflowing movement-producing signals to these structures. This collateralization may vary across species due to evolutionary specializations. We thus employed a comparative study between mouse and rhesus monkey to analyze the level of innervation that the STN and ZI receive from CST collaterals. We injected an AAV-GFP retrograde tracer in the arm region of the SC in both species to label CST neurons that send outputs to the arm region of the SC as well as collateral branches that terminate onto STN and ZI. We used immunoperoxidase staining to visualize the GFP from this injection. Digital images of the brain sections were taken using light microscopy (LM) and electron microscopy (EM). For LM images, we will visualize and calculate the spatial density of labeled terminals using MATLAB/Imagej algorithms. For EM images, we will identify labeled elements (e.g., terminals, dendrites, etc.) and measure their area to assess the level of influence collaterals have on the structures. The

results of this study will further our understanding of CST neurons in the arm region across species, thus evaluating the relevance of these species for the study of normal and diseased states, and as models of movement disorders such as Parkinson's Disease, a disorder in which fine hand motor control dysfunction is prevalent.

Christian Gomez

Discipline: Engineering

Authors:

#1 Christian Gomez

Abstract Name: Modular Road, Lane, and Traffic Object Segmentation for Autonomous Driving

This project develops a modular image segmentation pipeline for low-speed autonomous driving. Instead of learning steering commands directly, the system focuses on understanding the road scene by labeling each pixel as drivable road, lane marking, or traffic-related object. The primary goal is to design and demonstrate a pipeline that cleanly separates these classes in driving images so that future controllers can rely on clear, interpretable inputs. To achieve this goal, the approach combines existing open-source vision models into three main stages. First, a multi-task deep network composed of YOLO-based object detectors and a YOLOPv2 lane and drivable-area model takes camera images and produces initial proposals for road, lane lines, and key objects such as vehicles and pedestrians. Second, an automatic mask-generation stage built with the Segment Anything Model (SAM) and OpenCV refines these proposals into dense training labels, reducing the amount of manual annotation needed. Finally, a compact U-Net-style segmentation network is trained on a mix of public road-scene datasets and a custom image dataset collected around the California State Polytechnic University, Pomona campus. This network learns to output separate masks for drivable road, lane markings, and traffic-related objects. Initial qualitative tests on the campus dataset show that the model can produce coherent, continuous road masks and clear lane markings, while failure cases still appear under strong glare, deep shadows, and unusual lane configurations. Because the pipeline is still being refined, ongoing work includes quantitative evaluation, systematic comparisons to simpler baselines, and exploration of adding LiDAR and overlapping sensor data to further improve robustness in more challenging conditions.

Kira Gomez

Discipline: Biology

Authors:

#1 Luis Alegria

#2 Liliana C.M. Salvador

Abstract Name: Identification of Drug Resistance Mutations in *Mycobacterium bovis* Isolates causing Zoonotic Tuberculosis

Background Zoonotic tuberculosis (zTB), caused mainly by *Mycobacterium bovis*, remains an underrecognized cause of human tuberculosis, particularly in regions with close human-animal interaction. Infection occurs through consumption of contaminated animal products or inhalation of infectious aerosols. A major clinical challenge is the intrinsic resistance of *M. bovis* to pyrazinamide due to the *pncA* His57Asp mutation. Whole-genome sequencing (WGS) enables phylogenetic analysis to trace lineage circulation and detect drug-resistance associated mutations. However, systematic regional comparisons of lineage diversity and resistance profiles in human-derived *M. bovis* isolates remain limited, highlighting critical surveillance

gaps. Methodology Publicly available human and animal *M. bovis* isolates were retrieved from NCBI. As preliminary analysis, 109 African genomes were analyzed using SNP-based clustering and phylogenetic reconstruction to assess lineage sharing and geography-specific patterns. The current dataset includes 706 human *M. bovis* genomes: North America (570), Europe (112), Africa (3), Asia (6), Oceania (4), and South America (11). Ongoing drug resistance profiling includes genome assembly, annotation, and variant calling using the Bacterial and Viral Bioinformatics Resource Center. Drug resistance-associated mutations, spoligotypes, and lineage classification are being performed using Mykrobe and TB Profiler. Results The regional analysis identified one human isolate clustering with cattle derived isolates from Uganda (~37 SNPs), suggesting shared lineage ancestry. Transmission clusters (<12 SNPs) were detected among cattle in Nigeria and Ethiopia, and wildlife in South Africa. High genomic diversity in Morocco, Uganda, and Ethiopia contrasted with lower diversity in Zambia. These findings provide quantitative evidence of regional heterogeneity and cross-species lineage circulation. Discussion This study will integrate lineage and resistance profiling to support regional genomic surveillance of human *M. bovis*. Findings to date demonstrate geographically structured diversity and human-animal lineage overlap reinforcing the need for One Health-aligned strategies to monitor and control zTB.

Anthony Gomez

Discipline: Engineering

Authors:

#1 Anthony Gomez

#2 Katherine Zoller

#3 Natalie Mar

Natalie Mar

Katherine Zoller

Abstract Name: Detection and Quantification of Facial Symmetry Using Computer Vision Methods

Background: Upper and lower facial droop are early signs of stroke. However, subjective evaluation of the subtle changes is difficult to detect. Landmark analysis through computer modeling provides insights to quantify the severity and depth of facial asymmetry. This study aims to develop an asymmetry index (AsI) and establish a score range to reduce subjectivity in neurological assessment. Methods: This instrument development uses portable, self-contained system to quantify facial asymmetry via 3D facial landmark analysis. Asymmetry methods from credible research were evaluated to compare accuracy against manual measurements and landmark detection with algorithmic outputs using the same asymmetry formulas. Key landmarks (eyes, nose, mouth) were tested independently and combined into an AsI. Baseline comparators for stroke-patients were developed from 100 neutral-expression human face images averaged to generate a population AsI reference value. System robustness was established from faces with glasses, makeup, scars, and using varied lighting and conditions. Clinically relevant human subject data from patients admitted with stroke will be obtained in early 2026. Results: Early results from referenced studies support a hypothesis that healthy individuals will demonstrate low AsI values with narrow variances. Similarly, mouth and eye regions contribute most significantly to asymmetry in facial palsy. The composite AsI will reflect trends to remain stable across repeated image capture, accounting for environmental variability. Conclusion: This novel device will provide an accurate and reliable AsI in real time. The study contributes meaningful advances towards an objective method to identify facial asymmetry via computerized algorithms. Further testing and trials will provide data to refine the AsI.

Mateo Gomez Bedoya

Discipline: Linguistics and World Languages

Authors:
#1 Mateo Gomez Bedoya

Abstract Name: Supporting high school students' language learning through culturally responsive teaching and funds of knowledge

This project aimed to use funds of knowledge to inform culturally responsive teaching to support high school English learners' language learning. Further, this study was conducted in a suburban high school of 1,500 students and in an English as a second language (ESL) program. The classroom involved 12 students at the entering level. The students came from various Spanish-speaking countries. The primary goal of this research was to focus on content literacy and move them from one Language level to the next one. The study had 4 different theoretical concepts. The first one was using students' cultural and linguistic strengths to make learning meaningful. The second one was teaching language through content with scaffolded instruction. The third one was using academic language like repetitive vocabulary and structures. The fourth one was partnering with families and communities to strengthen support for learners. These theoretical concepts came from Souto-Manning (2010), Jimenez et al. (2015), DelliCarpini and Alonso (2013), Janzen (2008). Equally important, the study focused on a qualitative method and different data sources including: lesson plans with materials (lesson plans, culturally responsive texts, manipulatives, word banks, etc), journals, video and audio recording of classroom discussion, student work samples, and a funds of knowledge survey. The goal of this project was to identify different changes and patterns in students' language that were affected and supported by this teaching approach. They were able to develop their reading skills and made connections with the culturally responsive texts that incorporated historical events, cultural traditions, and professions which were chosen for guided and independent practices throughout the unit. Finally, another conclusion drawn was that after implementing students' funds of knowledge and culturally responsive teaching practices, teacher modeling, helped students understand how to clearly write more complex sentences in English, use repetitive vocabulary, and further their writing skills.

Diana Sofia Gomez Gallo

Discipline: Biology

Authors:
#1 Andre Garcia
#2 Brooke Tyree
#3 Anel Jaramillo
#4 Catherine Van Doorn

Abstract Name: Alcohol Abstinence Effects on Anxiety-Like Behavior, Drinking Behavior, and BNST in Mice

Alcohol abstinence is associated with increased anxiety-like behavior and neuroadaptive changes in the bed nucleus of the stria terminalis (BNST), a critical region for affective regulation. Past studies demonstrate that females are more likely to drink alcohol and relapse to alleviate psychological distress. This study investigates sex differences during and after alcohol abstinence periods by measuring drinking behavior, anxiety-like behavior and brain activity. Male and female mice underwent a two-bottle choice alcohol paradigm for 6 weeks. The mice had continuous free access to two bottles, one with water, and one with 10% ethanol. The bottles and animals were weighed every 48h to measure how much ethanol they consumed. After the first 6 weeks of drinking, they had a 2-week abstinence period. Next, they were exposed to the novelty suppressed feeding test (NSFT) to measure anxiety-like behavior. The bottles were placed back for 6 weeks, followed by another 2-week abstinence period where the mice were exposed to a stress restraint test and a second NSFT. Ninety minutes after NSFT the animals were perfused, and the brains were harvested. The brains were sliced, and immunohistochemistry was performed for protein expression of C-FOS, a neuronal marker for brain

activity. Next, a water-control cohort underwent the same experimental timeline (i.e., no ethanol exposure). Results showed females consumed more alcohol before and after abstinence compared to males. Drinking was increased post-abstinence compared to pre-abstinence, an effect driven by males. In the second abstinence, the second NSFT showed that history of restraint stress increased anxiety-like behavior in males and not females. Our conclusion is that both females and males are sensitive to abstinence, with females consuming more alcohol and males showing increased anxiety. To determine differences in neuronal activity between males and females, images of the BNST are currently being analyzed for C-FOS expression.

Matthew Gonzalez

Discipline: Interdisciplinary

Authors:

#1 Matthew Gonzalez

Abstract Name: Principia Scientia et Mathematica de Christvs/Archonos Q-CAS Economic Engine

The present invention relates to a hybrid computational and economic infrastructure system integrating quantum computation, classical processing, photonic signaling, and adaptive distributed consensus. The system enables coordinated computational processes, ledger validation, and autonomous governance functions across heterogeneous hardware types including quantum processors, photonic devices, and conventional computing substrates. The architecture incorporates a quantum-classical autonomous system (Q-CAS) capable of dynamic task allocation, operational continuity, and protocol evolution without full-system interruption. The system further includes a cryptographic token engine, a multi-layer ledger framework, and a scalable communications fabric supporting terrestrial, distributed, and remote deployments. Energy independence modes are supported through compatibility with renewable, off-grid, and emergent power systems. The system is designed to maintain functional integrity across present and future computational paradigms, including post-classical or neuromorphic implementations. This invention provides a generalized platform enabling secure computation, distributed recordkeeping, and self-optimizing operational control. Successor technologies demonstrating substantially equivalent functionality are considered within the scope of the invention.

Alexis Gonzalez

Discipline: Political Science

Authors:

Abstract Name: Key Predictors of ICE Arrests in 2025

From the start of President Trump's second term, Immigration and Customs Enforcement (ICE) has moved aggressively to restrict immigration activity. These restrictions have led to a dramatic increase in ICE arrests throughout the country. This study investigates the following research question: what are the key predictors of ICE arrests and the percentage growth from 2024 to 2025 across the states? The independent variables in this study are percentage Latino population, seasonal migrant workers, percentage Trump vote, whether or not a state borders Mexico, sanctuary vs. non-sanctuary states, and region. The dependent variables are ICE arrests in 2025 and the percentage growth in ICE arrests from 2024 to 2025 for each state. This study utilizes correlation and multiple regression analyses as well as ANOVA. The findings indicate that percentage Latino population, seasonal migrant workers, and Trump vote were positive and significant predictors of ICE arrests in 2025. Furthermore, the data analysis reveals that states with a higher population of seasonal migrant

workers also experienced significant growth in ICE arrests from 2024 to 2025, while Latino population and Trump vote percentage were not as significant in this area. Interestingly, non-sanctuary states experienced higher arrest rates than those with sanctuary policies in place, contrary to public belief of Trump targeting those states. The ANOVA revealed that the highest ICE arrest rates were evident in the South and lowest in the North Central region. Future research should explore city-level or county-level data, racial attitudes, and socioeconomic factors. The growth in ICE arrests remains a flash point for media coverage, public opinion, and the growing political polarization in the United States.

Edgar Gonzalez German

Discipline: Mathematics

Authors:

#1 Edgar Gonzalez German

Abstract Name: You Need Redundancy: Weight Decomposition for Homogeneous Cyclic Monomial Inequalities in Lean 4

Many algebraic inequalities, especially those involving cyclic homogeneous expressions, are typically proved through ad hoc manipulations or some combination of known inequalities, becoming an art of its own. This paper develops a general method for proving such inequalities whose terms are nonnegative monomials by decomposing them into a conic (nonnegative linear) weighted sum of simpler inequalities with unknown scalars; each corresponding to a cyclic rotation of variables. The idea is to enforce a single auxiliary inequality on one rotation of the variables and use the AM-GM inequality to compare monomials. By matching the exponent patterns term by term, we derive a linear system that, if solved, yields the desired inequality. This work is formalized in the Lean4 proof assistant, and code fragments are presented throughout the paper. Formally, each monomial in the auxiliary inequality places a linear constraint on the weights, and the entire set of constraints can be expressed as a matrix equation $M \cdot w = y$. The matrix M encodes how the exponents shift under cyclic rotation, while the vector y represents the exponent combination of the monomial we want to dominate using AM-GM. If this system has a solution with nonnegative entries, then the target cyclic inequality is a nonnegative linear combination of valid auxiliary inequalities, and therefore is itself valid. A key focus of this paper is identifying structural conditions on the matrix M that guarantee the existence of such nonnegative solutions without explicitly computing the weights. This includes invertibility, sign patterns, and positivity-preserving properties. The framework provides a systematic and potentially automatable way to prove entire families of cyclic inequalities.

Logan Goodenough

Discipline: Biochemistry

Authors:

#1 Logan Goodenough

#2 Sarah Vinnik

Abstract Name: Title: Inhibition of MDA5 by the Nodamura virus dsRNA-binding protein B2

Viral RNA sensing by the human protein MDA5 is a key innate immune function in the interferon pathway. The specialized RNA-dependent ATPase is a pattern-associated molecular patterns in the form of viral double-stranded RNA (dsRNA). Activation of MDA5 by viral dsRNA binding leads to transcription of genes encoding type I interferons, responsible for antiviral immunity by coordinating cellular immune responses to

viral infection. Viral genomes encode proteins that inhibit or weaken the type I interferon response pathway by inhibiting RLRs. Here, we aim to identify whether Nodamura virus protein B2 (NoV-B2), a viral dsRNA-binding protein, inhibits MDA5 signaling of the type I interferon response pathway. MDA5 and NoV-B2 were expressed in *E. coli* and purified by affinity and ion exchange chromatography. The RNA-dependent ATPase activity of MDA5 was measured in vitro by the colorimetric Malachite Green Phosphate Assay using poly(I:C) as a viral dsRNA mimic. NoV-B2 was included to determine if it inhibits this function. Future directions of this project include (1) investigating the mechanism of inhibition by making a mutation in NoV-B2 to abolish dsRNA binding, and (2) testing other viral proteins that may inhibit MDA5. Findings of in vitro inhibition of MDA5 by poly(I:C) may indicate an in situ inhibition of MDA5 ultimately contributing to impaired signaling of the type I interferon response pathway during viral infection.

Rachel Goodman

Discipline:

Authors:

#1 Rachel M. Goodman

#2 Amanda M. Starr

Abstract Name: The Student Network for Amphibian Pathogen Surveillance (SNAPS): Incorporating a citizen science project and independent research into an undergraduate curriculum

The Student Network for Amphibian Pathogen Surveillance (SNAPS) is a North American citizen-science initiative that integrates authentic research experiences into undergraduate education while generating high-value data on wildlife disease. SNAPS supports more than 60 institutions with shared protocols, centralized DNA testing for amphibian pathogens, and pedagogical resources—including lesson plans and attitudinal surveys—to strengthen student learning and engagement. Students collect skin swabs from wild amphibians during coursework or summer research, and samples are screened via qPCR for the fungal pathogens *Batrachochytrium dendrobatidis* (Bd) and *B. salamandrivorans* (Bsal). Faculty at Hampden-Sydney College and Longwood University joined SNAPS in 2023 and have contributed samples from 75 frogs and 6 salamanders collected by students during three courses (Ecology, Wildlife Biology, Conservation Biology) and one summer research project. Although no Bsal detections have occurred at any participating site, 7–10% of our samples within a surveillance period tested Bd-positive. Participation in this large collaborative network has provided faculty and students with experience in an authentic, large-scale research project with conservation significance, streamlined data sharing, and access to essential supplies and high-quality teaching materials. The project has also provided additional summer research in expanded laboratory training and enabled deeper inquiry for selected students. Overall, SNAPS has enhanced curriculum-wide engagement with authentic science practices while broadening opportunities for students to participate in ecological and molecular research. We will continue our participation in SNAPS in our 2026 Ecology course and will expand our summer research programs to include laboratory work on the amphibian microbiome and additional pathogens. We hope that involvement in this citizen-science program will provide all students with hands-on field skills and increase engagement by enabling them to contribute to a broader scientific effort. Students who join the summer projects will gain advanced research experience, including data management, molecular techniques, and scientific communication.

Cole Goodwin

Discipline: Environmental Science and Sustainability

Authors:

#1 Cole Goodwin

Abstract Name: Impact of Dam Intake Depth on the Outflow water Conditions: A Case Study of Walker Lake, Snyder County, PA.

Lake stratification strongly influences downstream water quality, particularly in reservoirs where discharge depth determines the physical and chemical characteristics of released water. Stratified lakes develop three layers: the warm, oxygen-rich epilimnion; the rapidly cooling metalimnion; and the cold, oxygen-poor hypolimnion. Because each thermal layer contains distinct temperatures, oxygen levels, nutrient loads, and metal concentrations, the depth of water withdrawal plays a major role in shaping downstream ecology. Walker Lake, a reservoir in Snyder County, Pennsylvania, historically released cold, low-oxygen hypolimnetic water, which significantly affected the water quality of Middle Creek. By 2025, management changes shifted the outflow to the epilimnion, resulting in warmer and more oxygenated discharge. Although the effects of dams on water quality are well documented globally, few studies have examined how changes in withdrawal depth within the same lake alter downstream conditions over time. This study evaluates whether Walker Lake's shift from hypolimnetic to epilimnetic discharge from 2018 to 2025 has influenced downstream water quality and biological communities. A multi-metric comparison of upstream and downstream data from both years, including temperature, dissolved oxygen, nutrient and ion concentrations, and benthic macroinvertebrate communities, revealed that the depth of discharge intake does influence conditions in Middle Creek.

Lucas Goodwin

Discipline: Biochemistry

Authors:

#1 Tomasz Kordula

Abstract Name: Investigating the Role of Regnase-2 in Glioblastoma Multiforme Tumor Growth Using Astrocyte-Targeted GEARBOCS Knockout

Background: Glioblastoma Multiforme (GBM) is a primary brain cancer, characterized by a unique immunosuppressive tumor microenvironment that promotes chronic neuroinflammation with persistently active pro-inflammatory cytokines that support tumor growth. Members of the Regnase family (Zc3h12A-D) are ribonucleases (RNase) that regulate neuroinflammation by degrading mRNAs encoding pro-inflammatory cytokines. In a healthy brain, Regnase-2 is highly expressed while Regnase-1 shows little expression. Under prolonged neuroinflammation, Regnase-2 expression is downregulated while expression of Regnase-1 is increased. However, Regnase-2's role in GBM is less understood. This project utilizes gene editing in astrocytes based on CRISPR/cas9 system (GEARBOCS) to target and knockout Regnase-2 in astrocytes and evaluate its effect on GBM growth and progression. Methods: gRNAs were designed, ligated into the GEARBOCS vector, and transformed into stbl3 bacteria. Colonies were selected, the plasmids were isolated, purified, and verified via SapI restriction enzyme digestion to confirm gRNAs insertion. Hek293T cells are cultured with complete DMEM and grown to approximately 80% confluency in T175 flasks. Cells are transfected with the generated plasmid and the helper plasmids (php.eb and pΔf) to package the construct into the functional AAV virus. The cells were harvested and lysed to release viral particles. The viral particles were purified using iodixanol gradient, ultracentrifugation, and filtration techniques. The AAV was tested in vitro for Reg-2 knockout efficiency using a western blot. Following verification, the AAV will be delivered retro-orbitally into mice, and effects on tumor growth will be analyzed. Expected Results: We anticipate that GEARBOCS-mediated knockout of Regnase-2 in astrocytes will significantly affect the growth and progression of glioma. Our data should provide evidence that through deletion of Reg-2, increased amounts of its target, Reg-1, will occur specifically in astrocytes. We expect to significantly alter the microenvironment of glioma and thus affect its growth and progression.

Vaida Goplin

Discipline: Health and Human Development

Authors:

#1 A. Noelle Larson

#2 Hans Nugraha

#3 Paul Huddleston III

#4 Linjun Yang

#5 Jonathan Morris

Abstract Name: Automated Volumetric Assessment of Hounsfield Units Using a Deep-Reasoning Learning Model: A Validation in Lumbar Vertebrae

Accurate evaluation of spinal bone density is critical for assessing bone health and guiding preoperative planning. Conventional manual approaches to Hounsfield unit (HU) measurement rely on single-slice regions of interest, limiting reproducibility and precision, particularly in patients with severe vertebral deformities. We hypothesized that a novel deep-reasoning and learning model (DR-AI) could fully automate volumetric spinal bone density assessment, providing strong correlations with bone mineral density (BMD) obtained from dual-energy X-ray absorptiometry (DXA), as well as with T- and Z-scores. A cross-sectional study was conducted on patients who underwent lumbar spine BMD assessment and lumbar CT imaging within one year. The DR-AI model was applied to analyze the soft-tissue window of lumbar vertebrae CT scans. Spearman correlation coefficients were calculated to evaluate relationships between volumetric HU values and DXA-derived BMD, T-, and Z-scores for each vertebra. Eighty-four patients met inclusion criteria (67 females, mean age 74.1 ± 10.3 years; 17 males, mean age 68.1 ± 12.4 years). Correlation analyses across L1–L4 demonstrated significant positive associations ($p < 0.0001$), with the strongest correlation observed at L2 between HU and BMD ($\rho = 0.75$). These findings suggest that DR-AI provides a reliable, efficient, and precise method for automated volumetric HU assessment, offering a promising alternative to DXA in spinal bone health evaluation.

Vaida Goplin

Discipline: Health and Human Development

Authors:

#1 Dr. A. Noelle Larson

Abstract Name: Defining Normal Variation in the Pediatric Spine to Enhance Clinical Decision-Making

The pediatric spine undergoes complex developmental changes, yet defining what constitutes “normal” anatomy remains a challenge due to limited reference datasets and variability across age groups. This study will explore normative spinal features by analyzing pediatric chest, pelvis, and abdomen CT scans obtained for non-spinal indications, leveraging existing imaging to minimize additional radiation exposure. The project aims to characterize vertebral dimensions, alignment, and overall morphology across developmental stages, with findings stratified by age and sex to highlight growth-related trends. While specific analytic methods are still being refined, the overarching goal is to establish baseline parameters that distinguish typical variation from pathology. By providing age-stratified reference values, this work will contribute to improved diagnostic accuracy, inform surgical planning, and support future research in pediatric orthopedics and radiology. More broadly, defining a “normal” pediatric spine through accessible imaging data has the potential to enhance

patient care, reduce uncertainty in clinical decision-making, and create a foundation for multidisciplinary collaboration in understanding pediatric musculoskeletal health.

Anastasiia Gordeeva

Discipline: Chemistry

Authors:

#1 Anastasiia Gordeeva

#2 Fang Xu

#3 Gary Jacobs

Abstract Name: Synthesis and characterization of Ni- and Co- Based Catalysts for CO₂ methanation

As the world ramps up its efforts to minimize the impact of carbon emissions, converting CO₂ from industrial flue gas into synthesized methane gas presents a promising method to accomplish this task. Using power-to-gas systems via methanation, efficient reductions are possible allowing for carbon capture and storage of renewable energy. Nickel- and cobalt-based catalysts have demonstrated successful conversion, however, there are limitations. These systems show reduced performance at lower temperatures, uneven metal distribution and catalyst instability. Additionally, the support material and metal-support interactions are not completely understood which impacts the catalytic performance optimization when it comes to the CO₂ methanation. This study focuses on the development of cost-efficient catalytic systems to convert carbon dioxide into synthesized methane gas through the methanation process. Nickel and cobalt catalysts with varying metal loadings were synthesized on silica and zirconia supports via incipient wetness impregnation. The catalysts are characterized by BET surface area analysis, H₂-temperature programmed reduction (TPR), CO₂-temperature programmed desorption (TPD) and transmission electron microscopy (TEM) to assess the effect of support material on metal dispersion, reducibility and interactions between the metal and the support. The influence of metal loading, the surface area of the support and the metal reduction protocol on catalytic activity and stability are examined. The findings of this research will allow the development of the catalytic systems capable of efficiently transforming CO₂ emissions into valuable energy sources. This advancement could significantly contribute to the transition towards repurposing and reduction of industrial combustion products.

Madeline Gordon

Discipline: Criminology/Criminal Justice

Authors:

#1 Ali Weinstein

#2 Yi-Fang Lu

#3 Sue-Ming Yang

Abstract Name: Resiliency and Critical Incident Exposure as Predictors of Police Officer Stress Across City and County Departments

Background/Objectives Police officers experience over 150 critical incidents (i.e., violent crimes, serious accidents) during their careers, compared with only 3-4 for the average person. This repeated exposure contributes to stress, though resiliency can buffer its effects. Less is known about how organizational context interacts with these factors. City and county police departments differ in jurisdiction size, resources, and frequency of critical incidents, which may shape stress experiences. This study examined whether resiliency,

critical incident exposure, and departmental context (city vs. county) are associated with police officer stress. Data were drawn from a Bureau of Justice-funded project (15PBJA-22-GG-00143-BRND). Methods From February 2022 to November 2024, 47 city and 130 county officers from Virginia completed the 10-item Connor-Davidson Resilience Scale-2, the DSSQ-3 State Questionnaire (measuring work disengagement, distress, and worry), and the Critical Incident Exposure Questionnaire. Regression analyses with $p < 0.05$ tested associations. Results The majority of participants were male (county: 78.4%; city: 75%) and aged 40 or under (county: 71%; city: 89%). Work disengagement was significantly associated with resiliency and critical incident exposure, while distress and worry were not. Critical incident exposure explained 4.7% of variance in work disengagement ($p < 0.05$), departmental context (city vs. county) explained 7.4% ($p < 0.05$), and resiliency accounted for the largest share at 14.1% ($p < 0.05$). Together, these factors explained 26.2% of the variance ($p < 0.05$). Conclusion Resiliency, critical incident exposure, and departmental context each predicted work disengagement, with resiliency being the strongest predictor. Officers' departmental setting (city vs. county) also significantly influenced work disengagement, suggesting that organizational structures may shape stress responses. Future research should explore organizational structures, such as workload, resources, and community demand to guide interventions that strengthen resiliency and reduce work disengagement among police officers.

Maya Gosai

Discipline: Biology

Authors:

#1 Sweta Agrawal

#2 Clément Vinauger

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Sami Sheikh

Abstract Name: Disrupting The Mosquito Mind-Body Link: How Proprioceptive Mutations Impair Locomotion and Host Seeking in *Aedes Aegypti*

Mosquitoes pose a substantial threat to human health due to their ability to transmit parasites and viruses including malaria, yellow fever, and dengue. The control of mosquito-borne pathogens has become increasingly difficult as mosquitoes develop increased resistance to popular insecticides. To address this issue, we are investigating a novel class of insecticides (IRAC Group 9) whose effectiveness against mosquito populations is unknown. IRAC Group 9 insecticides include neurotoxins, such as pymetrozine, that disrupt the function of mechanosensory neurons known as chordotonal organ (CO) neurons. CO neurons are critical for hearing, walking, and navigation in a variety of insects. We aim to ascertain how these mechanotoxins disrupt CO neuron function in *Aedes aegypti* and how this disruption may alter mosquito walking behavior and overall fitness. Towards this end, we have developed an assay to compare the walking behavior of wildtype mosquitoes to mosquitoes exposed to pymetrozine. We are also assaying the walking behavior of mosquitoes with genetically ablated CO function via a mutation of the TRPVa ionotropic receptor, a mechanosensory channel responsible for regulating CO neuron activity. We recorded videos of walking mosquitoes via high-cameras. To assess step length, motor coordination, and body position, the mosquitoes' limb positions were tracked frame-by-frame using DeepLabCut, a machine learning algorithm. We find that disrupting CO neuron function, either through pymetrozine exposure or a lack the TRPVa channel, results in slower, less coordinated walking. Our results suggest that CO neurons play a significant role in neuromuscular coordination and targeting these pathways could interfere with the locomotive aspect of host-seeking behavior, pointing towards novel strategies to control the transmission of mosquito-borne diseases.

Ezra Gosman

Discipline: Engineering

Authors:

#1 Ezra Gosman

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#3 Saikrishna Ramasamy

Saikrishna Ramasamy

Srikar Burugula

Abstract Name: Tachycardia Heart Monitor Sensor Abstract

Many energy-limiting conditions, such as POTS, chronic fatigue syndrome, and fibromyalgia, significantly impact quality of life. Heart arrhythmias are common across the U.S., affecting more than 14 million people. Current sensors on the market are expensive, commonly inaccurate, and lack the necessary data for users. The purpose of our project is to develop a rechargeable and wearable heart sensor that can detect tachycardia events. Alongside the sensor, an app companion will be designed to display data from the sensor to the user. The companion app will display up-to-date pulse calculations and will be capable of compiling data into a PDF for the user to print as a report. Our prototype utilizes a PPG sensor connected to an Arduino Nano ESP32 circuit to track voltage readings from the user's bloodstream. The Arduino Nano has internal Bluetooth capabilities, allowing it to transfer voltage values directly to a companion app connected to the cloud. This companion app handles our computations, including any calculations, physically graphing our pulse wave, and utilizes Swift to detect heart arrhythmias such as ventricular tachycardia and atrial fibrillation. In future work, we plan to scale down our circuit; we are currently researching other possible solutions as well. With this scaled-down version of our circuit, we are looking at potentially developing a wearable alternative device that users could utilize to track their cardiac activity at a more affordable price, accurately. We will be implementing a neural network to make our app more personal and adaptive to each user. This will allow us to more accurately detect arrhythmias and fatal cardiac activity since users have varying lifestyles. Additionally, we are developing a template that will import all trends and data for the user to print out as a report for doctors and health professionals.

Chloe Gotes

Discipline: Gender, Ethnicity, Diversity, or Cultural Studies

Authors:

Abstract Name: Culture, Tradition, and Gender Inequality: A Historical and Religious Analysis of Female Genital Mutilation/Cutting in 21st Century Egyptian Society

Female Genital Mutilation/Cutting (FGM/C) is a form of gender based violence continually perpetuated in Egypt based on religious beliefs and cultural tradition. Deeply entrenched in patriarchal structures, FGM/C is a manifestation of gender inequality permitted to continue by historical and religious societal aspects. This interpretive work identifies social and cultural factors that have aided in defining FGM/C as a religious requirement and allowed for its widespread prevalence. It has been undertaken to better understand the large role Islamic and Christian religions have played in the continuation of the practice. Most Egyptian girls undergo FGM/C on the basis of religion and culture; thus, it is imperative to examine how these factors have evolved and influenced the practice in modern-day society. This reinterpretation aims to contribute to the academic field of history while using literature review and textual analysis to collate source material. Knowledge activities undertaken to produce this interpretive work include detailed reading and close examination of primary and secondary sources, along with sacred texts from the Qur'an and the Bible. The outcome of this work demonstrates how FGM/C has been misconstrued in Islam and Christianity as a practice rooted in and required by such religions. Aspiring to control female sexuality, patriarchal structures in Egypt

have historically created socio-cultural factors hidden under the guise of religion to ensure the practice of FGM/C.

Yuto Goto

Discipline: Biology

Authors:

- #1 Yuto Goto
- #2 Nicholas Mischian
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- #9 Stephanie Lockwood
- #10 Stephanie Randell
- #11 Stephanie Randell

Abstract Name: Rope Sponge Diversity and Health Status in Roatán, Honduras

Sponges play essential roles in Caribbean reefs through filtration, nutrient cycling, and habitat formation, and their abundance has increased where coral cover has declined. Rope sponges such as *Aplysina cauliformis*, *Aplysina fulva*, and *Amphimedon compressa* are common in this region, and two emerging diseases have been reported in the Caribbean. *Aplysina* Red Band Syndrome (ARBS) affects *Aplysina* spp., while Sponge White Patch Disease (SWPD) affects *Amphimedon compressa*. ARBS is characterized by a rust-colored band of necrotic tissue that is later colonized by algae and microorganisms, while SWPD presents as irregular white patches with sharply defined boundaries from the surrounding red tissue. Both conditions can reduce sponge biomass and habitat structure. A paucity of data on rope sponge populations and disease status in Roatán limits the ability to detect and respond to future outbreaks. This study was conducted to assess rope sponge diversity and disease prevalence in Roatán, Honduras. Data were collected from 27 to 30 May 2025, using belt transects (BT) and the Randell–Robertson Marine Survey Technique (RRMST). A total of 220 rope sponges were recorded. The most abundant species were *A. cauliformis* (n = 78), *A. fulva* (n = 48), *Niphates amorphus* (n = 37), *Niphates erecta* (n = 30), and *Amphimedon compressa* (n = 24). Most sponges were healthy (85.9%), but ARBS (3.6%), SWPD (1.8%), physical damage (3.2%), and unknown disease (5.5%) were present. Lesion material from ARBS was identified by microscopy as filamentous cyanobacteria (*Lynxbya sordida*) and red algae, with expert confirmation. Chi-square tests showed that species composition differed significantly among sites for both methodologies. Disease patterns were species-specific: ARBS affected *A. cauliformis* and *A. fulva* (8/126; 6.3%), whereas SWPD occurred only in *Amphimedon compressa* (4/24; 16.7%). These findings confirm the presence of sponge disease in Roatán and provide baseline data for monitoring and reef management in Caribbean reefs.

Parisse Goutier

Discipline: Engineering

Authors:

- Tyler Ludwig
- David Njuguna

Abstract Name: Engineering Clean Water: The Pure Water Project

After earthquakes devastated Haiti in 2010, a team of Embry-Riddle students and faculty built and installed a solar-powered water purifier to improve both the environmental and human health concerns created by the lack of infrastructure, clean water, and sanitation. Since then, the group Pure Water Project has installed 10 water purifiers in orphanages, clinics, schools, and community centers in Haiti and the Dominican Republic. The group relies on its partner selection criteria and local contacts to determine the installation site for the purifier. The fall and spring semesters leading up to the installation trip in May are spent designing, building, and testing the purifier. This process incorporates mechanical, electrical, and hydraulic design. The Mechanical Team designs and constructs the purifier frame, including cutting and welding metal, designing 3D printed brackets, and plumbing the PVC system. The Electrical Team designs and wires the electrical box in charge of powering the purifier. The Water and Sanitation Hygiene (WASH) Team develops learning activities to teach the local community personal hygiene practices and help them set up a micro-business to sell purified water. Profits from the micro-business ensure the ongoing maintenance and operation of the system. In May 2025, Pure Water Project students and faculty installed the purifier in Rincón De Yuboa, Dominican Republic, to accomplish the group's overall goal: using engineering principles to provide purified water to areas lacking reliable access to clean water.

Isabella Goveia

Discipline: Chemistry

Authors:

#1 Verona Peterman

#2 Genevieve Huynh

#3 Rohit Bhide

Abstract Name: Evaluation of Structure-Property Relationships in Cotton-Bound Photocatalysts for Synthesizing Pharmaceutical Drugs

Traditional synthesis of pharmaceutical drugs relies on the use of toxic metals which poses limitations in sustainability. Currently, homogeneous photocatalysis, which uses light illumination to drive organic reactions, has been shown as a solution. However, the sustainability of reactions with these catalysts is poor as there are challenges with their recovery and reuse. In this work, I propose the development of photocatalyst-bound cotton that will exhibit higher reaction yields, selectivities and effective recovery and reuse in organic syntheses. The photocatalyst-bound cotton is synthesized by covalently attaching molecular photocatalysts to the primary hydroxyl groups on the surface of cotton fabrics. This is done through a two step process. The first being, a silanization reaction to covalently attach (3-aminopropyl)triethoxysilane (APTES) to cotton. In the second step, a nucleophilic acyl substitution reaction between APTES-functionalized cotton and perylene-3,4,9,10-tetracarboxylic dianhydride. These photocatalyst-bound cotton samples will be characterized using colorimetry, a common technique in the textile industry used to quantify color. Furthermore, the applicability of these photocatalysts will be tested through their use in the oxidation of sulfide to a sulfoxide group, a functional group present in many pharmaceuticals. We will use nuclear magnetic resonance spectroscopy (NMR) to monitor the reaction kinetics, yield and selectivity for the sulfide oxidation reaction. With this NMR analysis and the colorimetry results I will merge the textile and chemistry fields to develop a calibration curve to offer an easy comparison between the shade of the photocatalyst and the rate of reaction. In addition, I will investigate how the heterogeneous nature of our photocatalysts will offer ease of recovery and reuse via the separation technique of filtration. Overall, this work will serve as a foundation in the development of low cost textile-bound photocatalysts in sustainable and efficient synthesis which can be applied to pharmaceutical drug syntheses.

Discipline: Computer Science

Authors:

#1 Eyuphan Bulut

Jacob Gray

Abstract Name: Mapping LEO Satellite Internet Performance Using Mobile Starlink Deployment

High-speed, low-latency internet connectivity on the move is a critical challenge for applications in connected vehicles, disaster response, and remote education. While terrestrial networks such as 4G or 5G are widespread, they lack coverage in remote or rural geographic areas. Low Earth Orbit (LEO) satellite constellations, such as SpaceX's Starlink, promise global high-bandwidth, low-latency internet. However, their performance is well-documented in stationary scenarios, while data for *mobile* applications is scarce. This project explores the feasibility and real-world performance of LEO satellite internet while in motion. To capture real-world data, the team designed and deployed a mobile measurement system by mounting the Starlink satellite on a vehicle. This system captured GPS data simultaneously with connectivity metrics, including upload/download speeds and latency. First, throughput was tested on standard Wi-Fi and 5G mobile hotspots using iperf3 to establish a control group. A Python script using Dash was developed to render collected data as geographic heatmaps, facilitating the identification of spatial performance patterns. Two main tests are in the active collection stage, the first attempting to verify claims by previous studies that Starlink's global scheduler reallocates satellites roughly every 15 seconds. By obtaining RTT times and isolating to the second recorded, we aim to determine the impact this transition has on connectivity. The second main goal is to compare critical connectivity metrics between traditional wireless phone services and Starlink's satellite connectivity. As of now, data on several mobile carriers is being collected in tandem with Starlink data to help determine the feasibility of Starlink over a traditional mobile data plan. Data collection will be expanded to include weather, travel speed, and location type (e.g., urban or rural). At the project's conclusion, we aim to have a clear picture of Starlink's advantages and disadvantages and the contexts in which it is best applied.

Mathijs Goyens-Harvey

MD - Salisbury University

Discipline: History

Authors:

Abstract Name: Cherokee Women and the Continuity of Traditional Culture Under Assimilation in the Nineteenth Century

The back-and-forth between attempts to assimilate the Cherokee through "civilizing" programs and pressures for their removal drove major Cherokee cultural change. From early land encroachments before American independence, then U.S. "Civilization" programs with mission schools in the early 1800s, followed by brutal removal policies in the late 1830s, and later policy-based approaches to assimilation in the 1880s. The roles and powers of "traditional" Cherokee women—vital to Cherokee society, culture, spirituality, politics, war, and diplomacy—were increasingly questioned as distinct changes in Cherokee culture started to shift the roles of Cherokee women, starting in the post-American Revolutionary era. Historiographical narratives often describe this period as the beginning of cultural loss and erasure, as well as the loss of Cherokee women's traditional rights, roles, and powers. Other, more contemporary Scholars, such as Robert J. Conley and Theda Perdue, understood the Cherokees' motives for adopting parts of Euro-American governance and religion as demonstrations of resilience, not loss, of culture, against the external threats of settler-colonialism. However,

while it is important to show how Cherokees used and adapted Euro-American teachings to fight for political sovereignty, this paper argues that, while Cherokee women indeed experienced the wrath of Euro-American concepts of womanhood, by reanalyzing historiography and methodological practices and applying them to primary sources, important continuities in women's powers, roles, and traditions in the nineteenth century are revealed. These continuities can be used to recognize strategies employed to maintain traditional culture, as Cherokee resistance was also rooted in the continuation of their own "traditional" cultural practices. Thus, we gain a more complex view of Cherokee culture, its resistance, its persistence, and its reactionary changes to Euro-American assimilation and removal.

Kaya Grabowski

Discipline: Anthropology and Archaeology

Authors:

Abstract Name: The ontogeny of trabecular bone in the macaque (*Macaca mulatta*) hand

Differences in locomotion among primates have led to observations about their impact on bone composition. Modes of locomotion change throughout the lifetime of the macaque monkey (*Macaca mulatta*), particularly between arboreal juvenile years and terrestrial adulthood, which in turn decreases the variability of hand position and movement between the two age groups. Although there have been studies on how different factors impact bone composition in primates, there is a gap in the study of trabecular bone in Macaques, particularly how directionality of the trabeculae (considered an indicator of loading variability and measured as degree of anisotropy) might change through life. This study assesses the differences in trabecular bone between juvenile and adult Macaque fifth metacarpals, gaining a better understanding of the changes that occur in trabecular bone through ontogeny. Previously microCT scanned bones will be processed and segmented using Dragonfly and FIJI, while isolated volumes of interest for trabecular bone analysis will be segmented in Volume Graphics StudioMax. Permutation tests will be carried out in R Studio to determine the statistical difference between juvenile and adult samples. We predict that degree of anisotropy values in juveniles will be significantly lower (less directional) than in adults, as they engage in more variable hand positions and locomotion. These findings will expand our knowledge on the effects of locomotion and hand position on trabecular bone development in primates and could also be used to draw parallels with humans.

Madison Graf

Discipline: Biology

Authors:

#1 Sylvia Kehoe

Mariyah Creaser

Abstract Name: Effectiveness between two caustic paste brands when disbudding dairy calves

This study aims to evaluate the pain-related behaviors in dairy calves following the application of caustic paste brands when used for disbudding. Although a popular way to disbud dairy calves, the evaluation of pain related behaviors has not been researched. The live animal experiment was completed at a commercial dairy farm using 84 Holstein calves. Calves were managed according to farm protocols and if their passive transfer of immunity was successful (5.5 mg/dL serum total protein), they were enrolled into this study. Treatments include 0.2 or 0.4 mL Dr. Naylor's caustic paste, 0.2 or 0.4 Dr. Larson's caustic paste, or a sham application of petroleum jelly. Individual cameras were focused on each calf above their pen and recorded continuously for

four hours following the application of the treatments. After all live animal work was finished, video recordings were downloaded into Boris (Turin, Italy). An ethogram was developed to monitor signs of pain behavior in dairy calves. This ethogram included the frequency and duration of pain-associated behaviors including head shaking, head rubbing, ear flicking, tail flicking, foot stamping, leg raising, and lying transitions. The collection of this visual data supports the evaluation of pain to determine if differences exist between caustic paste brands. Although we have finished the recording of ethogram based behaviors from the video data, the analysis of this data is ongoing and will be completed by March 2026. Results from this study will provide insight into the welfare implications of dairy calves when using various caustic paste disbudding products. Our conclusions will provide farmers insight into which caustic paste proves to be least painful for dairy calf disbudding.

Elena Graf

VA - Virginia Commonwealth University

Discipline: Psychology

Authors:

Abstract Name: Temperament, Archetypes, and Memory Bias: Historical Lineage of Personality Psychology

How is it possible for two people walk the same trail yet remember entirely different worlds, one filled with sunlight and wonder and the other marked by danger and unease? This question has guided a long intellectual tradition aimed at understanding how personality shapes memory. This paper traces the historical development of that inquiry by examining how psychologists from the nineteenth to the twenty-first century conceptualized the relationship between temperament, archetypes, and memory bias. The discussion begins with Wilhelm Wundt, whose structuralist framework proposed that memory is filtered through subjective “mediate experiences” that arise from an individual’s temperament. Wundt’s Two-Axis Theory characterized personality as a combination of emotional strength and changeability, which influenced the aspects of experience that were most likely to be encoded and later recalled. In contrast, American functionalist William James emphasized the practical functions of consciousness. His distinction between the active “I” and the experiential “Me” presented personality as a fluid system of tendencies, in which dominant components of the self influence memory formation. We then explore the significant theoretical shift to psychoanalytic theory, introduced by Carl Jung in the twentieth century. Jung located the source of memory bias not in conscious temperament but in unconscious archetypes. Through dream analysis and cross-cultural comparison, he argued that inherited psychological patterns structure perception and selectively encode memories that align with one’s archetypal orientation. Across these developments, a consistent conclusion emerges. Memory is not a neutral recording device; it is continuously shaped and constrained by personality. By connecting this historical trajectory to contemporary personality psychology like HEXACO and The Big Five, this proposal continues to expand upon these foundational ideas. These findings suggest that future progress will involve identifying the neurological mechanisms that link individual personality to the memories that define subjective experience.

Elena Graf

VA - Virginia Commonwealth University

Discipline: Philosophy, Ethics, and Religious Studies

Authors:

#1 Andrew Moon

Abstract Name: Consciousness as Computation: Representations under the Lens of the Hard Problem

Why does a perfectly functioning robot, capable of computing its own internal states, fail to experience phenomenology as we humans do? This question frames my inquiry into whether the Computational Theory of Mind (CTM) can illuminate the central mystery of consciousness. I begin by situating CTM within Marr's three levels of analysis, emphasizing how representational architecture enables cognitive systems to encode and transform information. I then connect this framework to philosopher David Lewis' "Mad Pain and Martian Pain," which identifies pain with the physical state that fulfills the appropriate causal role. While Lewis articulates the functional structure of pain, he does not address why these states possess an intrinsic "what it is like" quality. This is the phenomenon philosopher David Chalmers terms the Hard Problem. To deepen this analysis, I examine models that distinguish between first-order representations (encoding sensory input) and higher-order representations (the system representing its own states). This hierarchical framework provides a promising naturalistic entry point for understanding phenomenal consciousness: when a system represents its own processing, it appears to generate a unified, first-person perspective. Finally, I consider how CTM contributes to ongoing debates about the nature of conscious experience. By clarifying the mechanisms through which cognitive systems encode, integrate, and monitor information, CTM offers a framework for theorizing about how subjective perspectives might arise from complex computational organization. While it does not yet provide a complete account of consciousness, it remains a powerful tool for articulating the structural and functional underpinnings of mental life.

Fritz Graham

Discipline: Biology

Authors:
#1 Jennifer Uno

Abstract Name: Investigating Gut-Brain Interactions in Alzheimer's Disease Through the Zebrafish Model

Currently, 7 million Americans aged 65 and older are affected by Alzheimer's disease (AD). Despite its prevalence, the underlying causes of AD are still debated, and the need for effective model organisms for studying this disorder is essential. Recent studies have highlighted the potential role of the gut microbiome in neurological diseases through the gut-brain axis. The disruption of the microbiome is thought to be involved in the onset and/or progression of AD. Zebrafish are an effective model for studying the gut-brain axis because they possess both similar brain and gastrointestinal structures to those of humans. Moreover, they possess genes *appa/b* and *mapta/b*, which are homologues with the human genes APP and MAPT associated with AD in humans. Zebrafish, however, have not yet been utilized to study the role of the gut-brain axis and its impact on AD. This study investigates the relationship between gut dysbiosis and AD using zebrafish as a model organism. We hypothesize that gut dysbiosis contributes more significantly to the onset of AD. This study will be conducted by (1) chemically inducing AD in zebrafish before inducing gut dysbiosis and (2) inducing gut dysbiosis before chemically inducing AD. Behavioral assessments will be performed to measure cognitive decline, and molecular analyses will be used to assess changes in AD-related genes. This study aims to confirm the zebrafish as a successful model organism for studying gut-brain interactions in AD, as well as to further elucidate the role the microbiome plays in the progression or onset of AD.

DaniLeigh Graham

Discipline: Psychology

Authors:

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#2 Stephen Foster

Abstract Name: A Targeted Prosociality Intervention for Previously Incarcerated Populations

Personality interventions for recidivism and re-offense continue to be scarce, with many interventions focusing on clinical counseling or forms of punishment. However, prior research shows the importance of prosocial behavior in personality change models, which could be of use in reducing the well-known link between negative personality traits (e.g., Dark Triad) and (re)offending. In a single six-wave longitudinal study, we examined the effect of a set of prosocial behavioral tasks (e.g., holding the door for someone) and the motivations to change on shifts in Dark Triad traits in previously incarcerated individuals (N = 245; control n = 84; experimental n = 161). When comparing changes in self-reported personality traits between the experimental group and a control group, results from the study found that, within the experimental group, participants reporting higher motivation to change their “darker” personality traits had significantly lower Dark Triad scores compared to their scores at the study’s onset. This study gives promising preliminary evidence for a low-cost behavioral intervention to support the reduction of antisocial traits which contribute to recidivism rates.

Shane Grant

Discipline: Biology

Authors:

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Abstract Name: : Identification and gene expression analysis of Auxin Biosynthetic Pathway genes in Duckweed (*S. polyrhiza*)

Plant growth development is an important phase of a plant’s life and studies are crucial to determine the environmental factors impacting the growth responses. Auxin, mainly Indole-3-acetic acid (IAA)- the predominant naturally occurring auxin, is an important plant hormone and has been widely identified for its role in plant growth and development. While IAA biosynthesis is well characterized in higher plants, there is no information available in aquatic plants. In this project, we aimed to identify the genes involved in auxin (IAA) biosynthesis pathway and quantify the gene expression of auxin (IAA) biosynthesis encoding genes in growth and/or stress conditions. IAA is mainly biosynthesized from tryptophan by two sequential enzymatic reactions consisting of TRYPTOPHAN AMINOTRANSFERASE of ARABIDOPSIS 1 (TAA1) and YUCCA (YUC) of the indole-3-pyruvic acid (IPA) pathway. TAA1 converts Tryptophan to IPA, and YUC catalyzes the oxidative decarboxylation of IPA to produce IAA in the IPA pathway. In duckweed genome, three TAA gene homologues are present-SpTAA1, SpTAA2 and SpTAA3. Further, we have characterized the gene expression of these three gene homologues-SpTAA1-3 in copper induced growth inhibited model. Our results indicate that the genes encoding for Auxin biosynthesis pathway are present in duckweed plants and their gene expression indicates the functionality of this pathway.

Ethan Gray

Discipline: Computer Science

Authors:

#1 Ethan Gray

#2 Md Shirajum Munir

Abstract Name: IoT Powered Multi-Agent Machine Learning Testbed for Cybersecurity Research

The evolving field of generative Artificial Intelligence (AI) poses unprecedented cybersecurity risks and attack vectors in Internet of Things (IoT) applications. To explore and combat these new risks, this research developed a physical testbed, which is equipped with a Multi-Agent Machine Learning Framework powered by IoT devices. These IoT devices are Raspberry PI modules that can collect sensor data and act as Machine Learning (ML) agents that execute on-device ML models. The testbed also hosts a main server that retrieves data from the ML agents' outcomes and can be intentionally infected to simulate a cyber-attack by native generative AI models such as Generative Adversarial Networks (GANs) and Autoencoders. The goal of this research is to utilize this testbed to analyze the cybersecurity risks that arise with possible new AI-driven attack vectors on outcomes of the ML agents. Therefore, on top of the developed testbed, an IoT-based industry lab safety application is implemented and tested. Each of the ML Agents contains a program that retrieves data from sensors such as CO, temperature, and humidity data, which is then evaluated with the respective on-device ML model to classify lab environment safety measures from 0 to 3 labels. In particular, random forest and linear regression models are alternatively implemented in each IoT agent to analyze the sensor data and return lab environment safety labels. This information is then transmitted to the compromised main server. This application of the testbed simulates an infected network and creates an ideal sandbox for testing and analyzing the hazards and vulnerabilities proposed by these proprietary methods of generative AI cyber-attacks. Experimental results show that the autoencoder can recreate the ML agents' outputs with very high precision, with an average data loss of approximately $1.0325e-10$, indicating an almost perfect reconstruction of the original outcomes and higher risk of attacks.

Ainsley Gray

Discipline: Engineering

Authors:

#1 Bjoern Reinhard

#2 Koustav Kundu

Abstract Name: Harnessing Like-Charge Interactions: Lipid-Functionalized Gold Nanoparticles for Bacterial Inactivation

Bacterial infections pose a significant global health challenge, necessitating innovative treatment strategies beyond conventional antibiotics, especially as antibiotic resistance increases. This study explores the development of an inactivation approach for *Staphylococcus epidermidis* (*S. epidermidis*) utilizing lipid-coated gold nanoparticles (AuNPs). Unlike traditional antibacterial methods that rely on uncontrolled inactivation mechanisms and contribute to antibiotic resistance, this strategy employs biomimetic lipid encapsulation to enhance specificity and minimize cytotoxicity. Lipid-coated AuNPs were synthesized and characterized for stability, surface properties, and antibacterial performance. The lipid membrane consisted of varying concentrations of DOPS, a negatively charged lipid. Characterization revealed that AuNPs functionalized with DOPS exhibited a pronounced negative surface charge of approximately -35 mV, improving biocompatibility in biological media due to electrostatic similarity with cell membranes. Binding trials demonstrated strong like-charge interactions mediated by monovalent counterions, resulting in immobilization of the AuNPs on the surface of *S. epidermidis*. This phenomenon was not attributed to

bacteria-specific binding, as similar results were observed when trials were repeated using negatively charged polystyrene beads with similar dimensions to those of *S. epidermidis*. Future directions include leveraging the photothermal properties of gold in conjunction with charge-based targeting, enabling localized heating to damage bacterial membranes while reducing cytotoxicity and improving efficiency. Additionally, this approach could be adapted to incorporate increasingly biomimetic AuNPs and broaden its application to diverse pathogens, given its reliance on electrostatic interactions rather than membrane-specific binding.

Natalia Grazda-Valdez

Discipline: Biology

Authors:

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#12 Liliana Salvador

Abstract Name: Understanding the Role of Wild Suids in *Mycobacterium bovis* Transmission in Multi-host Systems: A Systematic Review

Mycobacterium bovis is the main cause of animal tuberculosis in livestock and wildlife, which can also infect humans causing zoonotic tuberculosis. The issue surrounding this mycobacterium lies with spread and control of animal tuberculosis at the wildlife, livestock, and human interface, presenting a global economic and public health challenge. Maintenance hosts are species that sustain a pathogen in an area regardless of whether there are other species present that can disseminate the pathogen. Wild suids (i.e., wild boar [*Sus scrofa*] natively and invasive wild pigs [*S. scrofa* x *domesticus*] elsewhere) serve as *M. bovis* maintenance hosts. A thorough understanding of the factors promoting maintenance host status is necessary to improve disease control. In this study, we aim to define the epidemiological, ecological, and behavioral factors that promote wild suids as maintenance hosts for *M. bovis* transmission. We conducted a systematic review, following the Preferred Reporting Items of Systematic Reviews and Meta-Analyses (PRISMA) 2020 guidelines and utilizing the Population, Exposure, Comparison, and Outcome (PECO) search method for determining keywords. These keywords were used to systematically pull references from several databases. A total of 1,517 references were identified through our initial search. Utilizing Rayyan, duplicates (n=551) were removed from the literature collected, leaving a total of n=1,219. Once initial abstract screening was complete, n=127 references were left. Of these, 88 met the inclusion criteria and were included for analysis. We identified 42 variables of interest in these references divided into the following categories: Diagnostics, Demographic, Behavioral, Environmental, Ecological, and Epidemiological. A meta-analysis is being performed to determine the risk factors underlying *M. bovis* infection (based on prevalence) in wild pig populations stratified by diagnostic test used. This study will allow us to address *M. bovis* transmission in wild suid populations globally, informing guidelines applicable to different regions for efficient prevention and control.

Ryan Graziano

Discipline: Art History

Authors:

Abstract Name: El Lissitzky and His Impact on Design

This essay will examine El Lissitzky's contributions to the art and design field, and how he dove deeper into the possibilities of using design for visual communication in post-revolutionary Russia. From the struggles as a Jewish artist facing discrimination to later making collaborations with avant-garde artists from all over Europe, El Lissitzky shows a modern design that is founded through geometric shapes, abstraction, functionality, and social purpose. His most popular piece is the Prouns series, which bridged the gap between architecture and painting and was a turning point to him becoming the lead figure of Constructivism. Today, his influence and signature pieces continue to inspire designers in all aspects of design. By pioneering a new relationship between art, society, and technology, Lissitzky played a crucial role in shaping the visual systems that define modernity.

Carter Green

Discipline: Mathematics

Authors:

#1 David Brown

#2 Caitlynn Clawson

#3 Aysel Erey

#4 Rudy Garcia

#5 Derek Hein

#6 Samuel Powell

Abstract Name: Fractional Vertex Cover Reliability of Graphs

A graph is a collection of objects, called vertices, where if two vertices are related to each other there is an edge connecting them. Let G be a graph and let $0 \leq p, q$ and $p + q \leq 1$. Suppose that each vertex of G gets a weight of 1 with probability p , $1/2$ with probability q , and 0 with probability $1 - p - q$, and vertex weight probabilities are independent. The fractional vertex cover reliability of G , denoted by $FRel(G; p, q)$, is the probability that the sum of weights at the end-vertices of every edge in G is at least 1. In our research, we first constructed various computational formulas for $FRel(G; p, q)$ considering general graphs, basic graphs and graph operations. Secondly, we determined the graphs which maximize $FRel(G; p, q)$ for all values of p and q in the classes of trees, connected unicyclic and bicyclic graphs with fixed order, and determined the graphs which minimize it in the classes of trees, connected unicyclic graphs with fixed order. Our results on optimal graphs extend some known results in the literature about independent sets, and the tools we developed have potential to solve the optimality problem in other classes of graphs as well.

Jaryn Green

Discipline: Political Science

Authors:

#1 Jaryn Green

Abstract Name: “Show Me the Incentives and I Will Show You the Results” Ethics, Economics, and Ecology in AI Usage

The economic impacts of AI have been long since researched, as well as the ecological detriment this new technology brings. However, with the United States stock market investing so heavily in this new technology, it begs the question: how can AI be used ethically? If it is contributing to the problem of climate change, can it also be a solution? What are the incentives needed to change the results? This essay will examine a more ethical usage of AI with respect to climate change, and how economics can be used to incentivize this.

Asia Green

Discipline: Exercise Science and Nutrition

Authors:

#1 Madison Chandler

Abstract Name: Exercise Expectations: Can the Placebo Effect Boost Exercise’s Effects on Mood and Cognition?

A single session of aerobic exercise can improve mood and cognitive function. However, little is known about whether expecting exercise to enhance brain function can influence these outcomes. The purpose of this study was to examine whether psychological expectations about exercise benefits can amplify changes in mood and cognition beyond the physiological effects of exercise itself. Twenty-three full-time undergraduate students (mean age=20.7±0.9 years; 70% female) were randomly assigned to either an Expectation–Benefit (n=11) or Control (n=12) condition using a between groups pre-test/post-test experimental design. All participants completed a pre-test battery including a visual analog scale of expectancy and familiarity with the brain benefits of exercise, the Abbreviated Profile of Mood States (POMS), and a flanker task to assess inhibitory control. Participants then viewed one of two short videos: either a brief educational video describing how exercise enhances brain function (Expectation-Benefit), or an unrelated video on volcanoes (Control). All participants then completed a 25-minute moderate-intensity treadmill walk, maintaining 60–70% of their age-predicted maximum heart rate. Post-test measures were identical to pre-test. Data collection is ongoing (target N=40), and planned analyses include repeated measures ANOVAs to compare pre- and post-test scores between groups for expectancy and familiarity scores, POMS domain scores, and flanker task accuracy and reaction time. Results from this study may provide valuable information about the ways in which expectations about exercise’s benefits can be leveraged to improve mood and/or cognitive performance.

Liliana Green

Discipline: History

Authors:

Abstract Name: Living Histories: Curating the Continued Negative Health Effects of 9/11 at the 9/11 Museum

The 9/11 Museum's rotating exhibition space has displayed the exhibition, “Dust: Illness and Advocacy after 9/11,” since 2023. It tells the story of the health effects and healthcare advocacy battles that began to surface post-9/11. This exhibition shows that the 9/11 Museum—a contemporary history museum—does not treat 9/11

as an event of the past but as an ongoing history. How, then, do contemporary history museums and their curators tell histories anchored in the present? To break apart this exhibition and clearly analyze what it tells us about memorial museums, I apply what Amy Sodaro suggests are the three main criteria to look for when discussing memorial museums. First, the museum function. This refers to the museum's ability to use objects, ephemera, and personal accounts to show the history to an audience. Second, the memorial function. This determines how well the institution provides the audience with a space to grieve and remember those affected by the event. Finally, the ability to communicate “never again” to an audience. This criterion is important given that many memorial museums are founded with this message of education and moral learning at their core. How can an ongoing history represent the idea of “never again”? By looking at this exhibition through this lens, I found that, though the exhibition works in the museum as an educational tool, it lacks the distance from the event to truly become a memorial. Something that is still happening cannot be memorialized. “Never again” cannot be applied. My research proves that contemporary histories require a new set of curatorial methods to represent the ongoing as well as the recent past. Furthermore, it opens up a discussion on how to present living, current histories that project into the future.

Becky Green-Marroquin

Discipline:

Authors:

#1 Becky Green-Marroquin

Pamela Byrd-Williams

Vivian Vy Le

Abstract Name: Pathways and Career Explorations in STEM (PaCES): Advancing Equity and Persistence for Community College Students

The Pathways and Career Explorations in STEM (PaCES) program was a collaborative initiative between Los Angeles Valley College (LAVC), Los Angeles Pierce College (LAPC), and the University of Southern California (USC). PaCES addressed persistent equity gaps in STEM by improving retention and transfer rates among community college students, with a focus on Biology majors. Over three years, PaCES engaged 176 students through a two-tiered structure combining academic coaching, mentorship, and experiential learning. Tier 1 emphasized academic support and exposure to diverse STEM careers, while Tier 2 provided immersive research experiences at USC’s Wrigley Institute and courses designed to strengthen STEM networks and prepare students for competitive internships and transfer applications. Guided by two research questions: what factors influence STEM persistence and how to enhance educational experiences at two-year institutions. PaCES implemented evidence-based interventions, including early research opportunities, faculty and near-peer mentorship, and community-building activities. Mixed-methods evaluation (pre/post surveys and focus groups) informed iterative improvements and contributed to broader educational research. Program outcomes demonstrated significant impact: 71% of participants earned STEM degrees, two-thirds transferred to four-year institutions, and 8% enrolled in graduate programs. Post-program engagement remained high: over 35% of participants worked in scientific laboratories, 86% attended or presented at scientific conferences, and at least 34% participated in community outreach, including mentoring and volunteering at schools and museums. Additionally, 38% completed summer internships or research experiences, further solidifying their commitment to STEM. PaCES also established sustainable academic structures, including workshops and new for-credit courses, and strengthened institutional partnerships to expand access to STEM resources. By fostering persistence and success, PaCES offered a replicable model for community colleges nationwide. Its long-term impact extends beyond individual achievement, contributing to a more inclusive STEM workforce and advancing strategies to support diverse learners in higher education.

Leah Gregg

Discipline: Biology

Authors:

Abstract Name: Anticoagulants Safety In The Geriatric Population

The earth's population is currently shifting towards a demographic that includes an increased number of geriatric citizens. With this influx of elderly citizens, we have yet to see an increase in the research that surrounds their care. Anticoagulants are among the most commonly prescribed medications within this age group; however, their overall effect on both the health and safety of this community is less understood. This study investigates the frequency and type of adverse events patients suffer from while being on or recently discontinued from anticoagulant medications. In order to study this population, patient data were selected and blinded from Careline Health group's patient population. Charts were then divided into those discontinued from anticoagulants and those who remain on them within a six-month time frame. Information such as indication for use, type of medication, patient sex, and patient gender were also collected as variables within the data set. From here, we performed various odds-ratio tests for significance while comparing different variables from our data. Through this, we determined if patients who remain on anticoagulants experience significantly more adverse events than those who are discontinued from them. Following statistical testing, we found no significance between being discontinued from anticoagulants and a decrease in adverse events; however, results showed that being discontinued from an anticoagulant medication made patients five times less likely to suffer significant injury from a fall. This study provides critical information about the safety of anticoagulant medications within the geriatric population. Knowledge of this nature could allow future physicians to make more informed recommendations about one of the most administered medications for this age group. If we want to adjust and grow our understanding of the fastest-growing demographic within our society, studies such as this will edge us closer to achieving that goal.

Jamison Greiner

Discipline: Political Science

Authors:

#1 Andrea Lopez

Abstract Name: Aid or Ailment: The Effect of Foreign Aid on Sub-Saharan African Democracies

After a period of democratization in the 1990s, many Sub-Saharan African states have experienced democratic backsliding. Scholars have debated the causes of this trend, from both internal and external standpoints, with no clear consensus emerging. In this study, I contribute to this debate by arguing that 1) "distracted" international donors and 2) increased foreign aid allocation lead to democratic backsliding. Following the end of the Cold War, donors focused on democratization; however, after September 11, 2001, donor priorities shifted away from democratization, and illiberal actors utilized the "moral hazard" to misuse increased aid to consolidate power. It was expected that democratic backsliding would emerge as donors became distracted after 2001 and increased aid to the region. To test this hypothesis, this study used Freedom House, V-Dem's five high principles and clientelism as measures of democracy and Official Development Assistance to measure foreign aid. The study was broken into two time periods of 1990-2001 and 2002-2019 to reflect donor distraction. Linear regressions were run on all three of the dependent variables for the forty-nine countries in the region. The results suggest that the proposed theory is largely unsupported, with only a minor effect observed on the outcomes. Specifically, the evidence from this study does not support the claim that increased aid causes democratic backsliding. However, minor negative effects of distractedness on Freedom House rankings and V-Dem scores suggest that the predicted effect of distracted donors is somewhat supported. Nonetheless, minor R² values for all variables indicate that the explanatory capacity of the proposed theory is limited at best.

Blayne Griffin

Discipline: Physics and Astronomy

Authors:

#1 Sofia Sheikh

#2 Blayne Griffin

Abstract Name: "One of Everything": A technosignature search of the Exotica Catalog with the Allen Telescope Array

The Search for Extraterrestrial Intelligence (SETI) is a sub-field of astrobiology which searches for technologically-capable life in the universe. Some "technosignature" searches have focused on traditional astrobiological targets of Sun-like stars or Earth-like exoplanets, but it is also important to cast a wide net to search for "life as we don't know it". Breakthrough Listen's "One of Everything" Exotica Catalog helps us define this wider net of targets. We present an observing campaign of the approximately 648 observable targets in the Catalog, which spans from solar system objects to large cosmological structures. This novel exploratory search, focusing on bands 1.000-1.672 GHz, 1.672-2.344 GHz, 4.200-4.872 GHz, and 8.000-8.672 GHz, is conducted using 28 of the Allen Telescope Array's 42 6.1m dishes at Hat Creek Radio Observatory. By broadening our search for extraterrestrial intelligence with this "One of Everything" catalog, we hope to set the stage for future science and SETI projects and set strong upper limits of some of the most extreme and understudied environments in our universe.

Teagan Griffin

Discipline: Nursing and Public Health

Authors:

#1 Thomas Futrell

#2 Jamie Newman

#3 Nicholas Bustamante

Abstract Name: The Health Hut & Henry: Making Complex Medical Information Accessible

The complexities of medical and public health information make visual communication a vital tool for communicating clearly and effectively to diverse audiences, regardless of language or educational differences. This poster describes the illustrative process and development of an educational campaign for The Health Hut of Ruston, a free clinic that serves residents throughout Lincoln Parish. The Health Hut serves a population of non-native English speakers and people with little or no health insurance. The language barriers and, in some cases, the limitations in education, provide an opportunity for a partnership between Louisiana Tech University's VISTA Center and the staff at the Health Hut to create more personalized and meaningful medical educational materials. Through client consultation and review by providers and patients, four handouts were created with information about blood pressure, blood sugar, nutrition, and counseling services, each offering vital basic health information and ways to connect with the Health Hut. In addition, through the creation of the materials, a mascot was born: Henry the Health Hut Helper. Henry provides a secondary opportunity to communicate with the community as a character readily identifiable to Health Hut patients, helping humanize the brand and make health care more approachable. The creation of the Health Hut's illustrative campaign and mascot advertised affordable healthcare options and crucial health education information. Ultimately, this collaboration between Louisiana Tech University's VISTA Center and the Health

Hut not only allowed students to give back to the community by enhancing public health communication for underserved populations but also provided them with invaluable professional, real-world experience in using design to have a meaningful social impact.

Teagan Griffin

Discipline: Nursing and Public Health

Authors:

#1 Jamie Newman

#2 Nicholas Bustamante

#3 Thomas Futrell

Abstract Name: Project Henry: Making Complex Medical Information Accessible

Given the complexities of most medical and public health information, visuals have become a vital tool for communicating important health information clearly and effectively to diverse audiences, regardless of language or educational differences. This poster is a deep dive into the illustrative process and development of the poster Campaign for a local medical Non-Profit, The Health Hut of Ruston. The Health Hut is a free clinic in Ruston, LA that serves a population of non-native English speakers and people who have little or no health insurance, making it difficult for them to afford routine primary care providers. The language barriers and, in some cases, the limitations in education, provide an opportunity for a partnership between Louisiana Tech University's VISTA Center and the staff at the Health Hut to create more personalized and meaningful medical educational materials. Through client consultation and review by patients, four handouts were created with information about blood pressure, blood sugar, nutrition, and counseling services, each offering vital basic health information about each subject and a route of connection to the health hut to learn more. In addition, through the creation of the materials, a mascot was born. Henry, the Health Hut Mascot, provided a secondary opportunity as a character readily identifiable to the patients at the Health Hut, helping humanize the Health Hut brand, which can clear many negative stereotypes and fears associated with the medical field. The creation of the Health Hut's illustrative campaign and Mascot, advertised affordable healthcare options and crucial health educational information. These concerns are most prevalent in specific requests made by clients to improve the readability and approachability of the pieces, using calmer colors, larger typefaces, and even constructing a mascot to make the poster campaign more friendly and welcoming to the community.

Joshua Griffin

Discipline: Environmental Science and Sustainability

Authors:

#1 Guangbin Li

#2 Patricia Dotingco Arcellana

Abstract Name: The Effect of Wastewater Sources and Thermal Hydrolysis Pretreatment on Biomethane Yield in Anaerobic Digestion

Anaerobic digestion is a process that breaks down organic waste without oxygen to produce biogas, a renewable energy source primarily composed of methane. Because methane yield varies depending on waste type and treatment, improving production reliability is critical for sustainable energy applications. This in-progress study compares methane and total biogas production from two different wastewater sources and evaluates how yields change after thermal hydrolysis pretreatment (THP), a heat-based method that breaks down complex waste structures before digestion. A microbial inoculum-only control was included to provide a baseline for gas production and composition without wastewater feedstock. This means the inoculum control contained only the methane-producing microbes and no added wastewater, allowing us to measure how much gas those microbes produce on their own for comparison. Wastewater samples were collected, homogenized for consistency, and added into batch anaerobic digesters inoculated with mixed microbial cultures. Digesters were maintained at 37 °C, a common moderate temperature used in real-world biogas systems. Gas collection systems enabled daily measurement of cumulative biogas volume, while methane concentration and organic breakdown were tracked over 45 days. All other experimental conditions were held constant to isolate the effects of water source and THP. Results show that both wastewater source and THP influence methane and gas production. THP increased total biogas output for both sources, indicating improved waste accessibility for microbes. The inoculum-only control produced the lowest gas volume but the highest methane proportion, highlighting that pretreatment and feedstock affect both gas quantity and composition. These trends suggest THP is a promising method for improving wastewater-to-energy systems, though optimization may need to be source-specific. Future work will refine methane quantification and test THP intensity to further enhance biomethane reliability for scalable energy production.

Liz Griffin

Discipline: Psychology

Authors:

#1 Natasha Tonge

Griffin Perry

Abstract Name: The Relationship Between Stigma and Help-Seeking Intention: How Masculinity and Social Support Affect the Likelihood of Reaching Out

Recent data indicates over 65% of college students are reporting poor mental health negatively affecting their academic performance on a weekly basis. Yet, the number of students who seek care has not been rising at the same rate. Emerging adulthood is a pivotal period where one's concept of self, including concepts of gender norms, evolve independently from parental guidance. Exposure to new people can build a larger social circle, but can also increase exposure to negative public stigma. Masculinity can reduce help seeking behaviors, but buffer social support. However, there has been a lack of research on social support and masculinity post COVID-19. COVID stopped the socialization of most adolescents over 2020-2021. As a result, the way young adults perceive self-stigma within their social circles could have changed, but this has not been fully

explored despite how prevalent the shift is. The aim of this project is to address these gaps by examining the relationship between self-stigma and help-seeking behaviors alongside masculinity, in a post-COVID sample. Sample size is projected to be ~400. College students will complete a web-based survey measuring stigma, masculinity, social support, and mental health intention. We will utilize simple linear regression to examine the relationship between self-stigma and mental health help-seeking intention. Subsequently, we will run two moderation models to examine the buffering role of perceived social support and a hypothesized enhancing effect of masculinity. We hypothesize that higher self-stigma will predict lower help-seeking intention. Furthermore, we hypothesize that masculinity enhances this relationship, while social support will act as a buffer. This research will improve our ability to better understand factors influencing help-seeking and create personalized outreach for individuals who may be unlikely to seek help due to masculinity intrapersonal barriers. Results will also inform future directions for researchers and interventionists.

Catori Griffin

Discipline: Business

Authors:

Abstract Name: An Exploration of Non-Voting Behaviors among Gen Z Consumers: Beyond the Impact of Social Media

Generation Z is one of the most politically aware yet under-engaged demographics in the U.S. Despite strong social media use and interest in social issues, about half (53%) of Generation Z voters did not participate in the 2024 U.S. presidential election (CIRCLE, 2005). While research often examines how social media mobilizes voters, less is known about how it discourages participation. This study explores factors contributing to non-voting among eligible Generation Z individuals, including social, societal, and systemic influences, as well as feelings of helplessness, lack of control, and limited knowledge about voting procedures. Results show that non-voting was strongly associated with feelings of helplessness and distrust in the electoral system, with 61% of respondents feeling their vote did not matter and 57% viewing the system as unfair. The study highlights how social media and systemic factors shape disengagement and suggests strategies to boost political participation among young voters.

Gabriella Griffith

Discipline: Geography/Geology

Authors:

#1 John Allen

#2 Hunter Midkiff

#3 Joseph Allen

Andrew Beohler

Abstract Name: Exploring Geochemistry of Pseudotachylyte in the Homestake Shear Zone to Test the Utility of Handheld XRF in the Field

In this field study, handheld XRF was utilized to compare the geochemistry of two contrasting pseudotachylyte domains in the Homestake Shear Zone (HSZ), Colorado. Pseudotachylyte is a deformational product of frictional flash melting, yielding cm-thick, black glassy veins that cool in 10s of seconds along fault surfaces during earthquake slip. The melt matrix is chemically dominated by preferential melting of low-silica mafic minerals in the host rock; quartz (SiO₂) has a high melting point and survives as micron to

mm-scale, fractured clasts. Low silica and high FeO/ SiO₂ ratios are directly proportional to low melt viscosity, which could help lubricate faults and influence slip. To test this, we used handheld X-ray fluorescence (XRF) in the field with an analytical spot size of ~8 mm to collect FeO and SiO₂ content for host rock and pseudotachylyte in two contrasting domains (d1 & d2) with different host-rock structure. Since quartz clasts positively skew silica values relative to the more mafic matrix, we used WDS spectroscopy on an electron microprobe (EPMA) at Concord University to determine chemistry of 10-micron spots within the matrix in order to exclude unmelted quartz clasts to better reflect melt composition. The results of XRF vs. EPMA analyses normalized to 100% for SiO₂ and FeO show d1 pseudotachylyte has 92.1% vs. 89.9 SiO₂, (n= 55, 100), whereas d2 pseudotachylyte has 86.4% vs. 91.9% SiO₂, (n=53, 146). Pseudotachylyte XRF data showed d1 with an FeO/SiO₂ ratio of 0.086 and d2 with 0.157. EPMA results record d1 having a FeO/SiO₂ ratio of 0.112 and d2 with a ratio of 0.088. Within error, XRF and EPMA data are comparable, suggesting handheld XRF may have utility for obtaining field geochemical analyses from cm-scale pseudotachylyte. Ongoing work will further refine the model with additional EPMA analyses.

Bri Grindrod

Discipline: Mathematics

Authors:

#1 Eric Vance

Abstract Name: LISA: The Design and Future of Collaborative Statistical Analysis

LISA: The Laboratory for Interdisciplinary Statistical Analysis is a worldwide network of statistical collaboration labs started by Dr. Eric Vance. Despite being such a widely used field in academia, statistics is often not taught to students and researchers in depth or specified well enough to be used with the precision it could be. Ignoring common errors or simple misconceptions, domain experts often don't have the bandwidth to have intimate knowledge of their domain as well as the best statistical processes that could be used in their research. By introducing a statistical collaborator, the research capacity for individual labs as well as the manpower required decreases, and the quality of the data science done skyrockets. It was this idea that sparked the initial LISA, then spread it across the world. The point of the labs is threefold: to provide research infrastructure to the local community, to improve community statistical literacy, and to teach the next generation of statisticians and data scientists as collaborators. To do this, the network of labs relies on community, student and staff engagement, donor and university funding, as well as the support and research from other labs. Getting this often is easier said than done: budget cuts, funding, staffing issues have all corroded the longevity and sustainability of LISA branches. The objective of the LISA project is to compile the findings and data of a variety of different LISA-centered projects into a cohesive report to support the sustainability of the existing labs, streamline the effectiveness of their pillars, and show how statistical collaboration is integral to the community at large.

Kate Grissom

Discipline: Biology

Authors:

#1 Cindy Stenger

Abstract Name: Investigating Missense Mutation Y189C of PSEN1 and Describing its Association with Acne Inversa

Acne inversa (also called hidradenitis suppurativa) is a chronic inflammatory condition that affects the skin. This disorder causes recurring abscesses to develop on the skin and will typically rupture, heal, and reform. Mutations in the PSEN1 gene have been linked to causing familial acne inversa. The PSEN1 gene encodes for the presenilin-1 protein, which is part of the gamma-secretase complex. If the Notch signaling pathway is disrupted due to a variant in PSEN1, acne inversa could occur. This study discusses a missense amino acid swap in the PSEN1 gene that could contribute to the development of acne inversa. A change in protein structure and function caused by pathogenic variants in PSEN1 is expected. A variant of unknown significance (VUS) was selected by analyzing genomic data from gnomAD. The VUS was found on amino acid position 189, with a swap from Tyrosine (polar) to Cysteine (nonpolar). This swap is also at the end of an alpha helix outside of the transmembrane region, which could cause a change in structure and function of PSEN1. In silico programs were used to predict the pathogenicity of variant Y189C. A Molecular Dynamics Simulation (MDS) was also conducted to compare the movement of the transmembrane protein for the native and variant.

Jude Grodesky

Discipline: Computer Science

Authors:

Abstract Name: topological Feature Extraction on Clinical Images: Methods and Performance

Machine learning and deep learning methods have become standard options to apply for image processing applications to determine features from clinical images for classification algorithms. The black box nature of deep learning, however, presents obstacles in clinical use. Lacking clarity in the features being measured produces discomfort and uncertainty for medical professionals who utilize these processes and their findings. There is also a loss in information about the context of the features. Utilizing topological methods, we can observe the global structure of the data while producing features, preserving contextual information to aid clinicians in determining the formation or changes of the features. Through the technique of persistent homology, we observe the longevity of features, providing information on their stability and prevalence. These features and the information about them can then be worked with to perform feature analysis, both to describe the data for clinical understanding, and to be applied back to enhance deep learning techniques such as attention models. We analyze how meaningful the extracted features are, linking them to conceptual features and demonstrating their performance when used within classical machine learning models. Through presenting the extraction of salient features and displaying their performance when used in classification tasks on clinical images, we introduce a viable path for feature mapping other than deep learning methods. We explore methods and parameters in topological data analysis and their effects on feature performance. Additionally, we demonstrate the clarity preserved through these methods of feature extraction.

Anne Grogan

Discipline: History

Authors:

Abstract Name: Call Their Names: The Radical Activism of the Black Quilting Tradition and the AIDS Crisis

Socio-economic violence in the United States has left historically marginalized groups, particularly Black Americans living in inner cities, at an increased risk of infection and disease. From the violent overthrow of Reconstruction onward, social policy in the United States has continuously fought to undermine African

American communities by severely limiting resources not only for work and education but also for safe housing and medical services that include access to proper health care and disease prevention. This research project explores how the initial HIV/AIDS epidemic in the 1980s severely impacted inner-city Black communities due to socioeconomic issues created by historic anti-Black violence and oppression (employment, housing, medical discrimination) from the time of Reconstruction onward, and how this violence led large groups of Black Americans to be more vulnerable to infectious disease outbreaks. By deeply exploring the power of African American tradition and memory, specifically how Black Americans have utilized their knowledge of their history of triumph and tragedy and their talent for artistic expression to protest injustice in the present, this research aims to amplify the voices of African American allies and activists who used the art of quilting to claim as their own and humanize Black individuals who have died and/or are suffering from HIV/AIDS. By studying the art of quilting from exhibits around the country, the National AIDS archives in Washington D.C., numerous interviews with leading AIDS activists, and numerous oral history accounts of the Black quilting tradition, I hope to add to the scholarly discourse on HIV/AIDS awareness within Black communities and how quilting as an artistic form of expression and historical legacy of the Black experience has been a powerful form of activism, and continues to be used to create meaningful impact within the Black Lives Matter movement.

Ben Gronbach

Discipline: Engineering

Authors:

#1 Fatemeh Khatami

#2 Kyle Capili

#3 Ryan Smith

Kyle Capili

Ryan Smith

Abstract Name: Analyzing Kinematic Data with Machine Learning to Detect Injuries in Swimmers

Overuse shoulder injuries are among the most prominent injuries in collegiate-level swimmers. The high training volume, combined with the repetition and frequency of the overhead motion in a swim stroke puts the shoulder under an immense amount of biomechanical stress, degrading the joint over time. Some of the most common injuries include rotator cuff impingement, tendinitis, or labrum tears. These injuries are often rooted in issues of muscular imbalances, improper stroke technique, and excessive joint laxity. Tracking and identifying these tendencies can potentially reduce the number of injuries from swimming. Existing methods which track biomechanical movements in water struggle to obtain accurate data. They rely heavily on coach observation or above-water motion capture, both of which lack precision and real-time feedback underwater. Camera systems are expensive, difficult to calibrate, experience delayed data tracking, and are unable to track motions underwater due to glare and water distortion. To resolve these challenges, our system utilizes waterproof inertial measurement sensors, allowing for the ability to accurately and consistently capture underwater motion in real time. This study will incorporate machine learning techniques to transform raw motion data into accurate, predicative insights regarding athlete performance and injury risk. Machine learning is the use of artificial intelligence to create statistical algorithms by analyzing given data sets, with the ability to learn and adapt without following explicit instructions. Due to its ability to improve its own performance over time, its usage in different fields has risen exponentially over the past few years. It has shown high capabilities to analyze data and detect and classify outliers. By inputting high-quality IMU data from division 1 swimmers and water polo players into various ensemble models and neural networks, this study aims to discover hidden high-risk movement patterns to predict and prevent overuse injuries.

Madysen Gross

Discipline: Health and Human Development

Authors:

Tanvi Tomar

Abstract Name: College Student Success: Food Insecurity and Substance Abuse

Food insecurity plays a significant role in college success. Research has found that food-insecure students experience sleep deprivation, difficulty focusing, and higher rates of disenrollment, and lower GPAs. Substance abuse presents a related challenge, possibly contributing as a coping mechanism for stress and scarcity. Abuse of substances can lead to lower grades and cognitive deficits. Despite various campus interventions, knowledge remains limited regarding cultural factors, local food environments, and the long-term effectiveness of support programs at Hispanic-serving institutions. This mixed-methods study investigates food insecurity and substance abuse among Hispanic and first-generation students at Purdue University Northwest (PNW), exploring the challenges and what culturally responsive interventions institutions can implement. The first phase, a survey assessing food security status and alcohol misuse, is now complete. Approximately half of the respondents reported experiencing some degree of food insecurity. The most common reported challenges included the inability to afford balanced meals, followed by groceries not lasting. The second phase will involve semi-structured interviews and focus groups with students who reported food insecurity. In-depth exploration of local food environment barriers will be investigated in coordination with stakeholders, including the Food Bank of Northwest Indiana. The final phase will involve a survey assessing food security status, alcohol misuse, resource utilization, and cultural factors affecting food access. To enhance generalizability, this phase will incorporate a national sample of Hispanic students recruited through Prolific.ac, enabling comparison with the PNW findings. Results will contribute to understanding food insecurity at Hispanic-serving institutions while informing the development of evidence-based, culturally responsive support services for Hispanic and first-generation students at PNW and similar institutions.

Ava Groth

Discipline: Education

Authors:

#1 Stephen Podowitz-Thomas

#2 Ava Groth

Abstract Name: The Self-Concept of Neurodivergent Undergraduate Students in STEM

Students' academic self-concept in STEM includes their beliefs about themselves as learners, their learning behaviors, and their future success in STEM. Neurodivergent students in primary and secondary education, on average, have more negative views of their academic potential and feel less control over their academic success, but little is known about the self-concept of neurodivergent undergraduate STEM students. For this study, responses to open-ended survey questions on self-concept from 115 neurodivergent undergraduate STEM students were analyzed. Participants were enrolled at one of 8 U.S. institutions, majoring in a range of STEM disciplines. Institutions represented a range of institution types. All participants self-identified as neurodivergent (autism, ADHD, and/or specific learning disabilities). A codebook was developed through thematic coding, drawing from participant responses and existing theories about academic self-concept. Four overarching categories identified observed patterns: (1) self-image of how students viewed their neurodivergence, (2) self-knowledge of the ways they learn best in STEM, (3) sense of control or agency over their own success in STEM courses, and (4) perceptions of their future selves in STEM professions. In a second coding cycle, subthemes of each category were identified. For example, complex conceptualizations of how their neurodivergence related to their STEM learning led to a range of subthemes in self-image,

including strength, difference, non-differentiating, and challenge views, sometimes in combination for the participant. Study results suggest strategies for faculty, mentors, and departments to support neurodivergent students, including emphasizing the strengths that students associate with their neurodivergence, acknowledging and normalizing challenges, and providing opportunities for students to identify unique ways they learn and practice course content.

Rylee Grover

Discipline: Physics and Astronomy

Authors:

#1 Rylee Grover

#2 Milind Diwan

Abstract Name: Characterization of an Americium-Beryllium Tagged Neutron Source for a 30-Ton Water-Based Liquid Scintillator Detector

Understanding the detection capabilities of water-based liquid scintillator (WbLS) is critical for its deployment in next-generation neutrino detectors such as THEIA and Phase II of the Deep Underground Neutrino Experiment (DUNE). This study focuses on the characterization and alignment testing of an americium-beryllium (AmBe) radioactive neutron source. We plan to dope the 30-ton WbLS detector at Brookhaven National Laboratory (BNL) with gadolinium (Gd) to improve neutron detection capabilities. This will be tested by implementing an AmBe source as a calibration metric. The AmBe source emits neutrons coincident with a 4.4 MeV gamma ray, making it possible to perform tagged neutron studies in the 30-ton detector. With planned Gd doping, accurate source placement and response characterization are of high priority. This work involved testing spatial alignment, analyzing the AmBe energy spectrum to verify gamma ray tagging, and evaluating its suitability for future neutron detection benchmarking in large-scale neutrino detection experiments. Alignment analysis resulted in the design switch from a stainless steel housing to an acrylic housing for the calibration setup, which includes the AmBe source, 4 Lutetium-Yttrium Oxyorthosilicate (LYSO) crystals, and a small photomultiplier tube (PMT). The results of the energy spectrum analysis yield a clear 4.4 MeV gamma peak, suggesting that the use of an AmBe radiation source is suitable to calibrate neutron tagging in the 30-ton WbLS detector at BNL. These results contribute to the broader effort to validate WbLS as a scalable detector medium and inform the future implementation of metal-doped WbLS systems in high-precision neutrino experiments. This study aligns with BNL's mission to investigate the building blocks of matter through high-energy physics research. As a result of this study, I have developed an understanding of experimental particle detection and measurement, gained firsthand experience in detector development, and learned valuable programming/data analysis skills.

Thomas Gruszkos

Discipline: Economics

Authors:

Abstract Name: United States Energy Policy Act of 2005: Investment and Incentivization of Nuclear Power in the United States and Unintended Stagnation of the Nuclear Energy Production Sector

Nuclear power has seen little development since the 1990s despite its potential to combat climate change by providing clean energy. The United States attempted to foster growth in the industry by introducing the Energy Policy Act of 2005 (EPAct 2005), which provided incentives and regulatory changes. This review

investigated the stagnation of nuclear power development, evaluated why the EAct 2005 was not as effective in stimulating the industry as intended by analyzing policy studies and cost analyses of energy production. The findings showed that nuclear power is competitive with other means of energy production in terms of operating costs, such as coal and gas, because of low and stable fuel costs. However, nuclear power requires the greatest initial capital of the major means of energy production. This capital requirement is what may have deterred investors from developing the industry. While the EAct 2005 attempted to offset initial capital costs, its incentives were insufficient to significantly alter corporate interest. Additionally, legislation permits only one form of financing, which requires substantial risk on developers, further discouraging developers from investment. Still, the lack of interest in nuclear energy can be attributed to more than just finance; public sentiment regarding waste, disaster, and weapons proliferation has strayed interest, and decommissioning requirements have become increasingly difficult. Based on these findings, this review proposes that the Federal Government should seek to incorporate larger tax benefits and heavily increased loan guarantees for nuclear power in their next energy bill to spark growth in the industry.

Brianna Guajardo

Discipline: Engineering

Authors:

#1 Brianna Guajardo

#2 Adela Mendez-Martinez

#3 Maria Reyes

#4 David Ruiz

Abstract Name: Prosthetic Design For Everyone: 3d Printing For Accessible, Adaptable And Personalized Leg Prosthetics

Prosthetic devices are essential for restoring mobility and independence, yet traditional designs remain costly, difficult to customize, and inaccessible for many patients. Recent advances in 3D printing offer a promising alternative by enabling affordable, customizable, and rapidly produced prosthetic components. This study evaluated the feasibility of designing and fabricating below-the-knee prosthetic parts using additive manufacturing methods. Prototypes of foot and ankle components were created using Polylactic Acid (PLA) and Tough PLA with different infill densities and structural patterns. Fabrication was conducted on MakerBot and Ultimaker printers, allowing comparisons in strength, flexibility, and overall print efficiency. The design process emphasized modularity, durability, and adaptability to individual patient needs. Results showed that Tough PLA with a grid infill provided superior stiffness and durability for the foot component, while PLA with a diamond infill pattern was sufficient for the ankle joint. The prototypes demonstrated functional flexibility, secure connections to the pylon, and promising durability for everyday use. Cost analysis indicated that components could be produced at a significantly lower cost than traditional prosthetics, with print times ranging from several hours to a full day depending on printer type. These findings suggest that 3D printing can help improve accessibility in prosthetic care by allowing rapid replacement, customization, and affordability—benefits especially important for children and underserved communities. However, the research also revealed limitations, including restricted printing time, limited access to equipment, and the early-stage nature of the design. This study presents only the lower-leg portion of a prosthetic system, meaning the model is not yet complete. Future research should expand to above-the-knee components, conduct long-term durability testing, and include clinical trials to evaluate gait, joint performance, and full-system functionality. Continued development is needed to create a fully functional, patient-ready prosthetic device.

Anmol Guard

Discipline: Biology

Authors:

Abstract Name: Differential role of the ET-1/ETA axis in kidney inflammation during high oxygen supplementation

The mechanisms involved in hyperoxia-induced organ damage are not fully understood. Endothelin-1 (ET-1) plays an important role in kidney disease and inflammation. We reported elevated plasma ET-1 and kidney fibrosis after 72 h of hyperoxia; however, if ET-1 drives kidney inflammation under hyperoxic conditions is unclear. We hypothesized that high oxygen supplementation leads to increased inflammation in the kidney, and that pharmacological blockade of the ETA receptor ameliorates that inflammation. Male C57Bl/6 mice drank normal water or ABT-627 (ETA antagonist, 5 mg/Kg/day in water) for 1 week prior and while receiving hyperoxia (>95%O₂) for 72 hours. Kidneys were isolated and stained against T cells (CD3+) and macrophages (F4/80+). Kidney T cells and macrophages were quantified in whole kidney scans using Metamorph software, and specifically in the cortex by manually counting 20 40X microscope fields/cortex. Hyperoxia resulted in a significant decrease in whole kidney and cortical T cells (normal air vs. hyperoxia, whole kidney: 0.06 ± 0.01 vs. 0.03 ± 0.00 % threshold area, $p=0.0005$; cortex: 1.50 ± 0.16 vs. 1.07 ± 0.07 cells/field; $n=12$ /group, $p=0.03$), while macrophages tended to increase in the whole kidney and decrease in the cortex (27.6 ± 1.07 vs. 23.2 ± 0.84 cells/field, $p=0.01$). ABT-627 prevented the increase in macrophages with hyperoxia in whole kidney, while it did not change T cells. Our results demonstrate that the effects of high O₂ on kidney T cell infiltration are independent of ETA signaling, while macrophage infiltration in the cortex is ETA-dependent.

Gayatri Guda

Discipline: Biology

Authors:

- #1 Gayatri Guda
- #2 Aditi Kumar
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- #4 Dana Lapato
- #5 Vasily Yakovlev
- #6 Roxann Roberson-Nay

Abstract Name: Extracellular Vesicle Concentration as a Marker of Psychological and Physiological Stress in Early Life

Extracellular vesicles (EVs) are nanoscale, membrane-bound particles released by most cell types, including brain cells, immune cells, endothelial cells, and epithelial tissues, and carry molecular cargo that supports intercellular communication. Because EV release is responsive to cellular activation and stress, their circulating concentration may reflect aspects of physiological regulation. However, the relevance of total EV concentration to psychological symptoms or acute stress reactivity in adolescents remains unclear. This study examined associations between plasma EV concentration, mental health symptoms, cortisol responses to the Trier Social Stress Test (TSST), and neighborhood opportunity in adolescents. Participants included 30 females and 29 males (ages 15-20). Plasma EVs were isolated and quantified using ZetaView nanoparticle tracking analysis, which provides particle counts in the 50-200 nm range. Participants completed measures of lifetime major depressive disorder and current depression, anxiety, and stress symptoms using the DASS-21. A subset completed the TSST with baseline, pre-TSST, and four post-TSST salivary cortisol samples collected at 15-minute intervals. Neighborhood context was indexed using Child Opportunity Index domains. Across measures, EV concentration showed negative correlations with self-reported anxiety, stress, and physical symptom severity. This pattern indicates that adolescents with lower circulating EV counts tend to

exhibit higher psychological symptom burden, consistent with the interpretation that reduced EV concentration may reflect a less adaptive or more dysregulated physiological profile. Effects were strongest in females, with correlations in the small-to-moderate range ($r = -.22$ to $-.31$) for symptom measures. Females also showed modest inverse associations between EV concentration and TSST cortisol, including peak cortisol ($r = -.43$). Neighborhood opportunity demonstrated similar female-specific gradients ($r = -.24$ to $-.36$). Although exploratory, these findings suggest that lower bulk EV concentration may index heightened psychological symptoms and less regulated stress physiology, particularly among females. Larger samples are needed to clarify mechanisms and developmental implications.

Julia Gudis

Discipline: Biology

Authors:

#1 Kaoutsar Nasrallah

Abstract Name: The Role of δ -Containing GABAA Receptors in Modulating Experimental Kainic Acid-Induced Seizures in Adult Mice

Epilepsy, a neurological disorder characterized by recurrent seizures, is often driven by hyperexcitable neural circuits that result from an imbalance between excitatory and inhibitory signaling. The dentate gyrus (DG) of the hippocampus is a brain region that plays a critical role as a gatekeeper, restricting excessive excitatory input to downstream hippocampal regions, and thereby preventing seizure spread. δ -subunit-containing γ -aminobutyric acid type A receptors (δ -GABAARs) help regulate the activity of neurons in the DG by providing steady background inhibition; dysregulation of δ -GABAARs is likely implicated in temporal lobe epilepsy (TLE), with prior studies suggesting that less inhibition is what leads to worsened seizure outcomes. This project will test the hypothesis that selective removal of δ -GABAARs from DG neurons exacerbates seizures by promoting overactivation of DG neurons. Two aims are proposed: (1) quantify seizure severity in DG- δ -GABAAR conditional knockout (cKO) mice versus controls after KA-induced seizures; and (2) assess neuronal activation using a marker of neural activity (c-Fos) visualized with fluorescence microscopy following immunostaining. The goal of this study is to uncover the potential role of δ -GABAARs in regulating seizures, providing mechanistic insights into tonic inhibition in epilepsy and identifying potential therapeutic targets for mitigating seizure progression and cognitive dysfunction.

Daniela Guedez

Discipline: History

Authors:

#1 Michael Proulx

Abstract Name: BEYOND THE FLESH: ASCETIC WOMEN, GENDER TRANSFORMATION, AND CHRISTIAN MONASTICISM IN EARLY CHRISTIANITY.

This project explores early Christian asceticism through a gendered lens, focusing on how fasting, celibacy, and withdrawal from traditional roles subverted gender in late antiquity. Roman society stressed marriage, domesticity, and familial lineage, but female ascetics undercut these norms by practicing celibacy, rejecting wealth, and pursuing holiness through bodily discipline. For women, asceticism offered escape from social constraints in gender roles. Hagiographical accounts described these women in terms that blurred gender norms, attributing masculine virtues as masculine or referring to them as male. While scholars have examined

women's roles in early Christian asceticism, female saints are often treated as peripheral to a male-centered ascetic tradition or focused primarily on themes of virginity. This project builds on that scholarship by emphasizing how women such as Macrina, Syncletica, and Mary of Egypt were portrayed as transcending gender categories. By highlighting the ways in which female ascetic practice destabilized cultural definitions of gender roles, the study reframes women not as exceptions but as central in the redefinition of holiness in late antiquity.

Johanna Guerrero

Discipline: Nursing and Public Health

Authors:

#1 Linnea Laestadius

Abstract Name: Substack Speaks on Measles: Themes, Claims, and the Politicization of Vaccination

Misinformation about measles and the Measles, Mumps, Rubella (MMR) vaccine is spreading at a rapid rate throughout the United States. This has caused many to become hesitant about the vaccine leading to a resurgence in measles outbreaks. A substantial amount of this misinformation is spread on an app called Substack, a platform where anyone can publish articles, videos, and podcasts to subscribers. The issue with anyone being able to publish content is that Substack has now become a center for misinformation. The purpose of this research is to answer one question: What are the predominant themes in Substack posts about measles? To answer this question, 100 posts were coded in MAXQDA using reflexive thematic analysis, drawing initial codes from prior research and other codes from posts. Each post was classified into a pro, anti, or unclear stance on vaccination. Four common themes were identified in Substack posts addressing measles and the MMR vaccine: (1) Pro-vaccine Substack posts are primarily informational and emphasize case counts and provide details about the dangerous health effects of measles. (2) Anti-vaccine posts focus on the negative side effects of the MMR vaccine, including claims that the vaccine is linked to autism. These posts also portray pro-vaccine groups as withholding scientific truths about the MMR vaccine. (3) Both pro-vaccine and anti-vaccine posts accuse one another of putting lives at risk. (4) The pro-vaccine posts were more likely than the anti-vaccine posts to critique politics/political leaders. Anti-vaccine posts tend to be more detailed to debunk science proving that the MMR vaccine is effective and safe. Due to the anti-vaccine posts' investigative and detailed nature, they often appear to be more believable in comparison to the pro-vaccine posts.

Luis Guevara

Discipline: Business

Authors:

#1 Luis Guevara

#2 Andrea Mejía

Andrea Mejía

Abstract Name: Dissemination of the implications of adopting Fourth Industrial Revolution technologies in organizations in Medellín

The Fourth Industrial Revolution (4IR), driven by the convergence of digital, physical, and biological technologies, has transformed social, economic, and technological domains globally. This revolution brings both opportunities and challenges for organizations, which must swiftly adapt to new business models and

operational processes. Medellín, recognized as an innovation district, is no exception. Therefore, this dissemination focuses on answering the question: How do organizations in Medellín contribute to sustainable development and social well-being through the adoption of 4IR technologies? This dissemination, a magazine with five sections, aims to share information with university students on the implications of adopting 4IR technologies. The material is based on research completed in 2024 regarding the contribution of these organizations in Medellín to sustainable and social development. The process behind its creation involved three phases: ideation and conceptualization, design and prototyping with user testing, and finally public presentation and dissemination, supported by experts to facilitate understanding. This work demonstrates that adopting 4IR technologies offers critical opportunities for strategic sectors in Medellín but also poses significant challenges in terms of socioeconomic equity. The material communicates these aspects in clear and accessible language, raising awareness and informing about the real impact of the 4IR on the city and its organizations. Thus, this scientific dissemination effectively promotes knowledge about local technological transformation, proposing strategies to optimize the responsible use of these technologies for the benefit of the community and organizational environment. The experience shows that communicating science in a practical and approachable way strengthens the readiness of future professionals to face the challenges of the Fourth Industrial Revolution.

Sai Charita Gujju

Discipline: Psychology

Authors:

Abstract Name: The Anxiety Gap: The Impact of Math Anxiety and Effort on Math Achievement by Sex

Introduction: Math achievement is a fundamental aspect of academic success for school children, setting the foundation for future STEM engagement and career pathways. However, psychological factors, such as Math Anxiety (MA), can be severely detrimental to a student's performance. Effort, meanwhile, is another critical motivational predictor that can positively or negatively impact Math Grades (MG). **Objectives:** This research aimed to clearly identify the relative influence of these key psychological and behavioral variables on math achievement and to test the critical role of sex as a moderator of these relationships. **Methods:** The study analyzed a cross-sectional sample of $N = 302$ students (4th and 8th grades). Validated scales were used to measure Math Anxiety (Math Anxiety Scale) and Effort (Intrinsic Motivation Inventory), while Math Grades were the most recent academic grades reported by the parents. The analysis included a multiple hierarchical regression, controlling for Family Income and Caregiver Education. **Results:** The full model confirmed that Math Anxiety was the most dominant, highly significant negative predictor of Math Grades ($p < 0.001$). We found that the negative impact of Math Anxiety was more pronounced for female students, demonstrating a greater psychological vulnerability to anxiety. Conversely, the positive academic return on Effort was significantly stronger for males. Although initially significant in bivariate models, the unique predictive power of Effort ($p = 0.0553$) and Family Income ($p = 0.0634$) became only marginally non-significant in the full model, suggesting their unique variance was largely absorbed by Math Anxiety's powerful effect. **Conclusion:** In conclusion, Math Anxiety remains the primary barrier to math achievement, operating with a sex-specific bias. The findings portray an anxiety gap and a differential return on effort, highlighting the necessity of targeted, sex-informed interventions that prioritize addressing underlying psychological barriers that may decrease math achievement for students.

Kaitlyn Gulbranson

Discipline: Biochemistry

Authors:

#1 Victoria Greene
#2 Kevin Zheng
#3 Keyur Karmacharya
#4 Isaac Babalola
#5 Dr. Samantha Katner

Abstract Name: Determining Heparan Sulfate Levels on Glioblastoma Cells

Glioblastoma (GBM) is a devastating, fast-growing brain cancer that arises from glial cells and is the high grade IV glioma. After diagnosis, the five-year survival rate is only 5% for GBM patients. Despite multimodal treatment approaches, GBM remains a difficult disease to treat due to the aggressive nature of GBM. Therefore, further investigation into understanding the mechanisms involved in GBM tumor progression is necessary to enhance patient survival. Proteoglycans offer an attractive mechanism to study as they are found on the surface of GBM tumor cells. Proteoglycans are proteins with carbohydrate branches called heparan sulfate chains of which facilitates multiple GBM cellular processes: rapid growth, angiogenesis, invasion, and metastasis. Here, we learned mammalian cell culture techniques and maintained GBM tumor cells in culture. Experimentation with a competitive enzyme-linked immunosorbent assay (ELISA) kit was used to detect the level of heparan sulfate chains on the cultured GBM cells, as overabundance could contribute to increased proliferative mechanisms of this cancer. Therefore, we examined the abundance of heparan sulfate chains in multiple GBM cell lines to determine their potential influence in the aggressive nature of GBM.

Lindsey Gump

Discipline: Social Work and Human Services

Authors:
#1 Lisa Moyer

Abstract Name: The Alabama Youth Relationship Education (AYRE) Project in Practice

Alabama has a history of family instability that can place youth at risk for developing unhealthy romantic relationships. Adolescents in the state experience higher rates of risky sexual behaviors and victimization, including physical dating violence. The Alabama Youth Relationship Education (AYRE) Project seeks to address these challenges by teaching youth about healthy relationship skills and, in the long term, strengthening marriage and parenting outcomes. AYRE does this by offering adolescents targeted relationship education and accessible support resources. During the spring and fall semesters of 2025, the author partnered with AYRE to complete a service-learning project. This presentation will share insights from that experience and illustrate how research can be effectively translated into community-based practice. The AYRE curriculum includes three core components. The first, Relationship Smarts Plus 4.0, is an evidence-based program designed to build communication, stress-management, and conflict-resolution skills while helping participants differentiate between healthy and unhealthy relationships. To incorporate emotional wellness practices, Mind Matters introduces strategies for emotion regulation, self-soothing, and resilience, offering practical tools such as breathing exercises and the 5-4-3-2-1 grounding technique. The curriculum concludes with Money Habitudes, which encourages participants to examine their personal habits and attitudes toward finances and to understand how financial decision-making can shape relationship dynamics. Working with AYRE highlighted the critical link between healthy relationships and overall well-being. Throughout the project, the author gained a deeper understanding of the role of parent-adolescent relationships during a pivotal developmental period. A central objective was to create meaningful learning experiences for youth by demonstrating how effective communication and relationship skills can improve their lives and positively influence those around them. This presentation will reflect on the author's work with AYRE and emphasize how evidence-based research can inform real-world programs that support youth and strengthen families across Alabama.

Amy Guo

Discipline: Psychology

Authors:

#1 Krista Hill-Cummings

Abstract Name: Collecting Under Uncertainty: How Nostalgia and IP Familiarity Influence Consumer Motivation and Behavior in the U.S. Blind Box Market

Blind boxes are collectible products sold in opaque packaging that hides the specific character from a larger series inside. Buyers do not know which figure they will receive until unboxing, which creates a heightened sense of anticipation and surprise. This study will examine the connection between blind boxes and individuals' experiences, focusing on their emotions, memories, and forms of self-expression. Specifically, there is an emphasis on nostalgia and familiar intellectual property (IP) characters to determine whether they increase purchase motivations. Although existing literature has analyzed blind boxes extensively within the Chinese market, there is limited study in the American demographics. To address this gap, the research analyzes the behaviors and motivations of 157 participants (purchasers and non-purchasers) through an online survey to measure purchasing patterns, emotional responses, and the influence of personally meaningful IP characters. The preliminary results of the study found that the strongest purchasing motivators were surprise and excitement, closely followed by an interest in collecting specific IP characters. Participants also express greater confidence in their purchases when they recognize the brand, character, or series. Meanwhile, individuals who have never bought a blind box explained that they usually don't collect items, although they either enjoy looking at collectibles or own a few. However, several participants responded that if a blind box featured a brand or character they particularly liked, their tendency to purchase would increase significantly. The survey also investigates how different shopping environments, such as in-store or online platforms, shape impulse buying. In addition, the Big Five Factor Inventory was conducted to understand how personality traits influence consumer susceptibility towards surprise and probabilistic rewards. Ultimately, the research aims to uncover why American consumers are drawn to blind boxes and how nostalgia influences their interest and engagement.

Bhavya Gupta

Discipline: Nursing and Public Health

Authors:

Abstract Name: Where Mountains Meet Medicine: How Medical Syncretism Shapes Access and Care in the rural Cold Desert Cultural Landscape of India

Current efforts in the rural Cold Desert Cultural Landscape (CDCL) of India include both traditional healing practices and biomedical healthcare delivery. Therefore, the project will research how medical syncretism—the integration of these systems—shapes healthcare access and equity in the region. Prior literature, case studies and ethnographies demonstrate that indigenous and biomedical systems coexist in rural settings, establishing the CDCL's remote and resource-limited context valuable for investigating how integration influences access to care. Drawing on theories of medical pluralism and medical syncretism, the proposed research will explore how practitioners balance traditional healing values with biomedical protocols to deliver accessible and patient-centered care. The project will collect primary data through semi-structured interviews with both traditional healers and biomedical professionals in the CDCL. Using thematic coding, the study

will analyze patterns in perceptions of integration, access, and equity. It is expected that collaboration between systems and the cultural legitimacy fostered by medical syncretism will enhance healthcare access and satisfaction. Ultimately, the project situates the CDCL's experience within the broader challenge of ensuring that healthcare systems worldwide respect cultural diversity while promoting universal access and well-being

Garima Gupta

Discipline: Chemistry

Authors:

#1 Yuvraj Dangat

#2 Hedieh Torabifard

Abstract Name: Predicting Gas Solubility in Deep Eutectic Solvents Using Machine Learning

Industrial greenhouse gas emissions have accelerated global warming by 50% and contributed to worsening air and ecosystem conditions. Traditional capture technologies based on solvents face many challenges, as most solvents are volatile and corrosive, limiting their sustainability and large-scale applicability. Recently, deep eutectic solvents (DESSs), comprising an HBD (Hydrogen Bond Donor) and an HBA (Hydrogen Bond Acceptor), have been more sustainable alternatives with low toxicity and highly customizable physicochemical properties. However, the chemical design space for DESSs is large, and experimental evaluation of gas solubilities is slow and expensive. Machine learning (ML) offers a strategy for accelerating solvent discovery by ML models, trained on curated literature data and descriptors from density Functional Theory (DFT), to predict NH_3 , CH_4 , NO_x , SO_x , and CO_2 solubility across diverse DES systems, which enables fast screening of new solvent combinations. The following project uses a multi-descriptor framework originating from DFT to achieve a predictive power comparable to COSMO-RS while avoiding computational and financial overhead associated with it. Electrostatic Potential (ESP) maps are computed as 3D descriptors of the electronic environment of each DES component. In order to convert the 3D ESP maps into a format suitable for machine-learning models, those are discretized into eight bins to form a 2D histogram, then flattened into a 1D feature vector. Different ML algorithms will be trained using metrics including R^2 , Root Mean Square Error (RMSE), and Mean Absolute Error (MAE). The final optimized models will go through a virtual screening of unexplored compositions of DES for the discovery of new HBD-HBA combinations that are capable of enhanced gas capture. This research is expected to produce precise and generalizable ML models that can give insights into the driving forces behind the solubility of greenhouse gases in DES and minimize harmful industrial emissions.

Aashman Gupta

FL - Embry - Riddle Aeronautical University

Discipline: Mathematics

Authors:

#1 Hailey Grabinski

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Eliane Dean

Abstract Name: Visualizing the Invisible: Simulating Electromagnetic Field in 3D Space with MATLAB

Electromagnetic field behaviours in free space are defined by Maxwell's Equations, which couple the temporal and spatial variations of electric and magnetic fields through partial derivatives. These derivatives quantify the rate of change of each field's vector component with respect to position and time in a 3D lattice, forming the basis for numerical field analysis. This research will develop a mathematical and computational framework using multivariable calculus to model, simulate, and visualize electromagnetic wave propagation in free space using MATLAB. Gradient, divergence, and curl operations are implemented to compute local field variations and energy transfer. The resulting data are used to generate 3D plots that represent the propagation of electromagnetic waves and the coupling between electric and magnetic components. By integrating partial differentiation into simulation, this study demonstrates how calculus enables precise modelling and visualisation of dynamic field interactions, supporting validation of Maxwell's equations and providing insights applicable to spacecraft communication, sensor optimization, and electromagnetic system design.

Anya Gurkin

Discipline: Interdisciplinary

Authors:

Abstract Name: Before It's Too Late: Feminist Approaches to Sex Education and the Prevention of Violence in an Austrian Classroom

Globally, debates around sex education reveal deep tensions between tradition, religion, and an evolving understanding of gender equity and violence prevention. In Austria, while national guidelines promote a comprehensive sexual education curriculum, topics around healthy relationships, gender dynamics, and the influence of media on sexual norms are often overlooked. The delivery of these lessons frequently depends on individual teachers' interpretations, classroom management styles, and confidence in navigating sensitive topics within multicultural environments. This research explores how feminist-informed approaches to comprehensive sex education can help teachers both develop their pedagogic skills and help them deliver preventative methods against domestic and interpersonal violence, particularly within classrooms where students come from diverse cultural and religious backgrounds. Using a qualitative case study, semi-structured interviews with teachers and the school's headmaster and ethnographic journaling of classroom observations at a secondary school in Vienna over the span of three months were carried out. Findings suggest that younger students tend to engage with sex education topics playfully and with curiosity while older students exhibit greater discomfort and restraint, often hesitating to name body parts or use sexual terms even before explicit content is introduced. Teachers described navigating diverse cultural and religious attitudes, gendered differences in participation, and misinformation from social media or pornography. Across classrooms, engagement was highest when lessons connected biological content to personal meaning, emotional understanding, and real-world issues rather than abstract facts. This research could contribute to ongoing global discussions on the role of education in promoting equality and preventing violence. By highlighting classroom level experiences, it could offer an avenue for policymakers and educators to strengthen culturally responsive and feminist approaches to sexual education in adolescents.

Paola Gutierrez

Discipline: Social Work and Human Services

Authors:

#1 LaShawnda Fields

Abstract Name: Navigating Changes: The Experiences of Nonprofit Leaders in Northwest Arkansas in the Current Social and Political Climate

Northwest Arkansas (NWA) is a rapidly growing region with an expanding network of nonprofits that play a vital role in meeting the needs of its increasing population. Many of these organizations are led by professionals committed to supporting minoritized, underrepresented, and under-resourced groups—terms frequently associated with diversity, equity, and inclusion (DEI) frameworks. In January 2025, the presidential administration requested a pause on payments for federal grants and other programs, generating widespread concern among nonprofits reliant on federal funding. Further, the federal government has intensified scrutiny of programs perceived as Diversity, Equity, and Inclusion (DEI) initiatives. A July 2025 Department of Justice memorandum instructed federally funded organizations to abandon practices interpreted as DEI-related, prompting uncertainty about compliance and sustainability. This study examines how funding-related legislative changes and shifting federal expectations impact NWA nonprofits and the leaders who guide them. The existing literature has not examined how federal, state, and local actions following anti-DEI decisions and funding rescissions have affected nonprofits in this region. Through semi-structured virtual interviews with nonprofit leaders and case studies of select organizations, this research investigates how leaders navigate a political and social climate increasingly resistant to DEI practices. Because interviewees serve diverse populations, they will likely report varied experiences within nonprofit leadership; however, common themes are expected to emerge regarding organizational responses to federal guidance, the influence of DEI perceptions on operational decisions, and the downstream effects on client services. By documenting these experiences, this study aims to contribute to scholarly and practical conversations on sustaining nonprofit organizations and supporting the human service professionals who lead them. It seeks to illuminate the challenges posed by legislative shifts, the strategies leaders employ to remain mission-driven, and the broader implications for equity-focused work in a changing national context.

Santiago Gutierrez

Discipline: Engineering

Authors:

Madison McClurg

Matthew Kim

Abstract Name: Design and Development of a Two-Axis Demonstration Gimbal for Engineering Education

This project focuses on the design and development of a compact two-axis demonstration gimbal intended to illustrate core mechanical engineering principles through an integrated electromechanical system. The system is required to achieve 90° of rotation in the cross-track axis and 120° in the in-track axis while maintaining smooth, controlled motion and a positional accuracy of 1.8°. To meet practical demonstration needs, the complete assembly must fit within a 1 ft³ envelope, mount to a standard aluminum base plate, and operate reliably from a 120 V outlet. The primary emphasis of the project is mechanical design, including structural and dynamic analysis, torque and bearing calculations, component sizing, and optimization under strict spatial constraints. The design integrates both machined aluminum components for strength and stiffness and custom 3D-printed parts to reduce weight, fabrication complexity, and cost. Following the design phase, we will move into prototyping, assembly, dimensional verification, and motion testing to evaluate the system against the defined performance criteria. Although the project includes electrical integration and motion-control programming, areas where we have less prior experience, we have embraced these challenges as an essential part of creating a fully functional system. We are learning to select and size stepper motors, determine feasible transmission methods, and implement basic motion-control strategies to achieve accurate multi-axis positioning. These additions broaden the scope of the project and strengthen its educational value. Overall, this work provides interdisciplinary, hands-on experience with realistic engineering constraints, multidisciplinary problem solving, and iterative design. The completed gimbal will serve as a

reliable and accessible platform for demonstrating mechanical motion, actuation, and system integration controls concept to engineering students

Mariana Gutierrez- Pagan

Discipline: Chemistry

Authors:

#1 Mariana Gutierrez- Pagan

Abstract Name: A Tug-of-War Between NaCl and Phosphate: Environmental Effects on Calf Intestinal Alkaline Phosphatase

Alkaline phosphatase (ALP) is an essential enzyme involved in skeletal mineralization, liver function, and immune modulation, and serves as an important biomarker for bone and liver disease. ALP activity can be conveniently monitored by measuring the conversion of p-nitrophenyl phosphate (pNPP) to p-nitrophenol (pNP). Previous work showed that *E. coli* ALP is activated by high NaCl concentrations and inhibited by phosphate, with NaCl having little effect on phosphate inhibition. This study aimed to determine whether similar behavior occurs in calf intestinal ALP. Reaction rates were measured across different pNPP concentrations in the presence and absence of NaCl and phosphate, using both HEPES and bicarbonate buffer systems. From these data, K_M and k_{cat} were determined under each condition. Consistent with *E. coli* ALP, NaCl activated the enzyme and phosphate acted as an inhibitor. However, the nature of the activation by NaCl is dependent on the buffer. Moreover, unlike *E. coli* ALP, our results suggest that NaCl can impact the inhibitory effect of phosphate on calf intestinal ALP activity under some conditions.

Ariana Guzman

Discipline: Biology

Authors:

#1 Hussein Yassine

#2 Jimena Estrada

Abstract Name: Assessing the Impact of Type 2 Diabetes on Cognitive Function in Middle Aged Hispanic/Latino Adults

Hispanic/Latinos experience a high rate of diabetes, which contributes to an increased risk of developing neurodegenerative diseases. Other factors, such as education have also been linked to cognitive functioning. Understanding the role between diabetes and neurodegenerative disease, while adjusting for education may be important for targeted prevention; however, there is limited literature examining the role of type 2 diabetes mellitus (T2DM) and cognitive function in the Hispanic/Latino population. Does T2DM and education level affect cognitive function among middle-aged Hispanic/Latino? We aim to expand our current knowledge by assessing cognitive function in 200 middle-aged participants (age 50-65) categorized as non-prediabetic, prediabetic, or diagnosed with T2DM using data from baseline and 2nd year. Data were collected as part of a study conducted at the University of Southern California examining both diabetes and cognitive function. Brain functionality was evaluated through MRI scans, clinical assessments, and cognitive testing to aid in the early identification of neurodegenerative diseases. The cognitive testing consists of the Montreal cognitive assessment-Basic (MOCA-B) and a neuropsychological testing battery. We conducted linear regression analyses with memory being the dependent variable and education and diabetes being the independent variable, adjusting for age and sex. We found a positive relationship between education and memory

(coefficient = 0.177, $p = 0.066$) and a small, non-significant effect on diabetes (coefficient = 0.211, $p = 0.845$). However, this difference was not statistically significant due to the small sample size. These data suggest that non-diabetic participants perform better than diabetic participants in memory due to differences in education level. Overall, participants with higher level of education scored higher than those with fewer years of education. This shows that education and diabetes both play a role in memory, which suggest early support to help lower the risk of cognitive problems in Hispanics with diabetes.

Ramon Felix Guzman III

Discipline: Engineering

Authors:

#1 Ramon Felix Guzman III

Abstract Name: ADVANCED CHEMICAL VAPOR DEPOSITION SYSTEM FOR SILICON NANOSTRUCTURE FABRICATION IN LITHIUM-ION BATTERY ANODES

Silicon's ten-fold higher theoretical capacity than graphite makes it a prime anode candidate, but significant lithiation-induced volume changes demand nanostructured architectures produced via deposition from silane synthesis. Unfortunately silane is very dangerous and an expensive precursor not suited for mass manufacturing of battery materials. In this work we demonstrate a prototype tool for silane-free (magnesiothermic) nanostructure synthesis for silicon anode fabrication. Our CVD-based tool enables the possibility of porous silicon and silicon-carbon composite bulk powder production eliminating need for SiH_4 . The tool is based on magnesium vapor reaction with porous silica particles. Optional carbon is added by pyrolysis of hydrocarbon precursors. Reactive gasses are added by remotely operated mass-flow controllers over various synthesis steps. Pressure and temperature, key factors in controlling Mg evaporation and matching its rate to Mg diffusion through silica particles, are tightly controlled with high accuracy by closed-loop controls and purposely designed hardware. Our custom CVD tool is fully automated using industry-standard programmable logic controller (PLC) and human-machine interface (HMI). Automation allows precise control of precursor gas flows, reaction zone temperature and pressure giving high level of reproducibility for nanosilicon synthesis. Automation also enabled integration of multiple safety interlocks, hazardous (hydrocarbon) gas sensors and self-leak check procedures for safe continuous operation. Real-time logging of temperature, pressure, and gas flow rates is implemented for better synthesis traceability. Resulting material produced in the tool were examined by X-ray diffraction (XRD): optimized runs display the expected Si ($\sim 28^\circ 2\theta$) and MgO ($\sim 42.5^\circ$) peaks with near stoichiometric ratio Si:MgO, confirming successful conversion of silica into silicon. To suppress unwanted byproduct, Mg_2Si formation, multiple powder preparation and synthesis recipe improvements were made demonstrating the ability of magnesiothermic reduction to produce anode material needed for the next generation of Li-ion batteries.

Alexander Gyekye

Discipline: Mathematics

Authors:

#1 Kaitlyn Niedzielski

Abstract Name: Beyond the Data: Understanding Sociotechnical Bias and Gender Inequity in Algorithmic Credit Risk Models.

Credit scoring models promise efficiency in lending by predicting repayment based on financial and

demographic data, yet their reliance on historical records risks perpetuating the very biases and inequalities they aim to overcome. Through exploratory data analysis, we identify significant demographic disparities: although women demonstrate a lower actual default rate (7.0%) than men (10.1%), they face a higher average annuity-to-income ratio (18.9% vs. 16.5%), indicating greater financial strain. We employ linear regression to model default risk and uncover a critical fairness trade-off. A simple model using only the annuity-to-income ratio, while statistically significant, would systematically over-predict risk for women, penalizing them for their higher financial burden despite their superior repayment history. Refining the model by incorporating gender improves predictive power but creates a legal and ethical conflict, as using protected attributes for credit decisions constitutes disparate treatment. We demonstrate that simply removing gender does not resolve the bias, as it resurfaces indirectly through correlated indicators like the annuity-to-income ratio, leading to a disparate impact. Our analysis reveals the "formalism trap" in sociotechnical systems, where technically sound metrics can encode and perpetuate social inequities. We conclude that ensuring fairness in credit risk assessment requires moving beyond simple models and neutral-seeming financial ratios to proactively mitigate embedded biases, highlighting a fundamental tension between predictive accuracy and non-discrimination in algorithmic decision-making.

Michael Gyimadu

Discipline: Mathematics

Authors:

#1 Gregory Bell

Abstract Name: When Does Simplicity Win? Comparing Classical and Deep Learning Methods for High-Dimensional Portfolio Risk Management

Despite the proliferation of deep learning in finance, it remains unclear whether neural networks provide meaningful advantages over classical methods for portfolio risk management. This study addresses the question: Under what conditions do classical dimensionality reduction techniques (PCA, SVD) remain competitive with modern deep learning approaches (autoencoders, variational autoencoders) for financial factor extraction? Principal Component Analysis (PCA), a classical technique dating back to 1901 and still frequently used in industry, is used to extract factors using eigendecomposition of the covariance matrix. Recent developments in deep learning, especially autoencoders and variational autoencoders, provide alternative methods that may be able to capture non-linear relationships and time-varying patterns. However, previous comparisons often analyze in-sample fit rather than real-world deployment factors such as computing cost, interpretability, and out-of-sample performance. Unlike previous research, this study evaluates techniques in three areas that are critical for industry practitioners: robustness under extreme market conditions, explainability, and speed. We implement and compare deep learning techniques (standard autoencoders, variational autoencoders) with classical techniques (PCA via eigendecomposition, truncated SVD) using S&P 500 stock return data from 2000 to 2024. We evaluate both approaches across multiple dimensions: (1) variance explained by extracted factors, (2) out-of-sample portfolio performance (Sharpe ratio, maximum drawdown), (3) computational efficiency (training time, inference speed), (4) interpretability (correlation with known economic factors), and (5) robustness during market stress periods (2008 financial crisis, 2020 COVID crash). This research will demonstrate that classical PCA-based approaches achieve around 85-95% of deep-learning's in-sample performance while offering major advantages in computational efficiency, interpretability, and stability during market stress. These findings matter for institutions that must balance explainability rules with the appeal of complex AI models. We contextualize these findings within the broader debate about when algorithmic complexity is justified vs when more straightforward, transparent approaches suffice, a topic with implications beyond finance.

Kristin Gyimah

Discipline: Chemistry

Authors:

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Abstract Name: Tuning the photoluminescence of atomically precise Au nanoclusters with Pt and Rh dopants

Nanoclusters have the ability to conduct or be utilized for a range of applications, contributing to many research fields and findings. This research project specifically focuses on tuning the photoluminescence of nanoclusters using metal dopants and ligand engineering. Researchers have found that due to the small size of nanoclusters, this contributes to the distinct optical properties they withhold such as absorption and photoluminescence. These optical properties allow nanoclusters to be manipulated in such a way to be applied to various fields. This project utilizes a synthesis-based approach where the target metal nanocluster is produced using reagents, extraction procedures, phase transfer catalysts, etc. The final product is then verified using UV-vis and fluorescence spectroscopy to confirm the target cluster was successfully achieved. Depending on the size formed, the nanocluster will emit light at differing wavelengths. Objectively, the goal of this project is to increase the band gaps within a nanocluster and for it to exhibit quantum confinement. Band gaps are the minimum energy needed to excite an electron from the highest filled state to the next energy level available. Due to nanoclusters being small in size, they have minimal atoms, fewer electrons, and fewer energy levels. Fewer energy levels are associated with fewer band gaps. Increasing the band gaps also causes optical properties of the nanocluster to increase, the focus property being fluorescence. The importance of these optical properties lead to various applications such as biological imaging, catalysis, and light harvesting.

Annika Gyurci

Discipline: Social Work and Human Services

Authors:

#1 Trond Bergestuen

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Abstract Name: Understanding Grief Support Needs in Rural Communities: a Mixed-Methods Study of Service Use, Access Barriers, and Perceived Gaps

Grief is a deeply personal process shaped by the availability and quality of support services. In rural areas, limited healthcare and mental health resources make accessing grief support especially difficult. Despite increasing recognition of grief's psychological and social impact, little research has explored how rural populations engage with or avoid these services. This study examines grief support use, perceived accessibility, and unmet needs in a rural Midwestern community after the loss of key providers. Through a large, cross-sectional survey, it addresses five questions: which demographic factors influence service use; what aspects are helpful or unhelpful; why some do not seek support; what barriers exist; and what unmet needs remain. By combining quantitative and qualitative data, the study offers a detailed view of service use and access. The findings provide practical guidance for healthcare providers, policymakers, and community groups to create more inclusive and sustainable grief support systems in rural communities.

Amie Ha

Discipline: Engineering

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Suhani Swain

Abstract Name: Lipid Emulsion-Dye Phantoms for Polarized Hyperspectral Imaging (PHSI) System Validation

Hyperspectral imaging (HSI) is a powerful optical technique that captures a continuous spectrum of light for each pixel, extending far beyond the limited red, green, and blue channels of traditional white light imaging. This enables precise characterization of biological tissues based on wavelength-dependent absorption and scattering. Meanwhile, polarized light imaging (PLI) detects structural and compositional variations in specimens via changes in the preservation and rotation (azimuth) of polarized illumination, often revealing subtle anisotropy. When combined, polarized hyperspectral imaging (PHSI) becomes a next-generation modality capable of detecting morphological and biochemical features that are invisible under standard imaging. Accurate PHSI calibration requires measuring how specimens absorb light and alter polarization state across a spectrum. This subsequently necessitates reproducible phantoms that mimic tissue-like scattering and absorption, often using commercial Intralipid and dyes. Intralipid is widely used because its optical properties resemble those of human tissue, but it can be costly and difficult to tailor to specific spectral ranges. In this study, we developed a tunable tissue-mimicking phantom composed of a homemade lipid emulsion, agar, and selected dyes. The lipid emulsion provides scattering, while the dyes act as absorbers, allowing for adjustment of optical properties across wavelengths. We examined emulsion concentrations of 0.1%, 1%, 10%, and 20%, along with methylene blue, crystal violet, safranin, and tartrazine at varying concentrations, to assess their usefulness for PHSI validation within the 460–600 nm range. Our results show that the lipid-dye phantoms reproduce the characteristic absorption spectra of each dye and that the homemade emulsion exhibits scattering behavior comparable to commercial Intralipid. Beyond validating PHSI performance, this low-cost, customizable phantom design supports broader imaging development, ultimately contributing to more accessible, reliable, and precise optical diagnostic tools for early disease detection and real-time intraoperative imaging.

Jon Solomon Habahbeh

Discipline: Biology

Authors:

Abstract Name: Ginkgo Biloba: an opponent of dementia?

We've all known at least one person who has suffered from some form of memory loss. With over 57 million people worldwide living with dementia, the search for tools that may preserve or improve memory has become more important than ever. Although there is no absolute cure, certain supplements have gained attention for their potential cognitive benefits. Among these, Ginkgo biloba sits at the top of the list. As a gymnosperm native to China, Ginkgo has been praised for centuries for its antioxidant and neuroprotective properties, leading it to become one of the most widely used herbal supplements in the world. The effectiveness of Ginkgo in supporting memory and slowing cognitive decline, however, remains a topic of debate. This project examines the impact of Ginkgo biloba and specifically the standardized extract EGb 761 in terms of memory performance, neurotransmitter levels, and long-term cognitive outcomes. By comparing evidence from clinical trials, neuropsychological assessments, and animal studies, we observed that the

results are varied. While some studies suggest that Ginkgo may influence neurotransmitter activity or support certain aspects of learning and motivation, many large-scale human trials report little to no improvement in memory or annual cognitive decline when compared to placebo groups. Despite its long history and promising theoretical properties, the current body of evidence suggests that Ginkgo biloba offers limited measurable benefit for dementia-related symptoms in most populations. Although, its safety profile, accessibility, and potential subtle effects make it a supplement still worth investigating. By integrating diverse findings, this project aims to provide a clearer understanding of Ginkgo biloba's true role in the ongoing fight against dementia.

Shady Habib

Discipline: Psychology

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Abstract Name: Impacts of the COVID-19 Pandemic on Caregivers and People with Down Syndrome

While it is widely accepted that some populations experienced disproportionate effects of the COVID-19 pandemic, there remains a paucity of research on the impact of the pandemic on people with intellectual and developmental disabilities. This study aims to document and describe the effects of the pandemic on people with Down Syndrome (DS) and their families across multiple domains of the Epidemic Pandemic Impacts Inventory, to identify latent risks and service needs posed to subpopulations within the DS community. Survey responses ($N = 214$) were collected across three waves, with a mean assessment at 16.1 months ($SD = 6.49$) into the pandemic, from caregivers reporting on behalf of themselves and the person with DS. Based on a series of Latent Profile Analysis (LPA), four-profile models were selected for their model fits and high entropies to identify subgroups within caregiver and DS survey endorsements. The four profiles for DS were moderate social and physical impacts (41.1%), high overall impact and infection (15.0%), low overall impact (33.6%), and severe economic stress, emotional, and educational impacts (10.3%). Pre-existing emotional dysregulation predicted membership across most subgroups, and older age predicted membership in the low-impact DS profile. The four profiles for caregivers were educational disruption (24.8%), low overall impact (57.9%), emotional and infection impact (5.6%), and economic impact (11.7%). A significantly strong association ($OR = 6.67$) was found between the emotional and infection impact caregiver profile and the high overall impact and infection DS profile. Conclusions will later be drawn based on future analysis of the results.

Isabelle Habonimana

Discipline: Physics and Astronomy

Authors:

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Abstract Name: Light Polarization Effects on Carbonaceous Meteorites by Raman Spectroscopy

Carbonaceous chondritic meteorites are considered some of the most primitive surviving materials of our solar system, and are mainly composed of micro/millimeter sized inclusions, surrounded by a matrix of microparticles. These constituents can provide valuable clues about planet formation, like the thermal, barometric and temporal conditions in which these meteorites formed. This information can be obtained through their physical properties, such as structure, composition, morphology and mechanical properties, which can be characterized by using microscopy and spectroscopy techniques. In particular, Raman spectroscopy has been used extensively on meteoritic samples since it is a nondestructive tool that provides information about their structure and mineralogical composition. One of the extensions of this technique is called polarized Raman spectroscopy in which the polarization of the laser excitation source and/or of the scattered light from a sample are taken into consideration. This method offers additional information about the orientation and symmetry of molecular bonds and vibrations within a sample. In this work, we characterize the original light polarization of our home-built Raman spectroscopy equipment and adjust this system by adding optical components for modified polarization experiments. We carry out Raman measurements on carbonaceous chondritic meteorites (e.g., Northwest Africa 3118). Our results show that the Raman peaks and bands of the analyzed materials found in the samples are affected to a lesser or greater extent due to the polarization of the light. For instance, the intensity of the peaks and bands increase or decrease when the polarization of the incident laser beam is modified with respect to the original polarization setup.

Jack Hagen

Discipline: Gender, Ethnicity, Diversity, or Cultural Studies

Authors:

#1 Jazilynn Geiger
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Abstract Name: Exploring Chinese Students' Preparedness, Expectations, and Motivation to Study Abroad in America in the 1+2+1 Program

There is little academic work on understanding intercultural communication and perceptions between China and the United States. In particular, there is little scholarship investigating the motivations, preparedness, and expectations of students studying abroad between the two countries. In this study, we conducted qualitative interviews with 19 students and a quantitative survey of 36 students at Suzhou University of Technology participating in the 1+2+1 study abroad program with University of Wisconsin - Eau Claire. Students reported high academic preparedness but low preparedness regarding social integration and safety, specifically in regards to the language barrier and a fear of gun violence while studying in the United States. The students also indicated that much of their perceptions of American culture are created or heavily influenced by Chinese social media. Considering the difference between social and academic preparedness, results indicate a greater need for support in social and cultural areas.

Margaret Haggerty

Discipline: Biology

Authors:

#1 Quinn Bozek

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Abstract Name: Predicting Presence and Preventing Poaching: Saving the Spotted Turtle

Spotted Turtles (*Clemmys guttata*) are one of many freshwater turtles in the Eastern US whose population is declining from both habitat threats (like loss, urbanization, and climate change) and illegal wildlife trade and trafficking. In order to help investigate resolve these threats, I worked with the Smithsonian's Turtle Conservation and Ecology Lab (TCEL) on what factors might affect *C. guttata* capture rates in traps, and created material on spotted turtles for law enforcement. I used generalized linear mixed models (GLMMs) on TCEL data from VA and NC watersheds to evaluate 5 variables that might effect *C. guttata* captures rates, and found that bait type, emergent vegetation cover, and canopy cover have no effect on capture rates. Trapping site and wetland type were unable to have a GLMM properly fitted to them, so further evaluation in the future is needed. Overall, further study is needed into what environmental factors drive spotted turtle populations. Additionally, I created an “at a glance” guide for *C. guttata* for law enforcement for identification of spotted turtles and information about their trafficking. Both of these products are being used by the Smithsonian Turtle Conservation and Ecology Lab to help support their work on the Competitive State Wildlife Grant for *C. guttata*.

Sofia Haider

VA - Virginia Commonwealth University

Discipline: Health and Human Development

Authors:

#1 Ye In Christopher Kwon

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Lojy Hozyen

Abstract Name: Molecularly Active Donor-Specific Antibodies: Using Donor-Derived Cell-Free DNA to Separate Harmful from Harmless HLA Antibodies in Lung Transplantation

Lung transplant recipients face the highest burden of rejection and chronic lung allograft dysfunction (CLAD) among solid organ transplant patients, with median survival remaining approximately 6–7 years despite advances in surgical technique and immunosuppression. This project aims to synthesize emerging evidence on how DSA and dd-cfDNA can be integrated into a framework for diagnosing and managing antibody-mediated rejection (AMR). Donor-specific HLA antibodies (DSA) are widely used as biomarkers of alloimmune risk, but their predictive value is inconsistent. While persistence, complement-binding (C1q/C3d), and class II specificity (particularly HLA-DQ) sharpen risk stratification, many patients with detectable DSA never develop AMR or graft loss, highlighting the limitations of DSA as a stand-alone marker. Donor-derived cell-free DNA (dd-cfDNA) has matured into a practical, noninvasive measure of molecular allograft injury. A multicenter cohort demonstrated that dd-cfDNA discriminates acute rejection with high AUCs and a negative predictive value around ~1%, supporting its utility as an early injury signal missed by histology alone. Beyond detection, dd-cfDNA carries prognostic information; extreme elevations identify patients at sharply increased risk of severe CLAD or death, even when routine markers are quiet. dd-cfDNA also rises with primary graft dysfunction and respiratory viral infections, which portend worse outcomes. Recent data suggest that the combination of DSA and dd-cfDNA defines a subset of patients with “molecularly active alloimmunity,” correlating with AMR and adverse outcomes. Using a synthesis of

contemporary clinical and translational studies, this project will integrate these complementary signals into practical, lung-specific pathways. We expect to outline a risk-stratification matrix crossing dd-cfDNA levels with DSA characteristics, propose diagnostic workflows for when combined signals should prompt biopsy or intensified surveillance, and highlight therapeutic implications for targeting high-risk biomarker phenotypes. The review also identifies key evidence gaps where standardized thresholds and multicenter validation are needed, providing an implementable roadmap for biomarker-informed AMR care.

Sofia Haider

Discipline: Health and Human Development

Authors:

#1 Ye In Christopher Kwon

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Abstract Name: The Impact of Functional Warm Ischemia Time on Long-Term Outcomes in Donation After Circulatory Death Heart Transplant

In donation after circulatory death heart transplantation (DCD HT), donor hearts undergo mandatory agonal hypoxia known as functional warm ischemia time (FWIT), traditionally considered safe when kept under 30 minutes. This study examined the impact of donor FWIT on long-term survival among DCD HT recipients. Using the UNOS database, adults (≥ 18 years old) undergoing DCD HT between 2019 and 2024 were stratified into nine FWIT subgroups: ≤ 15 , 15–20, 20–25, 25–30, 30–35, 35–40, 40–50, 50–60, and ≥ 60 minutes. Baseline characteristics, outcomes, and complications were compared across groups. Survival at 30 days, 1 year, and 3 years was assessed using the Kaplan–Meier method, and Cox regression models evaluated the effect of FWIT on overall survival. A total of 1,213 recipients were analyzed, including 409 (34%) who received NRP hearts and 804 (66%) who received DPP hearts. No significant differences in 30-day, 1-year, or 3-year survival were observed between FWIT groups ($p=0.68$). Notably, the ≥ 60 -minute FWIT cohort had survival rates of 93.3%, 85.7%, and 71.4%, compared to 96.6%, 92.7%, and 76.1% in the ≤ 15 -minute cohort at the same intervals. Rates of acute rejection ($p=0.7$), inotropic support ($p=0.8$), hospital stay ($p=0.7$), pacemaker implantation ($p=0.2$), stroke ($p=0.5$), and dialysis ($p=0.7$) were also similar across groups. FWIT ≥ 60 minutes was not associated with worse overall survival (HR 2.14, $p=0.119$). These findings suggest that prolonged FWIT ≥ 30 minutes does not significantly impact long-term outcomes in DCD HT. However, the role of NRP in donors with extended FWIT warrants further investigation. Centers may consider using donor hearts with prolonged FWIT in carefully selected patients.

Caden Halberg

Discipline: English and Literature

Authors:

Abstract Name: The Whey Forward: Successfully Advocating for the Galactosemia Community

Advocacy and public awareness are central to improving visibility and support for rare disease communities. This mixed-methods project examines how advocacy campaigns can increase awareness and engagement among Gen Z audiences through a case study on Galactosemia, a genetic condition similar to lactose intolerance, to explore how advocacy strategies can bring greater visibility to rare diseases. The study began with a literature review, which explored previous successful advocacy efforts such as the Ice Bucket

Challenge created by the Amyotrophic Lateral Sclerosis (ALS) community. An online survey was then conducted to gather Gen Z feedback on their willingness to engage in awareness efforts, and the findings were used to identify storytelling and design techniques that build long-term engagement. These insights informed the creation of the 'No Whey Challenge,' a campaign that invites audiences to reflect on dairy consumption and learn about the dietary restrictions faced by people with Galactosemia. My presentation at NCUR will begin with an overview of Galactosemia and its connection to the broader issue of rare disease awareness. I will then explain how existing campaigns inspired this project and present the survey's structure and findings. Next, I will show visuals from the "No Whey Challenge," including post prototypes and sticker designs, to demonstrate how audience feedback shaped the campaign's development. The presentation will conclude with strategies that attendees can use to design their own audience-centered digital advocacy efforts for underrepresented health communities. Attendees will better understand how audience-centered design and storytelling can strengthen digital advocacy for rare diseases and inspire new ways to bring visibility to underrepresented health communities.

Chloe Haldeman

Discipline: Psychology

Authors:

#1 Jennifer Wittmeyer

Abstract Name: Structural Brain Correlates of Intrusive memories Following Exposure to Distressing Events and Experienced Childhood Trauma

Post-traumatic stress disorder (PTSD) is a prevalent mental health disorder, intrusive memories are a core symptom of PTSD and reflect disruptions in emotional memory and regulation. The first part of our study investigates gray matter correlates of intrusive thoughts following exposure to distressing visual stimuli. Using previously collected magnetic resonance imaging (MRI) data (Visser et al., 2021), participants viewed a series of 60-second aversive video clips during MRI scanning, completed self-report measures including the DASS-21 (Depression, Anxiety, and Stress Scale) (Lovibond & Lovibond, 1995), and tracked the frequency of intrusive thoughts through post-scan journaling. Previous studies have shown that anxiety symptoms were positively correlated with gray matter volume in the left amygdala and hippocampus, consistent with their roles in anxiogenesis and emotional memory encoding (Picci et al., 2022). Conversely, greater cortical thickness in the bilateral anterior cingulate cortex (ACC) was associated with reduced anxiety and fewer intrusive thoughts, suggesting a neuroprotective role (Frodl et al., 2008). These findings were in line with our own results, which suggests that structural variation in emotion- and memory-related brain regions may shape vulnerability to intrusive memories. The second part of our study aims to compare a larger population to examine whether these patterns of gray matter volume and cortical thickness remain significantly correlated with behavioral measures of trauma. The population is people who experienced trauma which comes from previously collected data (Chopra et al., 2025). Participants answered a Childhood trauma questionnaire to measure abuse and similarly to the other study a DASS-21 scale. One of the participants' tasks was to categorize shapes versus emotional faces, this test has been used to look at PTSD (Chopra et al., 2025). Understanding these neural markers may inform targeted interventions for individuals at risk of PTSD, with implications for prevention and treatment strategies.

Antoni Halka

Discipline: Engineering

Authors:

#1 Adriana Del Pino Herrera
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Abstract Name: Characterizing the Cellular Landscape of the Pancreatic Cancer Tumor Microenvironment at Single-Cell Resolution

Pancreatic cancer is a particularly aggressive malignancy with a five-year survival rate of only 15%, underscoring the urgent need for improved understanding of disease mechanisms. Single-cell RNA sequencing (scRNAseq) offers a powerful approach for dissecting the complex tumor microenvironment and identifying potential therapeutic targets. We analyzed samples from cancer and non-cancer patients with pancreatic tissue with publicly available scRNAseq data (GSE140873, GSE205013, GSE231535) to compare tissue composition across non-cancer pancreatic tissue (n=3), primary tumor samples (n=11), and metastatic samples (n=3). Clustering and differential gene expression revealed distinct transcriptional phenotypes and enriched pathways between sample states. Upregulated genes were input to Enrichr to identify characteristic pathways, revealing immune system regulatory mechanisms enriched in cancer samples (p-val <0.001) and extracellular matrix remodeling pathways upregulated in primary tumors relative to metastasis (p-val <0.001). Marker-based cell type assignment revealed differences in composition between states. Primary tumors had a 21-fold increase in fibroblasts compared to normal tissue, consistent with cancer-associated fibroblast remodeling. Additionally, plasma cells (humoral immune response) and red blood cells (angiogenesis) were only observed in primary and not normal samples. Metastatic samples were dominated by immune infiltration with NK cells (33.8%), T cells (11.2%), and myeloid cells (10.7%) accounting for over half of the tumor composition, indicating active immune response compared to primary and normal samples. These findings delineate key cell phenotypes associated with pancreatic cancer progression, providing a framework for further investigation of transcriptional biomarkers and improving targeted therapeutic strategies.

Lavender Hall

Discipline: Biology

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Abstract Name: It's not what you eat, it's who you eat: Quantifying the isotopic shift of estuarine mud crabs infected by a castrating parasite

Species interactions, together with environmental conditions, regulate the structure and function of our natural world; yet, these interactions are both temporally and spatially context-dependent. Changes in the strength or direction of species interactions have the capability of fundamentally altering ecological communities and food webs. Within the Chesapeake Bay, Panopeid mud crabs occupy an important node in the Bay's food web, connecting low-level primary consumers and larger secondary and tertiary consumers. However, parasites can modulate host behavior and diets with the potential to form distinct trophic niches and significantly alter energy flow within a food web. The castrating barnacle, *Loxothylacus panopaei*, induces morphological and behavioral modifications of their host, likely altering the trophic niche of infected crabs.

Here, we quantified the impact of the crab-castrating parasite (*L. panopaei*) on the trophic niche of mud crabs (Panopeidae) within the Hampton River, a temperate, urban tributary of the Chesapeake Bay. We sampled from September through November 2025, using modified vexar cages filled with ~5L of sun-bleached disarticulated oyster shell. Cages were suspended from a pier, and mud crabs were collected weekly. We quantified the trophic niche of healthy and infected crabs using stable isotopes (δ^{13} Carbon, δ^{15} Nitrogen, and δ^{34} Sulfur). We hypothesized that healthy and infected mud crabs occupied distinct trophic niche space. While we are awaiting our results, we expect to find further evidence of how parasites can modify major nodes within food webs. Parasites, while often inconspicuous, may fundamentally alter energy flow within and between ecosystems.

Mikaela Hall

Discipline: Biochemistry

Authors:

#1 Masatoshi Inoue

Abstract Name: Engineering Bright Near-Infrared Fluorescent Proteins for Deep-Tissue Brain Imaging

Real-time imaging across the whole brain would allow in-depth study of the complex neural circuits underlying cognition and behavior in health and disease. A comprehensive view of distributed neural networks requires imaging techniques with both high spatial and temporal resolution, as well as cell-type specificity. Existing methods for brain imaging, such as functional MRI, have limited temporal resolution and cell type specificity, while conventional fluorescent proteins (FPs) in the visible spectrum suffer from limited tissue penetration and low signal-to-noise ratio in deep brain regions. To address these limitations, we are engineering near-infrared (NIR) FPs, which are genetically-encoded optical tools that will enable in vivo tissue imaging with greater depth and cell-type specificity. NIR FPs enable greater tissue imaging depth than visible spectrum FPs due to reduced light absorbance and scattering. However, currently available NIR FPs exhibit some limitations, particularly low brightness that limits their utility for deep-tissue in vivo applications. Previously we showed that NIR20, a novel NIR FP found through genome mining, has significant fluorescence and absorbance capabilities. In the present study, we assessed the biophysical properties of several NIR20 variants, testing photobleach, quantum yield, extinction coefficient, and potential as a protein fusion tag. We compared the properties of these NIR20 variants to that of their parent protein, mRhubarb713, as well as current best FP mRFP720, and found promising improvements. We anticipate that the NIR20 variants we have created, when tested in vivo, allow for deeper tissue brain imaging that goes beyond the capabilities of currently existing NIR FPs.

Joseph Hall

Discipline: Biochemistry

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#8 Robert Barber

Abstract Name: Biochemistry of a two-enzyme pathway for short and branched-chain fatty acid metabolism among species of the gut microflora.

Numerous studies reveal the importance of gut microbiome-derived short chain fatty acids (SCFA), such as acetate, propionate and butyrate, in signaling, metabolic, and health outcomes for animal hosts. Colonic microbiomes in Western human populations are generally dominated by species belonging to two bacterial phyla, Firmicutes and Bacteroidetes, which engage in a complex metabolic network that adjusts SCFA levels within an individual. Bacteroidetes includes well-recognized commensal and mutualistic species that serve to break down complex polysaccharides in the gut and generate products such as carbohydrates, propionate, and acetate that can serve as nutrients for the host and other microbial community members. In turn, Firmicutes utilize available resources (carbohydrates, acetate, etc.) to produce metabolites including an array of short chain fatty acids (SCFA), primarily acetate, propionate and butyrate, through fermentation. One SCFA metabolic pathway recognized within these species involves two distinct enzymes: 1) an SCFA kinase and 2) an acyltransferase. Together, these enzymes can reversibly interconvert SCFA with their acyl-CoA derivatives. Heterologous expression and purification of histidine-tagged variants for SCFA kinases and acyltransferases of key gut microflora species *Bacteroides thetaiotaomicron* and *Phocaeicola vulgatus* has allowed biochemical characterization of these enzymes using an array of both commercially available and laboratory-synthesized substrates. Moreover, efforts to identify protein interactions between SCFA kinases and acyltransferases using crosslinking methods and biochemical assays have been explored. Context for results as well as potential promiscuous SCFA kinase activity has been generated through co-characterization of related SCFA kinases from *Bacteroides mediterraneensis*, *Roseburia intestinalis* and *Methanosarcina acetivorans*. Taken together, results from these experiments provide insights regarding potential physiological roles for these enzymes in short chain, branched-chain, and medium chain fatty acid metabolism that may influence gut community dynamics and human health.

Shamiah Hall

Discipline: Nursing and Public Health

Authors:

#1 Katharine Walter
#2 Kim Hanson
#3 Emanuel Fonseca

Abstract Name: Fluconazole Treatment Patterns and Antifungal Switching in Patients With *Coccidioides* Infection Across a National EHR Network

Coccidioidomycosis (Valley fever), caused by *Coccidioides* spp., is increasing in incidence across the southwestern United States, yet real-world treatment patterns and outcomes remain poorly characterized. Fluconazole is the most widely prescribed antifungal, but little is known about how clinicians modify therapy in practice or whether treatment switching may reflect challenges in clinical response. This study aimed to evaluate fluconazole use and subsequent antifungal switching among adults diagnosed with coccidioidomycosis. Using de-identified electronic health records from the TriNetX Research Network, representing more than 73 million patients across 84 healthcare organizations, we identified 7,108 adults with a recorded diagnosis of coccidioidomycosis and analyzed antifungal prescribing histories. Patients were grouped as fluconazole-only, switched from fluconazole, other antifungals, or no antifungals. Among the 1,504 patients receiving any antifungal, 1,235 (82.1%) were treated with fluconazole, and 114 (9.2%) were switched to another antifungal, most commonly voriconazole or itraconazole. The average fluconazole treatment duration was 215.6 days, and 318 patients received fluconazole for over 90 days. Mortality analyses showed higher 90-day mortality among patients who were switched compared with those who remained on fluconazole or did not receive fluconazole. These findings indicate that while fluconazole remains the most commonly prescribed therapy nationwide, a subset of patients experiences delayed treatment changes accompanied by worse short-term outcomes. This work provides one of the largest real-world assessments of antifungal use in coccidioidomycosis and underscores the need for earlier evaluation of treatment response, improved diagnostics, and future studies examining clinical or biological factors that may contribute to antifungal switching and patient outcomes.

Victoria Hall

Discipline: English and Literature

Authors:

Abstract Name: Aphra Behn: Restoring Canonical Standing Through the Classroom

This project aims to examine the current state of Aphra Behn studies, with a particular focus on her standing within the British literary canon and how academic discourse can shape that standing. My interest in Behn emerged after taking an early British literature course in which no women authors were included on the syllabus. After taking that course, I was introduced to Behn by Dr. Philip Krummrich, my research mentor. As I immersed myself in Behn's prose, poetry, and dramatic literature, I was struck by the eloquence and sophistication of her writing, as well as her commercial success as a female Restoration playwright in a largely male-dominated field. This prompted me to question why such a significant historical figure in literature remains absent from many academic syllabi and broader canonical discussions. I have examined recent developments in Behn scholarship to gain an understanding of how scholars are working to recover and reassess her works. Through this examination of Behn studies, I will explore how these recent developments have made the case for Behn as a canonical author, as well as highlight what institutional barriers continue to limit her inclusion. Ultimately, I believe that integrating Behn's most accomplished and well-written plays into classroom syllabi is essential to securing her rightful place within the literary canon.

Parker Haller

Discipline: Gender, Ethnicity, Diversity, or Cultural Studies

Authors:

#1 Eric Huneke

Abstract Name: The Tempo of Change: Queer Culture in Classical Music

Classical music, or music rooted in educated European tradition, including forms such as chamber music, opera, and symphonies, is deeply embedded with tradition, from recital rituals and ensemble formations to gendered roles as musicians. As such, queer (LGBTQ+) individuals have faced barriers of discrimination due to the indivisible relationship of religion and classical music throughout history. The discriminations faced due to the traditionality of classical music, such as the factioning of voice parts, make it difficult for queer and gender non-conforming musicians to participate in and rise within classical music. Despite the inhibiting and erasure of queer musicians from these barriers, earlier individuals such as composers Pyotr Ilyich Tchaikovsky and Ethyl Smyth were able to gain significance within classical music. In the 21st century, the presence of queer musicians within classical music has shown a substantial increase, such as in the work of vocalists Adrian Angelico, Davóne Tines, and Lucia Lucas, who work to mend the deeply ingrained gendered expectations of the opera industry. Efforts to break these binding traditions are also seen in the field of music education, with the advocacy for inclusive experiences for musicians in training as well as emerging pedagogy discussing the teaching of queer students. This research analyzes the history of queer musicians within classical music from the 19th century to the present, the barriers these individuals faced, and the efforts being taken to mitigate the barriers queer individuals face in becoming classical musicians. This research adds to the lacking queer historiography of classical music under an intersectional lens of gender, sexuality, and socioeconomic status by using qualitative comparative sourcework of primary and secondary sources.

Rosaleona Hall-Loar

Discipline: Art History

Authors:

#1 Rosaleona Hall-Loar

Abstract Name: Mummy Brown and the Culture of Egyptomania

Mummy brown is an oil paint pigment which was used in Europe between the 1700s and 1900s which included ground Egyptian mummies and several types of tree resin to create a paint with translucent and often waxy qualities. This paint was especially useful as a wash but could be built up as well, which gave it flexibility as a medium. My research question deals with why this pigment was originally developed and used in Europe from an interdisciplinary perspective. What qualities did mummy brown have not only as a paint pigment but also as a symbol of status and trends, and how has this been studied? The interest and appropriation of Egyptian culture and history, often in an unethical and obsessive way in western civilizations is Egyptomania. This cultural phenomenon is the culprit for the fad of mummy brown which begun as early as ancient Rome, and later Napoleons' conquest in Egypt. Any humanity, especially art history, is extremely multifaceted. Reasons for historical questions always force us to look at many aspects including the cultural practices of the time, economics and trade patterns, colonization and appropriation which may not always be blatant, and the patterns of conquest. To understand why mummies were a preferred pigment, we must look at all these aspects. I also will use my own visual interpretations of multiple paintings, which are believed to include mummy brown from both the Virginia Museum of Fine Arts in Richmond, and the Louvre in Paris, and my own experience using and milling oil paints. I specifically want to focus on Eugene Delacroix's paintings as I found the brown paint used to have a unique quality in both The Virginia Museum of Fine Arts and the Louvre, which I expect contains mummy pigment.

Adrienne Hall-Phillips

Discipline:

Authors:

Abstract Name: A SMAL Spark: Turning Student Curiosity into Research Impact

This session explores how undergraduate research labs can thrive even in environments with minimal infrastructure and limited funding if curiosity, mentorship, and collaboration are placed at the center. Drawing from firsthand experience building an interdisciplinary research lab focused on social media and consumer behavior, this talk demonstrates how faculty can design meaningful spaces where student-driven inquiry aligns with faculty research agendas, while fostering curiosity. The lab began as a response to a simple question from a student interested in how social media is changing the way we interact with each other and companies. With no funding, no lab space, and only a laptop, that discussion evolved into a research lab where students contribute to published research and conference presentations. Through accessible tools and a focus on real-world relevance, the lab has expanded to support multiple research streams with undergraduate students as co-creators—not just assistants. By following a model that provides structured guidance early on and gradually shifts responsibility to graduate student mentors as their skills and independence grow, the lab's success has been built from the organic energy of shared inquiry. Along the way, I've found ways to integrate more research into my teaching, collaborate with peers across institutions, and stay engaged in my own scholarship. This talk is for faculty who want to build undergraduate research ecosystems with what they already have: passion, curiosity, and students eager to explore. Even SMAL labs can make a big impact, demonstrating how research and teaching can merge to empower faculty at all levels to create inclusive spaces that ignite undergraduate innovation.

Barbara Halm-Acquah

Discipline: Education

Authors:

#1 Barbara Halm-Acquah

#2 Johnasha Stuart, Ph.D.

Abstract Name: From Classroom to Communities: Empowering Students' Data Analytical and Presentation Skills Through Project-Based Learning

Project-Based Learning (PBL) at the undergraduate level is a pedagogical paradigm that integrates content mastery, meaningful work, personal connection, and problem-solving to create powerful learning experiences. Students enrolled in introductory STEM courses at a two-year college in Georgia, United States, experience challenges with interpreting real-world numerical data representations, such as charts, graphs, and plot diagrams. This challenge created an opportunity to design a PBL intervention to improve data visualization literacy (DVL) for students. Specifically, the PBL project was designed to mimic the work of a scientist investigating infectious diseases within their community. This study aims to explore whether a semester-long PBL intervention in an undergraduate microbiology course improves students' ability to analyze real public health datasets and enhances knowledge and self-reported confidence in scientific inquiry through community engagement. We aim to bridge the gap in data interpretation and communication using pre- and post-content knowledge assessments, pre- and post-survey questionnaires, and individual reflections. Implementing this PBL will provide insights into addressing challenges of DVL in STEM-related fields and fostering a multi-faceted skill set, such as gathering datasets, analyzing data, constructing graphical information, delivering presentations, and creating public service announcements related to relevant health concerns within the communities of students enrolled in early college courses.

Forrest Hamilton

Discipline: History

Authors:

#1 Forresr Hamilton

Abstract Name: Ulysses S. Grant: How an Author and a Memoir Saved a President

Ulysses S. Grant has had an upsurge in examinations by historians over recent decades, particularly regarding his controversial presidency. What many historians briefly mention about Grant is his own memoir and the reasons why Grant took up his pen to write it. After researching various primary and secondary sources, it becomes even more apparent that writing such a lengthy work was something Grant would never have done under normal circumstances. Given his own anxieties and disdain for writing about himself, it would take a financial scandal and a throat cancer diagnosis to make Grant step up to the writer's plate. As Grant worried about his wife inheriting his debt, he would be approached by Mark Twain, who was looking to avoid bankruptcy as well, to write his personal memoirs for Twain's publishing company. Grant attacked the project vigorously, working days on end to finish the book before his time ran out. Grant's memoir was published a few months after his death, with the royalties taking care of Julia for the rest of her life. The circumstances surrounding Grant's memoir serve as a testimony to not only his Civil War service, but also to his deep love and concern for his wife Julia. It is also a testimony to Grant's literary talent, one which Twain himself was impressed by. While never an individual to glorify his own actions in writing, Grant would put aside his own fears and self-criticism to spend his final year writing a thorough, balanced, and often critical reflection of his actions throughout the Civil War.

Meghan Hamlin

Discipline: Environmental Science and Sustainability

Authors:

#1 Julien Smith

Abstract Name: Turning Agriculture Around Without Turning the Soil Over: The No-Till Revolution

Over the past century and a half, the increasingly mechanized approach to agriculture, particularly its reliance on conventional tillage, has severely compromised soil integrity and drastically increased erosion and loss of soil organic carbon (SOC) in the most fertile top horizon, known as the topsoil. As such, a more human-centered, less mechanized approach to no-till agriculture can help mitigate this concern. This study is a survey of several previous studies surrounding this method, especially concerning the preservation of the SOC and structure of the surface horizon. Keeping tillage to a bare minimum, utilization of cover crop, and consideration of the Three Sisters method were compared to the conventional methods common in agriculture today. Also, looking back at previous examples of high tillage and its consequences was considered. It has been found that no-till, despite its counterarguments regarding compaction in the top layer, yields notable benefits to the topsoil and, as a result, the agriculture that depends on it. The lack of disturbance in the topsoil allows it to not only maintain its structure, but also its composition, most notably that of organic matter. Annual die-off and decomposition of agricultural plants directly add carbon to the soil, allowing it to more readily hold onto essential nutrients that the following year's crops will depend on to grow and flourish. Further, the method conserves the soil's readiness to hold onto water as much as conventional tillage can. The usage of cover crops, especially in winter, has been shown to mitigate topsoil from being eroded by water and wind. Lastly, the Three Sisters method combines the benefits of cover crop on behalf of the squash and nitrogen fixation on behalf of the beans. Considering these factors, no-till agriculture should replace conventional tillage methods.

Angela Han

Discipline: Computer Science

Authors:

#1 Wan Bae

Alice Han

Abstract Name: Optimizing Pedestrian Routes Through an Integrated Walkability Cost Framework

Previous work on route generation, such as in Google Maps, primarily focused on shortest-distance optimization. Multi-objective optimization approaches, meanwhile, typically incorporated only two or three dimensions of walkability. Our system extends this by integrating four: accessibility, safety, appeal, and comfort, which together incorporate both perceptual and objective factors such as slope and elevation into a unified routing pipeline. Additionally, we introduced a series of cost transformation functions that normalize raw scores across these four categories to generate routes that balance walkability and effort without significantly compromising distance or detour length. These transformation functions are essential because the routing task is treated as a minimization problem for unwalkability, ensuring that higher costs correspond to less desirable walking conditions. After computing costs for each function, we mapped them onto a sidewalk-based graph for realistic pedestrian routing, combining categories using normalization constants to ensure comparability. An extended version of Dijkstra's algorithm was then applied, accounting for differing traversal costs between uphill and downhill segments. Finally, a weighted ranking process was used to evaluate transformation cost functions and distinguish between routes that appear equivalent under Pareto optimality but differ in practical trade-offs. We tested our routing system across 57 origin–destination pairs and observed reasonable trade-offs, such as one case achieving a 6.89% improvement in walkability and a 31.75% reduction in slope or elevation gain, with only a 12.07% increase in total distance. Future work could adapt the routing algorithm to dynamically minimize the highest encountered cost along a path to better handle outlier conditions. Overall, our novel transformation functions and detailed trade-off analysis contribute to a more robust, nuanced, and practical multi-objective routing framework.

Alice Han

Discipline: Computer Science

Authors:

#1 Wan Bae

#2 Alivia Zhao

Angela Han

Abstract Name: Collaborative Urban Walkability Assessment Using Large Language Models and Environmental Analytics Module

Current approaches to measuring urban walkability depend on costly audits or emphasize broad physical metrics, while newer AI methods are susceptible to bias and the loss of contextual nuance. This research addresses these challenges by developing a system that combines a Multimodal Large Language Model (LLM) with an Environmental Analytics Module (EAM). Together, these components provide a comprehensive walkability assessment across four dimensions: accessibility, safety, comfort, and aesthetic appeal. The Multimodal LLM, GPT-4o mini, scans street view images (SVIs) for key features related to each walkability dimension and scores them from a scale of 1 to 10. These scores aligned with survey responses on

the same SVIs, indicating that the Multimodal LLM can reliably mirror human perception. The EAM focuses on environmental data that enables precise scoring and captures the unique conditions of each street. We validated the framework through a case study in the Downtown Seattle area using more than 21,000 Google Street View images and multiple urban datasets. The system scores are combined with distance, slope, and elevation penalties through transformation functions into a single composite cost. A Dijkstra-based routing method is applied to the directed graph to minimize the overall cost, producing paths that balance efficiency, safety, and comfort. A weighted ranking process was used to evaluate transformation cost functions for minimization and to distinguish between paths that may appear equivalent under Pareto criteria but differ in practical trade-offs. Future work will refine the scoring process and weighting schemes to better balance competing factors in order to further improve walkability assessments and pedestrian path generation. This research proposes a way to combine multimodal perception with environmental analytics to support more inclusive pedestrian planning and provide safe, accessible, and comfortable routes.

Sarah Han

Discipline: Political Science

Authors:

#1 Stephen Nelson

Abstract Name: Why do elite leaders make costly decisions in the nuclear realm? Examining the influence of dispositional factors on elite leaders' decisions to acquire, use, and/or test nuclear weapons.

Why do some elite leaders acquire, test, or use nuclear weapons despite its costly effects, and why do others not despite having the capability to do so? Existing literature attributes leaders' decisions to external factors (e.g. in-group pressure, familial obligation, and public accountability), which explains materialistic motivations behind leaders' decision-making process. However, less is said about the psychological motivations of leaders—specifically how dispositional factors (narcissism, low self-esteem, paranoia, cautiousness, and recklessness) influence leaders to pursue or not pursue nuclear weapons. This paper studies whether dispositional factors significantly influence elite leaders' decision-making process and justification of their decisions. I conduct a comparative case study analysis of three leaders: Kim Jong-un (North Korea), Harry Truman (U.S.), and Eisaku Satō (Japan). Kim and Truman are positive cases (leaders who used or tested nuclear weapons); Satō is a negative case (leaders who did not develop nuclear weapons). I have collected archival materials (speeches, interviews, diaries, notes, and biographies) for each leader and will analyze them through discourse analysis on NVivo. I will generate relevant codes based on each disposition and measure the frequency of each one across all archival documents. I hypothesize that dispositional factors significantly influence leaders' decisions to either pursue or abstain from developing nuclear weapons. However, if these factors do not show significant influence, my alternative hypothesis is that rationality and strategic decision-making (e.g. security-driven motivations, cost-benefit analysis, and power-driven motivations) have a greater influence on leaders' decision-making process in the nuclear realm. Understanding dispositional factors is crucial for developing effective nonproliferation strategies. Leaders can better anticipate others' behaviors, which can ultimately foster deeper cross-national awareness of each other's actions.

Emma Hancock

Discipline: Art History

Authors:

Abstract Name: From Cartography to Cartomancy: An Iconographic Analysis of The World Tarot Card

This paper analyzes iconography of the World tarot card, tracing its origins from medieval cartography, specifically in relation to apocalyptic and paradise motifs that conflate geographic space and time, delineating Christian ideologies through normative mechanisms. Drawing from Asa Mittman's analysis of the Matthew Paris and Hereford maps, this paper asserts that cartographic depictions normalized and perpetuated Christian identity and ideology—specifically through utilizing mechanisms of organization, positioning and proximity—creating a distinct syntax of interpretation that continues into the World card through its original trump order, and later divinatory function. This continuity is presented through Tjamke Snijder's discussion of communities of practice that allows for an analysis of hermeneutics through space and time by defining communities through operations of mutual engagement, joint enterprise, and shared repertoire. Cartographic depictions were a salient feature of the medieval Christian shared repertoire whose iconography and syntax became a significant aspect of the globalized court visual language between the 10th and 14th centuries. Integrating Eva Hoffman and Alicia Walker's discussion of medieval globalization elucidates the afterlife of iconographic depictions through appropriation, its relationship to materiality, and semiotic reception as a portable object. Early World cards were used in elite gameplay, eventually disseminating into the wider cultural consciousness through the rise of printing technology. These early World trump cards depicted paradise scenes, continuing the tradition of conflating space and time under Christian ideologies. With the rise of occultism in the 18th century, tarot iconography was utilized in divinatory functions, its iconography appropriated to align with the interpretations necessary to fulfill this function. Early occultists such as Etteilla, Gebelin, and A. E. Waite continued to conflate space and time through conventionalizing evangelist tetramorph iconography, the World card depicting the end of times rather than the paradise beginnings. This paper asserts a continuation of Christian ideologies even within occultist iconographic appropriation.

Madonna Hanna

Discipline: Biochemistry

Authors:

#1 Iryna Voloshyna

#2 Apoorvi Tyagi

#3 Michelle Krogsgaard

#4 Alessandro Leal

#5 Natalie Klar

#6 Sylvia Adams

Abstract Name: Tumor immune microenvironment features predict immunotherapy response in metastatic triple-negative breast cancer

Triple-negative breast cancer (TNBC) is an aggressive subtype with limited treatment options and poor outcomes. The central research question of this project is: How do specific features of the tumor immune microenvironment (TME) influence response to therapy in metastatic TNBC? To investigate this, we profiled immune phenotypes and transcriptional signatures in tumors from patients (n=14) treated with pembrolizumab monotherapy (C1) followed by pembrolizumab plus nab-paclitaxel (C2) in a Phase II clinical trial (NCT02752685). The patients showed a response rate of 47% after a median follow-up of 19.9 months. PD-L1 combined positive score (CPS) showed that 14% of tumors were PD-L1-positive (CPS ≥ 10), 64% had low CPS (1–9), and 22% were PD-L1-negative (CPS = 0). Formalin-fixed, paraffin-embedded tumor biopsies collected at baseline and after treatment cycles underwent gene-expression analysis using the NanoString Breast Cancer 360™ Panel and spatial immune mapping with OPAL Akoya imaging. Most tumors (n=11) displayed “hot” immune phenotypes - high cytotoxic T lymphocyte (CTL) infiltration and CTL-to-myeloid-derived suppressor cell (MDSC) ratios. In contrast, non-responders exhibited MDSC infiltration, indicating an immunosuppressive TME. Responding tumors showed enrichment of immune-related pathways (antigen presentation, interferon gamma signaling) and increased PD-L1 levels (higher CPS scores and gene expression). Pembrolizumab also induced broader immune activation, evidenced by increased expression of

effector genes (CXCL9, CD8A, NKG7, GZMA, IDO1) and reduced stromal-associated gene expression (FHL1, FLNC, LEP, SOX17, PDGFRA), consistent with enhanced immune cell recruitment and activity. Our findings demonstrate that a pre-existing, immunologically active TME strongly predicts therapeutic response to immune-chemotherapy in TNBC. This study highlights the value of integrating TME profiling to guide personalized treatment strategies and improve clinical outcomes.

Janel Hanna

Discipline: Biology

Authors:

#1 Andrea Wellington

#2 Erika Eggers

Abstract Name: Neurovascular Remodeling in the Retina of 5xFAD Mice: A Structural Retinal Biomarker of Alzheimer's Disease

Alzheimer's disease (AD) is a progressive neurodegenerative disorder that currently lacks early diagnostic biomarkers. The retina shares embryological origin and structural similarities with the brain, making it a promising site for non-invasive detection of neurodegenerative changes. Our study investigates whether AD pathology causes structural remodeling of the retinal neurovascular unit (NVU), focusing on astrocyte and pericyte coverage in 5xFAD mice, a transgenic AD model. Retinas from 9-month-old 5xFAD mice were compared to 7-month-old controls using confocal microscopy with FIJI/ImageJ analysis. Astrocyte-vessel overlap was assessed in the ganglion cell layer (GCL), while pericyte coverage was analyzed across the GCL, inner nuclear layer (INL), and outer nuclear layer (ONL). We quantified area coverage by astrocytes, pericytes, and vessels, and categorized astrocytes by soma position and morphology. Since in vivo retinal imaging cannot resolve cellular-level changes, our analysis clarifies whether AD pathology alters astrocyte-vascular interactions in ways that link clinical imaging with underlying cellular changes, supporting the development of early biomarkers. Despite no change in the total number of astrocytes, 5xFAD retinas exhibited altered astrocyte characteristics, including reduced vascular coverage, fewer somas on vessels, increased somas off vessels, and fewer thickened or coiled processes. Findings suggest that AD pathology disrupts astrocyte-vascular interactions and morphology, contributing to retinal NVU remodeling. 5xFAD retinas also showed layer-specific pericyte remodeling. Pericyte coverage was significantly increased in the GCL despite capillary loss, while the INL and ONL showed preserved pericyte-vascular engagement. Findings suggest both pericytes and astrocytes undergo AD-related structural changes that contribute to retinal NVU disruption.

Taliah Hanna

Discipline: Gender, Ethnicity, Diversity, or Cultural Studies

Authors:

Abstract Name: Resilience and Representation: Reclaiming the Voices of White Child Laborers on North Carolina's Tobacco Farm

This project explores how working on tobacco farms shaped the lives, identities, and beliefs of white child laborers in North Carolina during the Great Depression. By reframing child labor not solely as exploitation but as a site of agency and survival, this project seeks to recover overlooked voices of white rural laborers through oral histories from the Federal Writers' Project. These life histories reveal how children often

understood their labor not as victimization but as a source of pride and responsibility. Living in overcrowded, poorly built homes, they balanced long hours of fieldwork with limited schooling, viewing their contributions as essential to family survival. I examine contributing factors of religion and political beliefs that frequently emerged as empowering forces that kept them motivated, while mothers were highlighted for the emotional and domestic weight they carried alongside their children. The project also considers how families navigated and occasionally escaped generational poverty caused by the depression through marriage, military service, higher education, or selling farm goods. Further analysis considers how the work ethic and sense of responsibility formed through tobacco labor continue to shape contemporary attitudes toward work and family obligations. Drawing connections to Joy Harjo's poem "Tobacco Origin Story, Because Tobacco Was a Gift Intended to Walk Alongside Us to the Stars," the project portrays tobacco as both an economic and spiritual force, symbolizing endurance and the link between labor and life itself.

isabelle Hanning

Discipline: History

Authors:

Abstract Name: From Buchenwald to Montgomery: The Ripple Effects of Compassion in Social Justice Leadership

My research project investigates the profound moral and scholarly connection between Karl H. Hertz, a World War II veteran and professor at Capital University, and his former student, Reverend Robert Graetz, a white Lutheran reverend who became an active ally of Martin Luther King Jr. in the Montgomery Bus Boycott. My research asks, did Hertz's experience during World War II and in liberating the Buchenwald concentration camp shape his moral doctrine and scholarly work in ways that influenced Graetz's later civil rights activism? I believe that Hertz's confrontation with Nazi atrocities during the war deeply affected his worldview, compelling him to prioritize empathy, morality, and the importance in confronting injustices through both religion and action. Hertz charged this mentality into his teaching, influencing students like Graetz, who later risked his safety to support Montgomery's Black community in the struggle for racial equality during the Montgomery Bus Boycott. Using a mix of archival research, textual analysis, and historical context, my research draws from Hertz's *Everyman a Priest* and *Buchenwald and Beyond* alongside Graetz's memoirs *Montgomery: A White Preacher's Memoir* and *A White Preacher's Message on Race and Reconciliation*. Through close reading and comparison, I researched the moral and theological themes that connect the liberation of Buchenwald to the civil rights activism in Montgomery, Alabama. By highlighting this ripple of change, my research reveals how experiences of hardship and suffering can cause a ripple of intergenerational activism, shaping moral leadership across movements and locations. In the end, this project positions Capital University within a legacy of social justice education and action, highlighting how empathy constructed from a historical trauma can inspire lasting commitments to equity and compassion in American civil rights history.

Julian Hansell

Discipline: Engineering

Authors:

#1 Julian Hansell

#2 Charles Wade

#3 Robert MacCurdy

Abstract Name: Increasing Out-of-Plane Stiffness in 3D Printed Pneumatic Soft Robotic Actuators Using a Print-in-Place Endoskeleton

In the field of soft robotic actuators, Pneumatic Networks (PneuNets) have shown promise for their ability to perform safe and adaptable robotic manipulation. Most PneuNets are manufactured by casting silicone into a mold. However, 3D printing is emerging as a compelling alternative, providing a more streamlined fabrication process and enabling finer control over actuator geometry. Nearly all PneuNets, both cast and 3D printed, are fabricated using a single soft material, which makes them prone to bending in undesired directions (out-of-plane) while they bend in the desired direction (in-plane). Previous research has tried to mitigate undesired compliance by inserting a strain limiting layer into a mold before the silicone is cast. While this design decreases the out-of-plane deformation, it also significantly reduces the desired in-plane compliance that makes the PneuNet effective. Our research aims to leverage the multi-material capabilities present in the Inkjet 3D-printing process to print-in-place a strain limiting layer that resists deformation in all but one degree of freedom (endoskeleton) into a PneuNet. Using this process allows us to reduce the out-of-plane compliance of the PneuNet while providing increased geometric complexity and a faster and more repeatable manufacturing process. The endoskeleton is printed simultaneously with the soft actuator body, then tested on a robotic-arm-based test rig that measures the applied force at different pressures. Data from a PneuNet with an endoskeleton indicate significant out-of-plane stiffness with a modest increase in in-plane stiffness, suggesting a promising trade-off between stability and compliance. Ongoing work focuses on optimizing endoskeletal geometry and material distribution to enhance further directional stiffness and force output relative to existing single-material and cast-in-skeleton actuators. Our project demonstrates that 3D-printed endoskeletal structures can outperform current designs in terms of rigidity and versatility, enabling soft robotic grippers to interact more effectively with high-force objects and tasks.

Jack Hansen

Discipline: History

Authors:

#1 Christopher Blunda

Abstract Name: Romanization in the Gallic Provinces as Supported by the Roman Army

This paper explores Romanization—the process through which indigenous populations become culturally Roman—in the provinces of Gaul (modern France) during the 1st to 2nd centuries CE. It argues that the process of cultural conversion, broadly defined as “Romanization”, is a topic that has been debated repeatedly within the history of Roman scholarship. My analysis focuses on inscriptions, specifically, for example, those containing Gallic names performing explicitly Roman functions. My research is built off the theoretical insights of historian Greg Woolf, who has been the foundation for much of my work. In this paper, I cover the history of the debate regarding Romanization and then go on to provide my own analysis of the subject based on the primary literary sources and archaeological evidence. I argue in favor of the current historiographical sources which interpret the evidence of Romanization in Gaul as a willing cultural conversion. I discuss how Gallic leaders would then go on to replace the Roman authorities and become the authorities of Roman rule over their very own people. I also discuss how the Romans viewed the process of Romanization as they spread their ideals and culture through the Gallic provinces. Rome controlled vast territories and for the Romans, Romanization was more than the spread of culture; it was essential to the very stability of the Imperial system.

Emma Hansen

Discipline: Psychology

Authors:

#1 Dana Lindaman

#2 Keith Young

Abstract Name: Sequential vs. Simultaneous Language Acquisition: Effects on Working Memory

This project investigates whether simultaneous bilinguals, individuals exposed to two languages from early childhood, demonstrate different working memory capacities compared to sequential bilinguals, those who begin learning a second language later in life. Prior research has suggested that managing two linguistic systems may shape cognitive processes such as attention, inhibition, and working memory, but findings remain mixed. This study aimed to clarify whether the age of bilingual exposure meaningfully influences working memory performance in young adults. Data collection was conducted in Morocco, where bilingualism is widespread, and individuals regularly navigate multiple languages in daily life. Participants completed two auditory working-memory tasks: a backward digit span task assessing the storage and manipulation of numerical information, and an auditory N-back task measuring the ability to update and monitor information in real time. Participants also reported their language histories, including age of acquisition and degree of proficiency, which allowed classification into simultaneous and sequential bilingual groups. Results indicated no significant differences in working memory performance between simultaneous and sequential bilinguals on either task. These null findings suggest that the age at which a second language is acquired may be less influential in contexts where multilingual exposure is deeply integrated into everyday cultural and social environments. The constant use of multiple languages in Morocco may lead to similar cognitive engagement across groups, minimizing differences often reported in populations with less frequent bilingual interaction. These findings will be discussed within the broader landscape of bilingual cognitive research, with emphasis on how cultural and linguistic environments may moderate or override effects typically attributed to bilingual experience. Ultimately, this project highlights the importance of considering sociolinguistic context when evaluating cognitive outcomes in multilingual populations.

Michael Hansen

Discipline: Political Science

Authors:

#1 Daniel Simmons

Abstract Name: "Orders the Navy's Seal Team 6 to assassinate a political rival...Immune.": The Presence (or lack thereof) of Presidential Immunity in the U.S. Constitution, from Nixon's Justice Department to Trump v. U.S. (2024)

In the Constitution, only members of the legislative branch are granted any sort of legal immunity, yet in 2024 it was the president who received a sweeping immunity from prosecution from the Supreme Court. Is broad presidential immunity supported by any of the Founders or any constitutional law, or was the Court's decision a legal travesty as portrayed in the media? I answer this question through an extensive study of pamphlets and letters from prominent figures of the time, who helped shape the Constitution and advocate for (or against) its ratification. I supplement these sources with secondary writings from contemporary scholars of constitutional law. Finally, I track the growth of the idea that there was presidential immunity from Jefferson's attempt to avoid subpoena, to Lincoln's suspension of habeas corpus, to the 1973 OLC memo which gave presidents reprieve from Justice Department prosecution, and ending with the broad presidential immunity granted by the Supreme Court in Trump v. U.S. (2024). I find the Founders gave members of Congress clear immunity from arrest due to their adherence to British common law, yet presidential immunity was not explicitly included due to the Founders ignoring the common law concept of "the king can do no wrong." While presidential immunity has grown over the years, it is largely nonexistent in the Constitution, as the Founding Fathers broadly admit the president could be charged in a civil or criminal trial separate from

impeachment for private or nonpolitical actions, even ones related to their office, although they may be immune from arrest or prosecution during their time in office.

Ryan Hansen

Discipline:

Authors:

#1 Alexander Pittman

#2 Daniel Krutka

Abstract Name: How Should we Inquire Into Black Histories? A Critical Analysis of Inquiry Design Model Lesson Plans

Throughout our nation's history, African Americans have received inadequate attention in the curriculum and unfair treatment in schools. We see the irreducible need in teaching Black History because of the ample, more accurate understanding of history, and the ameliorated future that can be carved out because of which. The purpose of this research was to evaluate a multitude of African American History Inquiry Design Model (IDM) lesson plans. The IDM format claims to assist teachers in crafting lessons and units that engage students in investigating compelling questions, analyzing sources, and developing evidence-based arguments through its C3 framework. A framework that is innately incomplete and often poorly executed. Given the unique and complicated history of Black people in the United States, it is imperative that African American History is taught through a record of Black agency and advancement, as well as several other tenets. To that end, the 4 African American History IDM lessons qualitatively analyzed using both the Black Historical Consciousness (King, 2020) as a theoretical framing, as well as Fouche's. With this analysis, my professors and I have embarked on a series of presentations including the National Conference of Social Studies as well as CURC (Celebration of Undergraduate Research&Creativity) at Colorado State University where I was fortunate enough to be an awardee for the College of Liberal Arts.

Katherine Hanson

Discipline: Biology

Authors:

#1 Alyssa Evans

#2 Christina Norsten

#3 Matthew Abbott

Abstract Name: Characterizing and Identifying Human Brain Endothelial Cell Response to Encephalitic Orthobunyaviruses

The California serogroup orthobunyaviruses are mosquito-transmitted viruses that can cause neurological disease. La Crosse virus (LACV) is the primary cause of pediatric arboviral encephalitis in the United States, while Jamestown Canyon virus (JCV) is primarily associated with neurological disease in adults. LACV is both highly neurovirulent, it can cause damage and disease in the brain, and neuroinvasive, it can enter the brain by crossing the blood brain barrier (BBB). JCV is also neurovirulent but is not neuroinvasive. The viral M genome segment in LACV and JCV has been associated with differences in neuroinvasion. This segment codes for two virion surface glycoproteins (Gn and Gc) as well as a non-structural gene (Nsm). This study aims to identify whether it is the glycoproteins or the Nsm gene that allows LACV to cross the BBB while JCV cannot. Quantitative polymerase chain reaction (qPCR) was used to compare the host gene expression

response of LACV- and JCV-infected human brain endothelial cells (HBECs), the primary cell type in the BBB. Initially, HBECs were infected with LACV and JCV. Samples were collected at various timepoints post infection. From there, qPCR identified differences in host response by comparing messenger ribonucleic acid (mRNA) levels. HBEC host responses will identify how the infected cell responds to the different neuroinvasive phenotypes of LACV and JCV. Ongoing experiments are focused on developing viruses with swapped genes in the M segment (chimeric viruses). Infection of HBECs with these chimeric viruses will identify which M segment-encoded gene is responsible for eliciting different host responses between LACV and JCV. This presentation will focus on baseline differences in host responses to LACV and JCV as a first step in identifying the viral gene allowing for neuroinvasion.

Payton Hardesty

Discipline: Psychology

Authors:

#1 John Blanchar

#2 Kyle Mann

Abstract Name: The Role of Political (Mis)fit in Workplace Experiences and Employee Turnover Intentions

The attraction-selection-attrition (ASA) model suggests that employees who perceive misalignment with their organization's beliefs and values experience an increased likelihood of attrition or a stronger desire to leave. Similarly, research on ideological migration shows that Americans often relocate away from politically incongruent communities and toward those that better align with their political beliefs, reflecting a drive for social belonging. Just as the need for belonging helps explain relocation patterns and political sorting at the community level, the ASA model points to a similar process in employees' workplace decisions. If political values guide residential choices, they may also influence whether individuals decide to stay or leave their place of work. The present pre-registered study tests whether political (mis)fit in the workplace predicts workplace experiences that facilitate or hinder employee attrition. Participants (N = 608) were part- or full-time employed American adults recruited through Prolific's online platform, all of whom reported frequent in-person interactions with coworkers. They provided information about their work background and completed measures of their left-right ideology, perceived political alignment and misalignment with coworkers, experiences of workplace ostracism and incivility, sense of belonging, job burnout, job satisfaction, organizational commitment, ease of finding a comparable job, and turnover intentions. Results underscored the central role of belonging in how political (mis)fit shapes workplace experiences and hence turnover risk. Employees who perceived political alignment reported more positive workplace experiences, including greater belonging, which in turn predicted higher job satisfaction and organizational commitment. Conversely, perceived misalignment was associated with negative workplace experiences, such as greater ostracism and incivility, which predicted less belonging, greater burnout, perceptions of better job alternatives, and higher turnover intentions. These findings integrate insights from the ASA model and ideological migration hypothesis, showing that political (mis)fit corresponds with distinct workplace experiences and underscoring the importance of environments that foster belonging.

Shyla Hardowar

Discipline: Health and Human Development

Authors:

#1 Shyla Hardowar

#2 Esther Amlong

Abstract Name: Neurological and Cognitive Impairments Following COVID-19: A Systematic Review

COVID-19 has been associated with persistent neurological and cognitive symptoms in many individuals, yet the extent of these impairments and the mechanisms behind them are not fully understood. This systematic review examines the current literature on the long-term neurological and cognitive effects in adults and adolescents following SARS-CoV-2 infection. Collected evidence includes peer-reviewed studies published between 2020 and 2025, drawn from scientific databases and informed by cohort studies, neuroimaging research, and longitudinal clinical surveys. We searched PubMed and Google Scholar databases and included 15 articles in our review. Across the evidence, long COVID patients frequently reported memory difficulties, reduced attention, executive functioning problems, headaches, sensory disturbances, and subjective “brain fog”. Reported prevalence for these symptoms varied, with 20% to more than 70% of individuals experiencing at least one neurological or cognitive symptom months after infection. Many studies found that symptoms persisted for several months to over a year, and recovery trajectories differed across age groups. Factors such as severity of the initial infection, older age, and preexisting medical or psychiatric conditions were consistently associated with worse long-term outcomes. Proposed biological explanations for these impairments included chronic neuroinflammation, microvascular injury, immune dysregulation, and hypoxic damage during acute illness. Neuroimaging findings supported several of these mechanisms by showing changes in gray matter volume, white matter integrity, and functional network efficiency in some post-COVID patients. By synthesizing these findings across study types, this review highlights converging evidence that COVID-19 can produce lasting effects on the brain and cognition. The results also identify gaps, such as limited adolescent-focused research and limited long-term follow-up, that remain barriers to understanding recovery trajectories. Overall, this project provides a comprehensive summary of what is currently known about neurological and cognitive impairment after COVID-19 and emphasizes the need for continued research to guide clinical support for long COVID patients.

Nandita Hareesh

Discipline: Biochemistry

Authors:

#1 Morgan Murphy

#2 Natalie Small

#3 Meghan S. Blackledge

#4 Heather B. Miller

#5 Julie A. Pollock

Abstract Name: Weakening Bacterial Defenses: Competitive Inhibitors of the STP1 Phosphatase in *S. aureus*
NCUR Abstract

Antibiotic resistance in *Staphylococcus aureus* has made infections increasingly difficult to treat, with strains now exhibiting reduced susceptibility to drugs such as methicillin, vancomycin, and penicillin. A key contributor to this resilience is the serine/threonine phosphatase STP1, which coordinates essential cellular processes including cell wall integrity, biofilm development, and control of cell division and size. Targeting STP1 could therefore weaken bacterial defenses and improve the activity of existing antibiotics. To explore this, we expressed and purified STP1 and established a phosphatase assay to monitor its activity. Using this approach, we identified several small molecules that competitively inhibit STP1, demonstrating potential as antibiotic adjuvants. We have quantified the inhibition, modeled potential binding poses using SwissDock, and established initial structure-activity relationships.

Joseph Hargett

Discipline: Business

Authors:

Abstract Name: The Storytelling Involved in Marketing a Business/Club and the break down of proper Business Communication

This research examines how storytelling, personal branding, and business communication shape the development and marketing of a new student organization designed for Gen Z audiences. Although student organizations operate in academic environments, many adopt business-oriented strategies for branding, recruitment, and communication. This project uses the formation of The Business Strategy Room, a marketing-focused student organization, as a real-world case study to explore these dynamics. The study identifies a central problem: how can a new organization effectively attract members, communicate value, and establish credibility without an existing reputation? To address this, the project analyzes personal branding, digital communication, and marketing theory as they were applied throughout the organization's creation. Research on Gen Z consumer behavior, particularly their preference for digital engagement, informed the strategic use of Instagram as the primary communication channel. Design choices including dark color palettes and a bullhorn icon were selected to communicate professionalism and a focus on marketing, aligning with the organization's intended identity. Methodologically, the project combines practical application, demographic analysis, and business communication frameworks from Guffey & Loewy's Essentials of Business Communication. Key components include storytelling in logo development, message framing for recruitment, and the use of digital branding techniques in alignment with Gen Z marketing research (e.g., the Cafely case study on online purchasing behaviors). The study concludes by examining how setbacks, such as the required transition from a local club to a national chapter, provided opportunities to apply negative-news messaging strategies such as clarity, empathy, fairness, and professionalism. These experiences illustrate how business communication principles directly translate into student leadership and organizational development. The findings contribute to broader conversations on how undergraduate leaders can apply marketing and communication theory to build impactful, student-centered organizations.

Shreyas Harish

Discipline: Engineering

Authors:

#1 Daevin Oey

#2 Ritesh Sharma

#3 Yuichi Motai

Abstract Name: Pre-Flight GCP Planning for UAV Surveys Using Predictive GDOP Modeling

Accurate ground-based reference points, called Ground Control Points (GCPs), are essential for creating reliable 3D maps in ArcGIS. However, survey teams often design these GCP layouts based on experience or trial-and-error, which can lead to extra field visits, higher costs, and uncertain mapping accuracy. This work develops a predictive planning tool that helps surveyors determine how many GCPs are needed and where they should be placed before a drone mission begins. The method adapts a concept used in satellite navigation known as Geometric Dilution of Precision (GDOP), which describes how measurement geometry affects accuracy. By combining flight altitude, camera settings, image overlap, and a Digital Elevation Model describing terrain height, the system estimates areas where mapping accuracy may become weak. The system employs iterative optimization algorithms to identify GCP configurations that minimize predicted uncertainty

while reducing field survey requirements. Based on these predictions, the tool automatically generates suggested GCP placement maps and accuracy indicators, helping users see where additional control points might be required. All results are exported in ArcGIS-ready formats, such as KML, shapefiles, and feature layers, so that surveyors can load them directly into ArcGIS Pro or ArcGIS Field Maps. Validation testing across diverse terrain types—including flat agricultural areas, rolling hills, and mountainous regions—demonstrates the framework's ability to provide reliable placement guidance under varying topographic conditions. This predictive framework aims to reduce field trial-and-error, improve planning efficiency, and increase the likelihood of achieving mapping accuracy goals on the first attempt.

Savannah Harley

Discipline: Biology

Authors:

#1 Savannah Harley

#2 Daisy Fisher

#3 Jayden Boles

#4 Holly Basta

Jayden Boles

Daisy Fisher

Abstract Name: Functional Characterization of a Novel Endogenous Retroviral Protein

Cells encode many mechanisms to fight off pathogens like viruses. The OAS-RNase L is an innate immune system pathway triggered by viral RNA; during infection oligoadenylate synthetases (OAS) synthesize 2'-5' oligoadenylates (2-5A), which bind and promote the dimerization of RNase L (Zhang et al., 2013). Active RNase L cleaves viral and cellular RNA, inhibiting viral replication and limiting the spread of infection. Mammals regulate this pathway with phosphodiesterase enzymes (PDEs), which cleave 2-5A to prevent RNase L overactivation. Some RNA and DNA viruses have acquired PDEs from their host's genomes, which inhibit the innate immune response by cleaving 2-5A (Zhang et al., 2013). A previously uncharacterized endogenous retroviral protein was found to share sequence and structural similarities to known viral PDEs (Basta et al., 2009); however, it is unknown whether it shares their inhibitory functions. We hypothesize that this protein functions as a viral PDE. To test this, we transfected human lung cancer cells with the zebrafish endogenous retrovirus (ZFERV) predicted PDE fused to a GFP gene and an empty GFP vector control. These cells were stimulated with a synthetic double-stranded RNA (poly(I:C)) to activate the OAS-RNase L pathway. GFP was visualized by fluorescence microscopy, and proteins were separated using a native gel and transferred to a western blot probed for RNase L. Cells stimulated with poly(I:C), but lacking the putative PDE, are expected to have an activated OAS/RNase L pathway, indicated by dimerization of RNase L. Stimulated cells with a functional PDE are expected to have a deactivated OAS/RNase L pathway, indicated by monomeric RNase L. Additional confirmation of RNase L activation provided by visualization of RNA fragmentation will support the protein's characterization as a viral PDE, representing the first observation of a PDE in a retrovirus.

Joseph Harper

Discipline: Psychology

Authors:

#1 Joshua Barton

Abstract Name: Gaming for Growth: Exploring the Impacts of Different Video Genres on Cognitive and Emotional Development in Adolescents and Young Adults

Video games are now a central part of adolescence and young adulthood, yet their effects on cognition and emotional development remain widely debated. This project examines whether broad genre labels (e.g., action, puzzle, sports simulators) or their underlying core game mechanics (e.g., task-switching, multi-object tracking, cooperative play) better predict cognitive and socio-emotional outcomes in adolescents and young adults, including those with cognitive dysfunctions. Clarifying this relationship matters because parents, educators, and players increasingly use games for learning and intervention but lack clear, mechanic-based guidance or harm-reduction advice. The research consists of four parts. Part 1 analyzes how core game mechanics place distinct cognitive demands on players in order to increase cognitive performance. Part 2 compares different genres of games to identify which combinations of mechanics are most associated with performance gains in cognition. Part 3 examines how cooperative versus competitive structures shape sociability, emotion recognition, and overall well-being to benefit the player's emotional development. Part 4 evaluates how commercial and purpose-built games are used with adolescents who have cognitive or social limitations, and reviews risks such as excessive play and extrinsically motivated gaming to minimize the negative effects of gaming. The synthesis suggests that specific mechanics and play context predict outcomes more reliably than genre labels alone. Action and strategy games tend to support executive cognitive functions; augmented-reality and collaborative games foster sociability; and targeted training games can benefit adolescents with conditions such as Sensory Processing Dysfunction. Parents, educators, and the player themselves should prioritize games with structured feedback and cooperative goals, keep play moderate and intrinsically motivated, and limit time in highly competitive stress-inducing environments.

Shaun Harrington

Discipline: Chemistry

Authors:

- #1 Shaun Harrington
- #2 Maya Fernando
- #3 Mubaraq Toriola
- #4 Kayode Medubi
- #5 Michelle Meyer
- #6 Leggy Arnold

Abstract Name: Efficient Pd-Catalyzed Amination of Benzodiazepine Scaffolds for GPCR Ligand Development

Palladium catalyzed reactions have become prominent reactions for creating C-N bonds and are widely used in the synthesis of pharmaceuticals. In this study, a palladium catalyzed Buchwald-Hartwig synthesis was used to introduce new amine substituents to a brominated benzodiazepine for the development of compounds with novel activity. We established an optimized protocol utilizing 5% Pd₂(dba)₃ in conjunction with 10% Xphos as the catalytic system. Conversions with substituted anilines, aliphatic amines and heterocyclic amines were observed with yields ranging from 23% to 89%. All products were analyzed and characterized using liquid chromatography-mass spectrometry and NMR spectroscopy. We identified that some of these compounds are having promising affinities for the Alpha 2B adrenergic receptor (AR α 2B) and the 5-Hydroxytryptamine 2B receptor (5-HT_{2B}). We are currently synthesising new molecules to identify ligands with high specificity and better affinity enabling us to evaluate their pharmacological effects in vivo.

Marley Harris

Discipline: Art History

Authors:

Abstract Name: The Resurfacing Interest in Brutalism and Its Cultural Significance on Self-Expression: Analyzing the Intersection of Architecture and Graphic Design

After World War II, Europe entered the age of reconstruction and recovery for the millions of displaced victims of the war. The United Kingdom needed buildings, and concrete played a significant role in the creation of new buildings because the technological advances allowed for concrete to be widely accessible and became an extremely versatile medium for architects. The architectural movement of Brutalism—derived from *béton brut*, meaning raw concrete—becomes a global Architectural style, and the neutral materials used in Brutalism signified institutional power for many regions. Ultimately, European Brutalism is fundamentally intended to evoke truth and purity that would later be misconstrued into totalitarianism and apocalyptic dystopia in the United States. The graphic design movement of Brutalism holds the same fundamental ideas of truth and raw materials and has significant visual ties to 60's pop culture. The specific analysis of the promotional posters for the 60's "This is tomorrow" exhibition will be used to compare the possible influence this style of poster had on modern Brutalism. The modern resurgence of architectural and graphic design Brutalism in the United States is polarizing. Understanding the political response to Brutalist Architecture in government buildings is imperative to understanding the cultural removal of the fundamental ideas of Brutalism as a design. This paper analyzes the context behind Brutalism in graphic design, and the controversies surrounding the style are imperative in protecting the self-expression of design in the 21st century.

Jaden Harris

Discipline: Biology

Authors:

#1 Jaden Harris

#2 Jean Gonzales

#3 Sandeep Singh

Abstract Name: Development of CRISPR/Cas9 Approach to Express and Visualize VAPA Protein in Astrocytes Using Endogenous HA-Tag

Astrocytes are the most abundant glial cell in the nervous system and play a critical role in the support and development of neurons. However, little is known about the mechanisms behind their morphology or intercellular cross-talk with neurons. Previously, we have shown that neuronal contact with astrocytes stimulates expression of the S1P receptor, which in turn regulates Vesicle-Associated Membrane Protein A (VAPA). This posits VAPA as a novel member of astrocyte-neuron communication pathways. VAPA is a specialized protein of the endoplasmic reticulum that facilitates the transport of lipids across organelles through the creation of membrane contact sites (MCSs). Loss of VAPA has been associated with Chorea Acanthocytosis (ChAc) along with other neurodegenerative disorders. Here we show our strategy of designing an astrocyte-specific adeno-associated virus (AAV) to tag VAPA in vivo using a CRISPR/Cas9 approach. We used multiple gRNA predicting webtools to identify potential sites of HA-tag insertion at the N-terminus of the VAPA gene. Interestingly, the 3rd ranked gRNA from GenScript targeting exon 1 of the VAPA gene was the only option for HA tagging. We designed the gRNA together with HA-tagIN primers, then cloned these into the appropriate plasmid vector with Cas9 and gRNA scaffolds. However, after transfecting this plasmid construct into HEK293T cell cultures, western blotting did not reveal HA-tagging of the VAPA gene. Therefore, we have and are exploring different options to observe VAPA's role in neuronal cross-talk using our AAV framework and immunohistochemistry.

Ginny Harris

Discipline: Biology

Authors:

#1 Olivia Brill

#2 Jordyn Klumb

#3 Zoe Moreno

#4 Robert Winn

#5 Paul Mann

#6 Evan Pratt

#7 Matthew Jennings

Grace Wisniewski

Abstract Name: Evaluation of interfering substances in the novel D2HGlo assay for detection of D-2-Hydroxyglutarate (D-2-HG)

The 2021 World Health Organization (WHO) classification of Central Nervous System (CNS) tumors identified the mutational status of Isocitrate Dehydrogenase (IDH) as the most critical indicator for prognosis in glioma patients. IDH is a key component responsible for the energy generation of a cell. Mutations found in the active site of Isocitrate Dehydrogenase 1/2 confer a new function for the protein generating the oncometabolite, D-2-Hydroxyglutarate (D-2-HG). This oncometabolite is associated with disease progression in glioma and is found in other cancers such as AML (Acute Myeloid Leukemia). D2HGlo is a novel, fluorescence based, assay for detection of the oncometabolite, D-2-HG, and has the clinical potential to quantify D-2-HG concentrations in glioma preoperatively, intraoperatively, and postoperatively. D2HGlo quantifies D-2-HG in various body fluids including serum, plasma, and urine. Here, we investigate the efficacy of D2HGlo utilizing contrived samples containing interfering substances to determine the clinical utility of D2HGlo. Contrived clinical specimens including evaluation of anticoagulants found during a blood draw, hyperglycemia, hyperlipidemia, hyperbilirubinemia, and hyperproteinemia. The evaluation of D2HGlo in this interfering substances study is consistent with the guidelines of the CLIA 88 (Clinical Laboratory Improvement Amendments) federal standards.

Erika Hartman

Discipline: Environmental Science and Sustainability

Authors:

Abstract Name: Wings of Change: The Audubon Society of Kentucky Amid Generational Shifts in Environmental Engagement

Recent studies show that Gen Z cares more greatly about the environment than previous Baby Boomer and Gen X generations, but spends far fewer time outside enjoying nature. This trend is reflected in the decline of environmental clubs at the University of Kentucky and the lack of engagement in nature. Locally, the Audubon Society of Kentucky, a branch of the national bird conservation organization, has undergone expansion and contraction as interest in environmentalism has waxed and waned over the past 100 years. In particular, the youth of the 1960s and 1970s ushered in the original catalyst for today's environmental movement. This transformation challenged conservation organizations such as the Audubon Society to stay relevant to new audiences. Activism groups like the Sierra Club and the Audubon Society were charged to

encourage the inclusivity of youth and women, change their specific messaging to a broader public-health centered narrative, and stimulate bipartisan policy for the sake of future-focused environmentalism. Today, the Audubon Society of Kentucky appears diminished in outreach and influence when compared to the Kentucky Sierra Club, which continues to expand. Using the meeting minutes, brochures, and bird counts of the Audubon Society of Kentucky Papers, 1940-1976, at the University of Kentucky Special Collections Research Center, the organization's success in aligning with and accomplishing these goals during the 1960s and 1970s will be analyzed in comparison to the local Lexington Sierra Club branch. Furthermore, this project will examine how the prior work of the Audubon Society can illuminate the organization's future growth in Gen Z environmental activism and interest. The project will produce an educational event proposal for the Audubon Society of Kentucky in collaboration with the University of Kentucky to establish how the organization can follow modern-day environmentalism trends to increase visibility and connection with a 21st century public.

Marina Hartman

Discipline: Exercise Science and Nutrition

Authors:

#1 Eric Conchola

#2 Kevin Fink

#3 Jacilyn Olsen

#4 Barrett Cowan

#5 Damon Walker

#6 Tracy Morris

#7 Keith Rogers

Eliana Christensen

Abstract Name: Determining the Retest-ability and Reliability of the Jamar Handgrip Dynamometer and the Vernier GoDirect Handgrip Dynamometer

Handgrip strength has been found to be a substantial predictor for overall muscle strength. A study that agrees with the previous statement states plainly that, “-handgrip strength can be an effective tool for predicting muscular strength and endurance.” (Vaidya and Nariya). Currently, the Jamar Hydraulic Dynamometer is considered to be the “Gold Standard” when it comes to total hand grip test. It is estimated that the Jamar will remain to be more accurate when it comes to the test-retest reliability in comparison to the Vernier GoDirect as well as the Jamar Hangrip Dynamometer. The purpose of this research is to identify the test-retest reliability between different handgrip dynamometers. Methodology includes testing participants on two different hand grip dynamometers over the course of three tests during an overall 4 month research project. Participants will be tested on the Jamar Hydraulic Dynamometer as well as the Vernier GoDirect Handgrip Dynamometer. Each participant will go through two trials on each dynamometer to ensure accurate results per test. The tests will be done on the dominant hand first followed by the non dominant hand second to provide ample rest time between tests. Significant literature regarding the Venier Handgrip Dynamometer has yet to be published, however this device has other capabilities that the other dynamometers don't have. These capabilities include testing for muscle fatigue as well as individual fingertip strength. For this study, we will not be testing for these two variables, and just using the devices function for overall handgrip strength.

James Harville

Discipline: Health and Human Development

Authors:

#1 Keith McGregor
#2 Marshall Holland
#3 Harrison Walker

Abstract Name: The Use and Effects of TMS Therapies on Restless Leg Syndrome and Chronic Pain

Both Restless Legs Syndrome (RLS) and chronic pain disorders show a shared pattern of cortical disinhibition measurable through transcranial magnetic stimulation (TMS). Prior research consistently reports reduced short-interval intracortical inhibition (SICI), reflecting impaired GABA-A-mediated inhibition, and shortened cortical silent period (CSP), associated with GABA-B dysfunction. These deficits indicate hyperexcitability in motor and sensorimotor circuits. Early therapeutic studies suggest that high-frequency excitatory stimulation over the primary motor cortex (M1) and low-frequency inhibitory stimulation over the somatosensory cortex (S1) may partially restore inhibitory function and reduce symptoms. Objective: This project investigates whether repetitive TMS (rTMS) can normalize cortical inhibition and improve symptoms in individuals with RLS and chronic pain. Building on current literature, we aim to compare expected outcomes with data from our dual-cohort study and evaluate whether changes in excitability measures (SICI, long-interval intracortical inhibition [LICI], intracortical facilitation [ICF], CSP, resting and active motor thresholds) predict symptom improvement. Methods: Participants with RLS or chronic pain, including a subgroup with spinal cord stimulators, will complete baseline assessments consisting of H-reflex testing, somatosensory evoked potentials (SSEPs), vibratory event-related potentials, and diagnostic TMS. After completing an rTMS treatment regimen, all assessments will be repeated to determine how changes in cortical inhibition relate to changes in symptom severity. Preliminary Evidence: Previous studies show that high-frequency M1 or supplementary motor area stimulation improves RLS symptoms by up to 50% and enhances sleep quality. In chronic pain, 10–20 Hz M1 rTMS reduces pain by 30–50% and increases SICI while prolonging CSP, suggesting restoration of inhibitory tone. These neurophysiological shifts often correlate with clinical improvement. Expected Results and Significance: We anticipate that increases in intracortical inhibition will predict symptom reduction across both cohorts. Findings will help refine individualized neuromodulation approaches and support the development of TMS-based biomarkers for sensorimotor hyperexcitability disorders.

Halli Harwood

Discipline: Communications

Authors:

Abstract Name: Navigating Changing Tides: Environmental Corporate Social Responsibility within the Cruising Industry

Royal Caribbean has been catering to guests for more than 50 years, having first set sail in 1970. As Royal Caribbean has grown, alongside the entirety of the cruise industry, the company has increased their commitment to environmental stewardship. Following the rapid rebound of the cruising industry after the COVID-19 pandemic, Royal Caribbean launched an environmental initiative, SEA the Future, in which they have prioritized Sustaining the planet, Energizing communities, and Accelerating innovation in order to make the corporation more sustainable. With this initiative, Royal Caribbean has committed to delivering vacations “responsibly.” But in an industry that is inherently damaging to the environment, what does “responsibly” actually mean? Using a case study approach examining the company’s website and social media, along with media coverage of the initiative, this research explored the SEA the Future campaign for the way in which Royal Caribbean has communicated its sustainability policies and practices to stakeholders, including consumers, investors, employees, the government, and port city communities. Additionally, this research considered how these different stakeholders responded to and interpreted Royal Caribbean’s environmental messaging. A separate, but complementary, journalistic article expanded on this work by comparing Royal Caribbean’s SEA the Future campaign with Carnival Cruise Line’s Sustainable from Ship to Shore plan and

Norwegian Cruise Line's Sail & Sustain initiative, using thematic coding to identify patterns across the three cruise lines. Ultimately, this research aimed to analyze how major cruise corporations define the idea of environmental responsibility and how these narratives influence public perception of sustainability within the cruising industry.

Asma Hasan

Discipline: Biology

Authors:

#1 Rohan Mehta

Mikala Marcussen-Abuharb

Abstract Name: Impact of Sound Propagation on Fish Behaviors Coordinated Through Sonic Communication

Animals frequently use sound to communicate with each other in a variety of different ways, such as using alarm calls to avoid predators, breeding calls to find mates, and foraging/predation calls to find food. In all of these cases, communication allows individual animals to behave as a collective entity. However, sonic communication is dependent on the medium of communication. For example, sound declines in intensity by distance much faster in air than it does in water. Little work has been examined for how underwater acoustic communication impacts prey strategies in fish. The project investigates two main sonic behaviors in fish. Fish can either effectuate the “shutting up” method where they decrease volume to flee and are classified as escapers versus “shouting loud” where fish increase volume to mob a predator and are the mobbers. We developed an agent-based model in NetLogo in which fish, predators, and sound propagation are simulated within an aquatic environment. The model evaluates how sound intensity, distance, and behavioral thresholds impact survival outcomes, with adjustable parameters including a baseline. Our results show that the shut up and flee tactic has higher survival rates across most conditions, especially when predator detection thresholds were low. The shout loud mobbing strategy was more efficient when sound traveled far and foraging exceeding thresholds, indicating mobbing is beneficial in environments where large groups can collectively pressure the predator.

Asma Hasan

Discipline: Economics

Authors:

#1 Avraham Baranes

Abstract Name: Economic Benefits of Insurance Coverage for Patient Care in Preventative Services

The economic implications of insurance coverage for preventative medicine not only affect individual health decisions but are much deeper and are seen to affect social outcomes. Variables such as externalities, price elasticity of demand, and consumer response support understanding of patient data. Externalities arise because preventative care physicians, such as doctors of osteopathic medicine, use a holistic and preventative approach, thus reducing health risks and overall healthcare costs. Third parties that are not directly involved in these transactions can gain benefits from lower risk of disease transmission and reduced public health expenditures. Price elasticity of demand for services is analyzed to explore how insurance coverage will affect access to patient care, particularly in marginalized populations. Medical expenditure Panel Surveys from IPUMS surveys were used with U.S. adults from 2020-2024 to assess insurance effects on preventative services. Dependent variables include prevention utilization and independent variables include U.S. insurance

states. RStudio, a coding software, was used by importing IPUMS to create regression models and evaluate factors. Insurance coverage of care not only includes individual health benefits but also promotes positive externalities with significant effects on economic variables through a reduction in public health expenditures and improved social health outcomes.

Memphis Hashimoto Prater

Discipline: Visual Arts

Authors:

Abstract Name: Aesthetics and Accessibility: An exploration in incorporating accessorization into the creation of medical devices and mobility aids

The purpose of this study is to connect visual aesthetics to the creation and modification of medical devices, specifically allowing the wearer the choice of personalization according to their style. I have combined the traditional technique of lost-wax casting with CAD technology to create custom mobility aids and accessorize medical devices, making jewelry more accessible to individuals with physical disabilities. I want to continue to improve my skills in CAD, as it helps reduce the impact traditional metalsmithing techniques have on my body due to my disability. I was diagnosed with Sjogren's Disease at 18 years of age after several years of searching for a diagnosis, which significantly impacts my day-to-day functioning. Developing a disability after experiencing the majority of my childhood as a seemingly healthy individual left me with a sense of loss. To compensate for these feelings, I have gravitated towards creating functional work in my practice. I primarily focus on what it truly means for something to be functional and why creating something accessible matters. My knowledge as a maker, combined with my experience as a disabled individual, helps in navigating the challenges of adapting mobility aids for people to feel more comfortable to use them. I hope to emphasize that one's personal style does not have to be sacrificed at the cost of function. I desire for my practice to be a vessel for change.

Mohammad Ali Hassan

Discipline: Biology

Authors:

#1 Mohammad Ali Hassan

#2 McKenzie Cheynet

McKenzie Cheynet

Abstract Name: Cisplatin Induced Immunogenic Cell Death to Delay Tumor Onset in a Preclinical Model of Triple-Negative Breast Cancer

Chemotherapy remains the only systemic treatment for triple-negative breast cancer (TNBC), yet it achieves a pathological complete response in only 37% of patients. Patients with higher levels of tumor-infiltrating lymphocytes respond better (48%; Denkert, 2018), highlighting the immune system's importance in chemotherapeutic efficacy. Enhancing chemotherapy's immunogenicity is therefore crucial for both direct tumor killing and long-term immune surveillance. This occurs through immunogenic cell death (ICD), a regulated apoptotic process that releases damage-associated molecular patterns (DAMPs) to activate innate immune cells such as dendritic cells (DCs). We used a syngeneic orthotopic mouse model of TNBC to evaluate the immunogenicity of platin-based chemotherapies. TNBC cells were killed with oxaliplatin or cisplatin and injected into the right mammary gland of mice (n=10/group), while controls received saline.

One week later, mice were rechallenged with live cancer cells in the opposite mammary gland. If chemotherapy induced ICD, immune cells would eliminate the live cells, mimicking a vaccine-like effect. Over three weeks, cisplatin-treated cells significantly delayed tumor onset, whereas oxaliplatin-treated cells showed no effect. Gene expression analysis assessed immune infiltration. Cd45 was used as a pan-immune marker and Gzmb as a cytotoxic T-cell and NK-cell marker. Although neither differed significantly between groups, Ctla4 expression was significantly higher in tumors from mice injected with cisplatin-killed cells, suggesting increased immune infiltration accompanied by T-cell inhibition. Overall, these findings identify cisplatin as more immunogenic than oxaliplatin. Future studies will test whether this effect involves type I interferon signaling and DC activation, clarifying how chemotherapies stimulate innate immunity to improve TNBC outcomes.

Shahla Hassan

Discipline: Biology

Authors:

#1 Faheem Ahmed

#2 David Jefferson

#3 Laura Mathies

#4 Andrew Davies

#5 Jill Bettinger

Meera Velga

Adithi Thumuluru

Abstract Name: The Effect of Low Concentrations of Alcohol on Synaptic Transmission and Locomotion in *C. elegans*

Alcohol Use Disorder (AUD) is a chronic illness in which a person, despite detrimental health and social consequences, has an impaired ability to control or stop alcohol use. This research aims to enhance our understanding of the illness and identify how alcohol alters neuronal signaling. *C. elegans* are a useful model for the study of behavioral changes due to ethanol. Their simplified nervous system is strongly molecularly conserved with mammals, making them particularly advantageous for neuronal studies. In synaptic transmission, voltage-gated calcium channels are activated by an action potential, causing them to open. UNC-10, the *C. elegans* homolog of RIM (Rab3-interacting molecule), plays an essential role in organizing the presynaptic active zone and coordinating Ca^{2+} -triggered neurotransmitter release. It functions as a scaffold that anchors voltage-gated calcium channels near synaptic vesicle docking sites and recruits the vesicle-priming factor UNC-13 (Taru et al., 2019). UNC-10 ensures that calcium influx occurs precisely where primed vesicles are positioned, enabling rapid and efficient synaptic transmission. Loss of UNC-10 disrupts calcium channel localization and reduces synaptic efficacy, highlighting its central role in coupling active zone structure to neurotransmitter release (Taru et al., 2019). *unc-10* mutant animals are paralyzed, and surprisingly, low concentration ethanol can enhance the locomotion of these mutants. This project is designed to understand how ethanol causes this effect. To measure locomotion, we used a grid-crossing assay to determine how many grid squares each animal entered, allowing comparison of baseline versus ethanol-stimulated movement. Additionally, we used WormLab video analysis to quantify worm speed and total distance traveled under both basal and ethanol-exposed conditions. In this study, we are investigating how *unc-10* mutant animals' uncoordination can be rescued by low concentrations of ethanol, stabilizing intracellular Ca^{2+} stores and thereby bypassing the need for UNC-10.

Kayleigh Hasselmeier

Discipline: Film/Photography Studies

Authors:

Abstract Name: Reimagining Local History Through Interactive Technology

Traditional museum exhibits often struggle to capture the attention of diverse audiences, particularly younger generations accustomed to interactive and visual forms of learning. This project addresses that gap by introducing a technology-based approach to historical education through the creation of an interactive green screen exhibit. Designed to engage visitors with the rich history of Prescott, Arizona, the exhibit combines digital media and storytelling to let participants step into recreated scenes from historic local events, offering a vivid and engaging way to connect with the past. As a Simulation Science, Games, and Animation student, I drew on my background in 3D modeling, animation, and visual design to digitally reconstruct historical sites and bring still photographs to life. The department emphasizes cross-disciplinary collaboration, combining principles of 3D computer graphics, user experience design, and animation—skills that proved essential in developing this exhibit. The Western Heritage Center’s mission is to preserve and promote the Prescott area’s history through educational displays, art, and collaborative projects. Two major goals of the project were to digitally recreate the second Yavapai Courthouse and to feature Former President Theodore Roosevelt as a symbolic representation of the era, using tools such as Autodesk Maya, Adobe After Effects, and Adobe Substance 3D Painter. This was especially meaningful to the Western Heritage Center, as it provided a way to visualize important aspects of Prescott’s history that had previously existed only through text and static images. The development process incorporated green screen production, 3D modeling, video production, and digital compositing to create a functional and engaging exhibit. Through this hands-on collaboration, project members gained valuable professional experience while contributing to a meaningful community partnership. Ultimately, the project demonstrates how creative media technology and historical storytelling can deepen public understanding, inspire curiosity, and strengthen the connection between higher education and the broader community.

Emma Hastings

Discipline: Political Science

Authors:

#1 M. Courtney Hughes

#2 Lei Hua

Abstract Name: Overturning Roe v. Wade and pre-medical students’ views and medical school choices

The overturning of Roe v. Wade in Dobbs v. Jackson Women’s Health Organization (2022) has led to varying abortion laws across states in the U.S., potentially influencing medical education choices. While some research has examined abortion policy changes and medical residencies and fellowship decisions, none has investigated abortion policy and medical school decisions. This study aims to determine whether pre-medical students’ personal views on abortion influence their willingness to attend medical schools in states where abortion is illegal at all stages EXCEPT to save the life of the mother. A cross-sectional survey was distributed to pre-medical organizations at the two largest four-year institutions in each U.S. state and the District of Columbia, except Wyoming, which has only one four-year institution. The survey collected demographic data, political affiliation, intended medical specialty, and personal stance on abortion. Participants indicated their willingness to attend medical school in states with different types of abortion policies. There were 182 completed surveys from participants in 20 different states. Analysis showed that students who believed abortion is acceptable and should be legal at all stages were significantly less willing to attend medical school in states where abortion is illegal EXCEPT to save the life of the mother. Abortion policy may influence medical school decisions among pre-medical students, which may have long-term implications for physician distribution, particularly in states with restrictive abortion laws. Future research should explore how these trends impact healthcare workforce shortages and access to reproductive care.

Castner Hatanaka

Discipline: History

Authors:

#1 Sean Malloy

Abstract Name: Shielded by Power: U.S. Aid, Immunity, and the Palestinian Genocide

This research looks at how the United States is involved in the current conflict between Israel and Palestine, and whether U.S. support for Israel follows or violates international human rights standards. The main question is: Does U.S. aid to Israel contribute to human rights abuses in Gaza, and if so, why are those responsible not being held accountable? Many studies look at the Israeli Palestinian conflict, U.S. foreign policy, and human rights, but often discussed separately. My inspiration for this topic was brought to me by my mentor during class, along with growing discussion and footage online. This research shows how U.S. aid to Israel and certain laws protect both countries from being held accountable for actions in Gaza and the West Bank. Methods and sources used include books, articles, government documents, and news sources, applying literature review, content and thematic analysis, and both qualitative and some quantitative methods to understand connections between U.S. aid, international law, and human rights. A key finding is the United States Foreign Military Financing program (FMF), which gives Israel billions to buy American-made weapons often in the form of grants and stipends, some of which have harmed civilians in Gaza and the West Bank. Another important point is the Hague Invasion Act (2002), originally used to protect United State soldiers during the Iraq war, additionally the same act can protect allies like Israel from being prosecuted by the ICC or ICJ, blocking accountability for possible war crimes.

Laura Haushalter

Discipline: History

Authors:

Abstract Name: Taxidermy and technology: A history of climate change exhibitions at 20th- and 21st-century American museums of natural history

My research is on the history of temporary and permanent climate change exhibitions at natural history museums in the United States. My primary research question is: How have natural history museums responded to human-caused environmental destruction through their exhibitions, and what, if anything, are natural history museums doing now to address our current environmental crisis? My research begins with a historiography of natural museums and examines how early 20th-century museums responded to a sense of environmental crisis and widespread threats of species extinction. In the early 20th century, museums shifted from Victorian-era glass cases to modern and artistic dioramas that presented beautiful and pristine wilderness. These new dioramas attempted to inspire audiences to care about the environment and preserve wilderness scenes that preservationists viewed as disappearing. 21st-century museums are again changing their displays to address climate change, environmental justice, and extinction, this time using different technologies. I explore four specific museums, their histories, and how they are addressing the threat of climate change: the Field Museum of Natural History, the Natural History Museum of Los Angeles County, the Harvard Museum of Natural History, and the American Museum of Natural History. My research brings into conversation museum history, climate communications, and environmental history, while fitting into the larger scholarly conversation of the cultural and political role of American natural history museums. My

approach to this topic is new because I am recognizing that the public presentation of natural history itself has a history, and climate change fits into what is considered a “difficult history.” My research is built upon primary sources, including museum multimedia archives, periodical archives, relevant secondary sources from historians, scientists, and museum practitioners, and visits to current climate change exhibitions at relevant museums.

Hannah Havel

Discipline: Computer Science

Authors:

#1 Kirk Duffin

#2 Chris McCord

Abstract Name: Analysis of Central Configurations and Bifurcations in the Planar Unequal Mass 4-Body Problem

The classification of central configurations plays a central role in the study of the Newtonian N-body problem, governing a variety of features such as the existence of relative equilibria and bifurcations of the integral manifolds. The N-body problem is fundamental to understanding the motion and stability of celestial systems, from planetary orbits and asteroid dynamics to star clusters and galaxies. Studying central configurations provides insight into these motions, and is approached in a stepwise manner. We present new study for the planar 4-body problem with three equal masses and one unequal mass. This mass distribution is a natural next step beyond the equal-mass case, bridging the connection between theory and physically observed models to study new behavior. We describe a systematic approach to identifying and categorizing central configurations—balanced geometric arrangements of bodies, as a function of the variable mass parameter μ and potential energy U . We combine numerical and computational methods, emphasizing GPU parallelization to address the problem's high computational cost. The combination of analytic reductions with computer-assisted techniques allows us to map out the bifurcation structure in (μ, U) -space and provides insight into classification of configuration families, as well as the behavior at critical mass ratios in more complicated systems. Our results describe the transition between symmetric and asymmetric families of central configurations, examine the bifurcation structure of the problem through the identification of pitchfork and saddle-node bifurcations, and point to the emergence of a unique single asymmetric family that bifurcates from symmetry.

Mary Havens

Discipline: Psychology

Authors:

#1 Melissa Vélez

Abstract Name: Psychosocial Pathways Linking Vicarious Discrimination to Academic Achievement via Stress, Ethnic Identity, Familism

Experiencing discrimination, whether directly or indirectly, has been linked to adverse academic and psychological outcomes among ethnic-racial minority students (Huynh et al., 2017; Stevens et al., 2018; Walsdorf et al., 2023). Existing research focuses on personal experiences of discrimination, while significantly less attention has been given to vicarious discrimination- instances in which individuals witness, hear about, or learn secondhand of discriminatory acts against someone close to them, such as a parent or

caregiver. Examining this gap is critical because caregivers play a central role in shaping students' emotional security, motivation, and sense of belonging within academic environments. (Koren-Karie et al., 2012). This study seeks to examine if vicarious discrimination witnessed towards a primary caregiver impacts among ethnic-racial minority college students' sense of academic self-efficacy. Additionally, this study will explore perceived stress, ethnic identity, and familism as moderators. Ethnic-racial minority college students from diverse ethnic and racial backgrounds completed a survey. Participants were given validated measures on stress, discrimination, familism, and ethnic identity. Data collection is underway and will be completed by the conference. Hierarchical linear regression analyses will be used to test hypotheses regarding (a) the direct effects of vicarious discrimination on academic outcomes and (b) the moderating effects of stress, ethnic identity, and familism. It is hypothesized that exposure to vicarious discrimination against a primary caregiver will negatively hinder ethnic-minority students' academic self-efficacy in higher education. Additionally, we hypothesize that the relationship between vicarious discrimination of a caregiver and academic achievement is exacerbated by general stress, lower ethnic identity, and lower familism. Understanding the effects of vicarious discrimination towards their caregiver provides information critical to developing programming to support ethnic-racial minority students, such as workshops on learning strategies for coping with ethno-racial discrimination and supporting caregivers through discrimination. Clinical implications will be discussed.

Juliana Hayhome

Discipline: Biology

Authors:

#1 Juliana Hayhome

#2 Jasmine On

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#4 Kaylee Thomas

#5 Rosalyn Stanford

Abstract Name: Validating Environmental DNA (eDNA) Approaches to Assessing Soil Microeukaryotic Biodiversity

Microeukaryotic organisms, particularly nematodes, are highly abundant and diverse in soil ecosystems, where they fulfill critical ecological roles. Their spatial distribution is influenced by various environmental factors, including soil texture, nutrient levels, and vegetation. Despite their ubiquity, there is limited understanding of microeukaryotic biodiversity in soil habitats, especially within natural systems. Environmental DNA (eDNA) metabarcoding is a promising method to enhance our knowledge of soil microeukaryotic communities. Compared to traditional morphology-based taxonomy, eDNA metabarcoding can be more cost-effective, faster and may provide greater resolution, including the detection of rare species. In this study, we used eDNA metabarcoding (18S rRNA) to characterize microeukaryotic and nematode communities across various soil habitats in the Shipley-Skinner Reserve, Southern CA, USA. We also compared diversity patterns using two DNA extraction methods: raw soil and Baermann funnels, the latter is specifically designed to recover higher nematode abundance and diversity. Our analyses reveal that soil microeukaryotic diversity patterns are method-dependent, with the raw soil dataset exhibiting higher alpha-diversity across all metrics in habitats characterized by greater soil bulk density. When solely focusing on nematodes, the Baermann funnel dataset displayed the highest diversity, particularly in habitats with lower soil bulk density. Despite differences in alpha diversity and community composition, significant differences between soil types and among soil habitats were detected by beta-diversity analysis (nMDS and PERMANOVA) in both datasets, thus supporting their effects in structuring soil communities. As expected, nematodes were more abundant in the Baermann funnel samples, while fungi dominated the raw soil DNA sequences. Furthermore, our analysis revealed that nematode community composition varied considerably between DNA extraction methods, with cephalobids and dorylaimids more abundant in the Baermann funnel and soil datasets, respectively. These findings underscore the importance of understanding the nuances of different eDNA metabarcoding methods to accurately assess patterns of soil biodiversity.

Kaelyn Haynie

Discipline: Computer Science

Authors:

#1 Kaelyn Haynie

Abstract Name: The Texture of a Threat: Machine Learning & Obfuscated Malware Detection

Accurately detecting malicious programs is an expanding field of research for machine learning, with a novel approach incorporating a bytecode-to-image pipeline that produces images representative of software. These images are provided to convolutional neural networks (CNNs) to be examined for malicious pattern indicators. In this research, three unique CNN architectures are trained with 15,000 benign and malicious software samples encoded into images for the three major operating systems (OSs) targeted by malware: Android, Windows, and Linux. After benchmarking their performance on these samples, these CNNs are tested with 15,000 obfuscated versions of the same software to test their resilience against adversarial malware. The roughly 25% drop in accuracy from this obfuscation is mitigated by retraining the CNNs with these adversarial examples. Although this step improves the accuracy of detection against the adversarial samples, the CNNs lose a significant amount of their ability to detect unobfuscated malware. The Deep Boosted Feature Space Malware Classifier, using a support vector machine with a dual resNet and denseNet voting classifier head, performs the best of the three with initial 98.9 and 61.1 F1-Scores on the original and obfuscated data respectively, changing to 77.4 and 95.0 after the retraining step. This research simultaneously reaffirms the benefits of adversarial training while emphasizing the need for better methods of modeling and detecting malicious patterns in cross-OS software, both ordinary and obfuscated.

Morgan Hazelton-Tarango

Discipline: English and Literature

Authors:

Abstract Name: The Inherent Queerness of Horror: A New Perspective on Post-War Horror Literature

Horror as a genre has been relegated to the margins of literary studies, rarely considered a worthy object of analysis. Such marginalization, however, has allowed the genre to tackle societal issues in a way deemed too taboo for other media, which has attracted a particular set of people to horror media, including LGBTQ+ audiences. With its roots in the Gothic tradition, horror literature tends to conflate and purposefully confuse fear and desire, combining uncertainty and anxiety with excess and ornament. While such a breakdown of boundaries might elicit fear in a Western modern society predicated on efficient organization and discrete categories, it is also appealing to some. Drawing from scholarship in Gothic/horror studies and queer theory (including monstrosity and abjection), this paper examines the relationship between horror media and queer and transgender audiences, arguing that horror offers representation, catharsis, and weapons against societal marginalization. I examine four pivotal novels in horror literature which were published between 1950-1990, a period representing major sociopolitical shifts in British and American societies which had direct implications on normative understandings of gender and sexuality. This project engages with both close reading analysis and social context for each text: *The Haunting of Hill House* (1959), *Rosemary's Baby* (1967), *The Exorcist* (1971), and *The Hellbound Heart* (1986). Through my analysis of each literary text, I will explore an overlap of themes, including trauma, repression, domestic and family life, and liminality. These themes guide my reading of each novel, and thereby lead to uncovering the inherent queerness of horror.

Joanna He

Discipline: Biology

Authors:

#1 Joanna He

#2 Priya Singh

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#4 Liane Najm

#5 Yan Yang

#6 Bruce Trapp

Abstract Name: Astrocyte Association with a Surface-in Gradient Pathology in Multiple Sclerosis

Background: Multiple Sclerosis (MS) is one of the most prevalent inflammatory diseases in the central nervous system (CNS). Disability and progression have been linked to a surface-in gradient of neuronal loss, particularly in the outer layers of the cerebral cortex and the pial surface (Magliozzi et al., 2010). Objective: This project focuses on the pathology of intracortical astrocytes associated with vessels. We also look at the activation of pial surface-associated interlaminar astrocytes with apical processes extending to the pial surface and basal processes entering cortical layers II-IV (Verkhratsky and Nedergaard, 2018). Our preliminary data indicate a positive association between interlaminar astrocytes and vessels in MS brains. CSF components may induce interlaminar astrocyte activation, contributing to the surface-in gradient observed in MS. Methods: We conducted immunocytochemistry to investigate interlaminar astrocytes and vessel-associated cortical astrocytes using GFAP and CD44 antibodies. This analysis quantified vessel-associated CD44-positive cells in subpial and deep cortical regions. We used confocal and electron microscopy to examine morphology and associations/interactions of interlaminar astrocytes. Results: We found that compared to control brains, the MS cortex has a 40% increase in subpial CD44-positive cells and a significant increase in intracortical CD44-positive cells. Both GFAP and CD44 antibodies stained the pial surface. Some GFAP-positive astrocyte apical processes seemed to enter the pial surface and CSF space, and CD44-positive astrocyte basal processes appeared to descend into the cortex, often terminating on CD44-positive astrocytes associated with vessels in cortical layers II-IV and showing signs of pathology/degeneration. Descending processes from interlaminar astrocytes are often fragmented and associated with deep CD44-positive astrocytes. Conclusion: Our data suggest that CSF components at the pial surface may influence subpial CD44-positive cells as they interact with intracortical CD44-positive astrocytes and vessels in layers II-IV, influencing the surface-in gradient found in MS.

Nicole He

Discipline: Sociology

Authors:

#1 Mary Rose

Abstract Name: The Model Minority on the Stand: Social Identity Theory's Effect on East Asian Mock Juror's Sentencing.

With growing East Asian immigrant generations, normative expectations for success remain strong. In line with the stereotyped image of the "model minority," East Asian Americans usually have higher socioeconomic success compared to other ethnic groups, and make up only 1.5% of federal inmates (Federal

Bureau of Prisons, 2019). Nonetheless, East Asian Americans can and do become defendants, and with population growth, they are more frequently serving on juries. This raises questions about whether East Asian Americans serving as mock jurors will demonstrate in-group favoritism toward East Asian American defendants or instead react punitively toward a norm-breaker (i.e., the “Black Sheep” effect). Commonly, scholars marshal Tajfel and Turner’s Social Identity Theory to examine when jurors are lenient to defendants in their in-group, finding in-group favoritism when case evidence is weak and a group composes the majority of the jury. However, this research has only been conducted on Hispanic, White, and Black mock jurors. This project aims to examine East Asian Americans as both defendants and jurors in a mock-jury study. East Asian Americans are important to study because, according to prior research, collectivist ideals will promote high normative expectations for success, which may undercut in-group favoritism and instead prompt in-group rejection. By investigating how East Asian mock juror sentencing varies based on factors like numerical jury composition or the type of criminal violation, this study can shed light on how East Asian people handle the impact of norm violations when they must sit in judgment of fellow group members.

Olivia Headley

Discipline: Biology

Authors:

#1 Qi Tan

#2 Alireza Jian Bagherpoor

#3 Changli Zhou

Abstract Name: HIF1A Inhibition Reduces Radiation-Induced Profibrotic Signaling in Human Lung Fibroblasts

Radiation-induced pulmonary fibrosis (RIPF) is a severe and often irreversible complication of thoracic radiotherapy (commonly given for lung and breast cancers). RIPF is characterized by excessive extracellular matrix (ECM) deposition, which results in reduced lung function as it causes lung tissue to stiffen due to excess collagen production. A key driver of RIPF is the activation of fibroblasts into myofibroblasts – a process known as the fibroblast-to-myofibroblast transition (FMT). The FMT is associated with the upregulation of profibrotic markers such as COL1A1, FN1, and ACTA2, which indicate a state of fibrosis in tissues. Hypoxia-inducible factors (HIFs), particularly HIF1A, are transcription factors that regulate the cellular response to hypoxic conditions. HIFs have been implicated in both fibrosis in response to radiation. Radiation can induce pseudo-hypoxic signaling (hypoxic signaling even when sufficient oxygen may be present), which stabilizes HIF1A, even under normoxic conditions. This project investigates how X-ray irradiation influences HIF1A signaling and profibrotic gene expression in human lung fibroblasts (hLFs), and whether pharmacological inhibition of HIF1A can reduce the fibrogenic effects of radiation exposure. 10Gy of X-ray irradiation was given to hLF (human lung fibroblast) cells in an initial test to see the degree to which fibrotic markers were upregulated. In a second round of irradiation, the hLF cells were given a HIF1A pathway inhibitor, and a decrease in fibrotic markers was observed. This data supported our hypothesis that the HIF1A pathway is a mediator of radiation-induced fibrosis. Understanding this mechanism could inform strategies to mitigate RIPF and improve outcomes in patients undergoing thoracic radiotherapy.

Celia Hearn

Discipline: Political Science

Authors:

#1 Dr. Carrie Eaves

Abstract Name: The Political Digital Age: Generational Influence On Congressional Social Media Usage

As younger generations who have grown up with social media become members of Congress, they arrive on Capitol Hill more digitally literate and potentially better able to use social media as a method of communication. This leads to the question of whether there are systematic differences in social media usage and content between members of Congress in different generations. While some representatives entered Congress before social media's rise, younger representatives are entering with existing familiarity with the power of social media. These generational differences potentially impact how highly representatives value and rely on social media as a communication tool for constituent education and raising their profile. This study looks specifically at a representative sample of median members of the House of Representatives in the 119th Congress. The study specifically focuses on social media usage during the 2025 government shutdown, beginning on October 1st, 2025. The shutdown presents a unique moment when it was particularly important for members to communicate with their constituents and shape public opinion. A content analysis will be performed on members' messages shared across social media platforms such as Facebook, Instagram, and Twitter, as well as a quantitative analysis of the frequency and reach of posts. Past congressional research suggests that incumbent members of Congress have significant advantages in their ability to communicate with constituents, and this study's findings will suggest whether younger members are able to more effectively use social media to meet their goals in office.

Nathaniel Heaton

Discipline: Physics and Astronomy

Authors:

Abstract Name: Modeling the Projected Cross-sectional Area of Low Earth Orbit Satellites Using High-Fidelity Orbital Decay Analysis

Accurate modeling of atmospheric drag is critical for precise orbital propagation in Low Earth Orbit (LEO). However, the physical parameters required for drag modeling are often unknown or highly variable. This presents scientists with a challenging dilemma: attempt to isolate one physical parameter and find independent methods to solve for the others, or model a lumped aerodynamic parameter. This research lends itself to the former, presenting an open-source model for estimating the variable projected cross-sectional area of non-propulsive satellites by fitting high-fidelity numerical propagation models to historical Two-Line Element (TLE) satellite tracking data. The core of the numerical propagation model is a symplectic leapfrog integrator, which simulates equations of motion in an Earth-centered inertial reference frame. The integrator accounts for orbital perturbations due to Earth's oblateness, third-body gravitational influences from the Sun and Moon, and aerodynamic drag. The drag model incorporates a co-rotating atmosphere and utilizes the Jacchia-Bowman 2008 density model to precisely calculate atmospheric density at given epochs. Then, assuming that a value of 2.2 for any satellite's drag coefficient is scientifically defensible and that the mass of the satellite is known, the projected cross-sectional area of a satellite is calculated. The model is validated by using the known cross-sectional area of the spherical ANDE-2 Pollux and Starshine satellites, which the model successfully converged to. However, the idea that the only validation of this model was done with geometrically simple bodies indicates that there may be significantly greater error when it comes to modeling geometrically complex bodies. Therefore, further work seeking to resolve this hypothesized oversight would prove highly valuable.

Sophie Heberlein

Discipline: Business

Authors:
#1 Aimee Kane

Abstract Name: Exploring What College Seniors Prioritize in Their First Job

The purpose of this project is to explore what college seniors across different areas of study prioritize when searching for their first job after graduation. We will examine how students' sense of 'calling' impacts their expectations for meaningful work. This is relevant at a Catholic University, such as Duquesne, whose mission is to serve God by serving students through concern for moral and spiritual values. This creates an educational environment that encourages students to reflect on their ethical responsibility to others. Because college prepares students for the workforce, these messages shape how students think about what they value in a career. We will examine how the values of a Catholic university shape students' career priorities across different fields of study. Participants will be Duquesne seniors who complete a questionnaire asking them to identify their academic program (e.g., business, nursing). Then, there will be an open-ended question, "What makes a first job attractive?," which will allow students to explain what they prioritize. This will provide qualitative data on what participants value in a job. Next, participants will complete the Calling and Vocation Questionnaire (Dik et al., 2012), a standardized measure of how strongly they feel a sense of "calling" to their work. At the end, participants will have the option to enter a raffle to either win a \$30 gift card or donate \$30 to a non-profit. We will use this choice to see whether students' stated priorities in the previous questions align with their behavioral intentions. We expect students in service-oriented fields, like nursing, to value purposeful work. By contrast, business students may focus inward on their personal wants like higher compensation. These results will inform vocational psychology and showcase how higher education environments shape expectations formed prior to entering the workforce.

Jonathan Hedley

Discipline: Political Science

Authors:
#1 Gail Helt

Abstract Name: How financial counterterrorism units can stop the flow of terrorist funds.

In order to stop terrorism, you have to stop the supply of funds enabling terrorist networks to operate and commit deadly attacks. Financial counterterrorism units are often the unsung heroes helping to keep the public safe. This project will explore how terrorist networks are funded and how these networks try and stay under the radar of law enforcement. These methods include, criminal activity, (robbery, drug and human trafficking) crypto, state-sponsored, Cash, and online transfer apps such as Hawla which is significantly used in the Middle East and Africa. I will focus my attention on the importance of ensuring that financial counterterrorism units have the resources required in order to combat the ever-changing complexities and challenges surrounding terror finance networks, and I will argue that one of the keys to stopping the flow of terrorist funds is spotting not only regular, but irregular funding patterns. For example, this could be a regular pattern of an individual repeatedly travelling from one country to another with large amounts of cash. Or an irregular pattern which could be a one-off large payment that rings alarm bells for counterterrorism. There are several methods which financial units use to crack down on terrorism. These include specialists trawling through the data, legislation to allow the seizure of funds, tracking the travel of individuals, and multi-agency cooperation including international cooperation. Breakthrough methods against drug cartels could be used in the fight against terror finance networks. These methods are international cooperation, asset seizure, and funding and training programs. Therefore, greater cooperation, stronger laws, and more funding would help combat terrorism. In my research, I will highlight why the funding of terrorist networks is so complicated and the various loopholes which provide safe haven for terrorists.

Matthew Heerboth

Discipline:

Authors:

Christine Saber

Abstract Name: Celebrate Gannon: Bringing the NCUR Model to an Annual Symposium at a Small Predominantly Undergraduate Institution

Celebrating research programs at predominantly undergraduate institutions presents challenges in creating sustainable, campus-wide structures that support and showcase student scholarship. These structures can also promote, and advance university initiatives related to enrollment, fundraising, and new community engagement. Celebrate Gannon is an annual student-centered symposium that brings together scholars from across the university to present their research, creative work, and scholarly accomplishments. In 2012 the Gannon Undergraduate Research Symposium, a primarily STEM-based traditional student-mentor scholarship program, was redesigned to encompass a more comprehensive celebration of undergraduate scholarship that aligns closely with the Boyer Model of Scholarship. Today, Celebrate Gannon showcases a wide range of contributions including course-based undergraduate research, community engagement initiatives, interdisciplinary contributions, and senior capstone projects. As long-standing members of the Celebrate Gannon planning committee, we will describe the event's growth, key successes, and lessons learned, including strategies for overcoming initial resistance from faculty and committee members as the symposium expanded in scope. We will also discuss approaches for coordinating effectively across university divisions including marketing, facilities, and upper administration to promote, support, and execute an institution-wide research celebration. Our experience offers a practical and adaptable model for small, predominantly undergraduate institutions seeking to build or enhance their own NCUR-inspired symposiums.

Gwenyth Heidinger

Discipline: Geography/Geology

Authors:

#1 Andrew Veroeven

#2 Prajukti Bhattacharyya

#3 Peter Jacobs

Abstract Name: Analyzing Differences in Weathered Products Between Icelandic Basalt Samples

Iceland is used as a terrestrial analog for Martian geology research because its weathered material is more dependent on protolith mineralogy and chemistry, similar to Martian regolith. One weathered product commonly observed on Mars, uncommon on Earth, is maghemite. It is known to affect soil magnetization on Mars and has also been observed by remote sensing. Therefore, weathered products from Iceland containing maghemite can be used as a proxy to study Martian surface process. The goal of this research is to identify factors potentially affecting maghemite formation on Earth. For this purpose, we analyzed weathered basalt samples from approximately 800-year-old lava collected from two locations in the Reykjanes Peninsula within southwest Iceland. We created powdered samples selected from seemingly less weathered and more weathered parts of the basalts to compare mineralogical and chemical differences. Preliminary mineralogical data from powdered X-Ray Diffraction (PXRD) analyses indicate evidence of magnetite to maghemite transitions in both locations. The presence of maghemite in these samples is intriguing because there is not yet

a consensus on the factors needed for its formation. This research aims to provide insight into the formation of maghemite in weathered basalts on Earth to potentially infer Martian surface processes. This poster will present preliminary data from mineralogical, chemical, and textural analyses of weathered and unweathered Icelandic basalts to understand how these findings can be applicable to Martian geology.

Abby Heidorn

Discipline: Biology

Authors:

#1 Matthew Graham

#2 Barbara Murdoch

Abstract Name: Discovery of Scorpion Group 1 bacteria in the venom microbiome of the Eastern Swollenstinger Scorpion, *Anuroctonus phaidactylus*

Animal venoms are composed of a complex mixture of compounds with unique biological functions. Interestingly, protein components of venoms have shown potential clinical and pharmacological applications in a variety of areas, including the production of anti-cancer and antifungal medications. Despite the wealth of knowledge regarding venom proteins, scorpion venom has been presumed to be sterile and devoid of bacteria. Contrary to this belief, recent research in our lab found bacteria in scorpion venom, leading to a larger study characterizing the bacterial communities present in the venom of *Anuroctonus phaidactylus*, the swollenstinger scorpion. Using Nanopore sequencing, we analyzed venom DNA for amplicons from the 16S rRNA gene. Unexpectedly, we found four haplotypes of the Scorpion Group 1 (SG1) lineage in our venom samples. This finding indicates that SG1 is not unique to the family of Vaejovidae. Given that our four unique SG1 haplotypes are minimally divergent from those recovered in vaejovids, our discovery of them in a member of the Anuroctonidae family could represent a recent, successful host-switching event or a long-term pattern of frequent microbial exchange among scorpion hosts.

Torben Heinbockel

Discipline: Biology

Authors:

#1 Vonnie Shields

Abstract Name: Behavioral Olfactory Responses of Crickets to Essential Oils

The development of effective and safe repellents against arthropods is very important to prevent arthropod-borne diseases and is critical for human health and safety. The use of synthetic repellents (e.g., DEET) has been successful against pests, such as mosquitoes and ticks that cause diseases, e.g., malaria and Lyme disease. Other insects, such as crickets, cockroaches, and ants have omnivorous feeding preferences and can contaminate and destroy stored food products like sugar, flour, grains, etc. with their feces. Lately, DEET has raised environmental and human health risk concerns. Recently, selected aromatic plant-based essential oils have been used as alternatives to synthetic repellents against some arthropods. Essential oils work through the sense of smell of arthropods. In this study, the efficacy of 27 essential oils was measured in terms of their behavioral effects in an insect pest, namely house crickets, *Acheta domesticus*. We hypothesized that a selected panel of these essential oils would show strong levels of repellency against these crickets, while others would be weaker or ineffective. This hypothesis was tested in behavioral choice experiments where crickets were exposed to individual essential oils. Crickets were observed to either stay in an open-arena or

move toward the odor source located in a plastic bottle. In control experiments, where no odor source was present, crickets moved into the bottle. We observed 14 essential oils which exhibited the strongest levels of repellency (i.e., crickets avoided bottles containing these essential oils). The other 13 essential oils elicited weaker levels of repellency or no repellency at all. Some of the essential oils tested in this study may be considered green (environmentally friendly) repellents and have the potential to substitute harmful synthetic repellents. This work was funded by research grants from the Fisher College of Science and Mathematics (Towson University) and the NIH (Bridges grant 1T34GM150447-01).

Torben Heinbockel

Discipline: Environmental Science and Sustainability

Authors:

#1 Vonnie Shields

Rana Alzyoud

Abstract Name: Sustainable Control of *Drosophila suzukii* Using Methyl Benzoate Analogs as Repellent Agents

Food security is increasingly threatened by invasive agricultural pests, such as the spotted wing drosophila (SWD), *Drosophila suzukii*. This fruit fly species poses a major risk to global soft fruit production, particularly berries, due to its unique ability to lay eggs in ripening fruits using a serrated ovipositor. Since its initial detection in Hawaii and California, SWD has rapidly expanded its range across the United States, leading to crop losses of up to 80% if unmanaged. This poses significant economic challenges for growers and directly impacts food availability. While synthetic insect repellents like DEET have shown efficacy in reducing infestations, their environmental impact and sustainability concerns have driven the search for greener alternatives. In this study, we investigated the repellency of methyl benzoate, a naturally occurring volatile organic compound, and several of its chemical analogs against SWD. Repellency assays using 24 female flies per treatment group were conducted across various concentrations and timepoints. Dose-response models were used to calculate RD50 values, enabling a comparative analysis of compound effectiveness. Promising results were observed with anthranilates and ether-substituted benzyl ester compounds, demonstrating a strong potential for the emergence of environmentally friendly repellents. This research contributes to sustainable pest management strategies essential for protecting fruit crops and ensuring long-term food security. This work was funded by research grants from the Fisher College of Science and Mathematics (Towson University) and the NIH (Bridges grant 1T34GM150447-01).

Bridget Heindl

Discipline: Interdisciplinary

Authors:

#1 Jason Ware

Leo Malachowski

Abstract Name: Homeowner Well-Being and Community Livability: A Comprehensive Analysis in Lafayette, Indiana

Affordable housing is a cornerstone of any thriving community and is a critical priority for the Greater Lafayette region of Indiana. Through a collaborative partnership between the John Martinson Honors College, Habitat for Humanity of Lafayette, and the Quality of Life Foundation, our project focuses on

community revitalization by examining the quality of life of Habitat for Humanity homeowners. Habitat for Humanity is a nonprofit that works with volunteers and partner families to build new, affordable homes as well as complete critical home repairs. Our work integrates community engagement with a research-driven approach to create affordable neighborhood initiatives that enable residents to become connected. To guide our quality-of-life assessment, we developed a unified framework that combines Veenhoven's Four Qualities of Life and the Quality of Life Foundation's Framework 2.0. This model holistically evaluates both the livability of a neighborhood and the well-being of its residents. Using this framework, we created a homeowner survey that addresses five key dimensions: Safety and Transportation, Opportunities to Grow, Connectivity, Enjoyment of Life, and Accessibility. Preliminary findings from Habitat for Humanity homeowners reveal recurring themes, including limited neighborhood interaction, a lack of access to green spaces, and concerns about neighborhood safety. While some residents report opportunities for outdoor recreation, many experience barriers due to inaccessibility or lack of awareness. These findings underscore the need for initiatives that strengthen community connection and access to shared outdoor spaces. Based on these insights, our current phase focuses on conducting semi-structured interviews to gain a deeper understanding of homeowner experiences and aspirations. Guided by this feedback, we plan to implement a community gardening initiative in collaboration with local organizations to enhance neighborhood cohesion, promote access to healthy food, and foster long-term pride and self-sufficiency among Lafayette communities.

Jakub Hel

Discipline: Biology

Authors:

#1 Andrew Arrant

#2 Mackenzie Love

Abstract Name: Assessing the Role of Intracellular Progranulin in Restraining Inflammation and Supporting Lysosomal Function

Frontotemporal dementia (FTD) is the second most common cause of early-onset dementia after Alzheimer's. Roughly 20-25% of familial FTD cases are caused by GRN mutations, most of which cause haploinsufficiency of the protein progranulin. Progranulin is a glycoprotein responsible for restraining inflammation, exerting neurotrophic effects, and supporting lysosomal function. While it is known that progranulin undergoes both secretion to the extracellular space and direct trafficking to the lysosome, it remains unknown where progranulin exerts its critical functions. To address this topic, we created a novel knock-in mouse model (GrnL) that replaces endogenous mouse progranulin with L-PGRN, a modified version of human progranulin that is fused to the cytosolic tail and transmembrane domain of LAMP-1. This results in direct trafficking of progranulin to the lysosome with minimal secretion to the extracellular space. We sought to test whether this loss of extracellular progranulin would be associated with the development of FTD-like pathology including microgliosis, astrogliosis, and lysosomal dysfunction, thus helping to elucidate progranulin's critical site of action. Immunohistochemistry experiments were performed on mice expressing L-PGRN on a Grn knockout background. Both the heterozygous (Grn—/L) and homozygous (GrnL/L) knock-in mice displayed significantly lower levels of gliosis and lysosomal dysfunction markers than the progranulin knockout (Grn—/—) mice. To further assess lysosomal function, we asked whether mice expressing L-PGRN would display the dysregulation in enzymatic activity observed in Grn—/— mice. Lysosomal enzyme activity assays indicated that just one copy of the L-PGRN gene was generally sufficient to counteract dysregulation in enzyme activity. Together, these results suggest that extracellular progranulin is not necessary for preventing the onset of FTD-like pathology. Uncovering progranulin's cellular site of action is critical for informing the development of therapies to fight FTD and related disorders.

Luke Heller

Discipline: Interdisciplinary

Authors:

#1 DeAnna Beasley

#2 Chris Acuff

Abstract Name: Relating Microclimate Readings and Usage Patterns on the Mouse Creek Greenway in Cleveland, TN

Previous studies have suggested that a relationship exists between outdoor air temperature and the number of people using green spaces and trails. However, few studies have examined how trail usage relates to local microclimate conditions at specific locations. This study explores whether differences in the number of people present at different locations along the Mouse Creek Greenway in Cleveland, TN can be partially explained by differences in microclimate conditions during the summer at these locations. Microclimate and usage pattern data were collected on the Mouse Creek Greenway on June 4th and 5th, 2025. Spatial analysis was performed in ArcGIS Pro to calculate average temperature at each site, which was then normalized to NWS readings at Cleveland Regional Jetport. Ultimately, no relationship was found between temperature and usage pattern data. This is likely due to a limited amount of data and other variables influencing usage patterns.

Ethan Henderson

Discipline: Education

Authors:

#1 Jaden Yates

#2 Elijah Jensen

#3 Wilson Gonzalez-Espada

Abstract Name: Identifying Academic and Non-academic Factors Associated with Undergraduate Mathematics, Mathematics Teaching, and Space Systems Engineering Programs

According to national reports and relevant scholarly literature, there are nearly nine million science, technology, engineering, and mathematics (STEM) jobs in the United States. Despite a booming job market, the U.S. is not graduating enough STEM graduates. Part of the problem is attrition, where STEM-interested students switch into non-STEM majors or drop out of college altogether. Mathematics, engineering, physical sciences, and other quantitative fields are disproportionately affected by STEM attrition. The purpose of this study is to identify to what extent academic factors (high school GPA, ACT scores, and grades in specific college classes) and non-academic factors (gender, first-generation college student, and socioeconomic status) explain why students who initially intended to complete an undergraduate degree in mathematics ($n = 94$), mathematics teaching ($n = 140$), and space systems engineering ($n = 256$) persist and graduate in their intended major, switch out of these majors but still graduate from college, or do not graduate. The study used a quantitative methodology, including descriptive and inferential parametric and nonparametric statistics, depending on the dataset's characteristics. Although the study is still in progress, preliminary findings suggest that students with lower high school GPAs, lower ACT scores in math and science, lower socioeconomic status, and those who are first-generation college students tend to leave their original major at significantly higher rates. Next steps include examining the role of grades in specific college classes and developing a multinomial regression model to identify the relative weight of the independent variables. This study is important because it could lead to establishing cost-effective academic and non-academic interventions that could help retain as many students as possible, resulting in better-qualified mathematics, mathematics teaching, and space systems engineering professionals in KY.

Jillian Henderson

Discipline: Biology

Authors:

#1 Maninder Sandey
#2 Jonathan Marable
#3 Alana Kramer
#4 Himarishi LNU
#5 Damien Ruiz
#6 Payal Agarwal
#7 Bruce Smith

Abstract Name: Revolutionizing Veterinary Oncology: A Nanobody-Based Approach to Immune Checkpoint Therapy

Cancer is the leading cause of death in geriatric dogs (>10 years), yet current treatment options provide limited survival benefits and are frequently associated with significant toxicity. Tumor-mediated suppression of T-cell activity via the PD-1/PD-L1 immune checkpoint represents a major barrier to effective antitumor immunity, as many cancers exploit this pathway through PD-L1 overexpression to evade immune surveillance. To address this, we are developing a nanobody-based immunotherapy designed to restore T-cell function by blocking PD-1/PD-L1 signaling and thereby enhancing tumor clearance. We previously identified anti-PD-1 and anti-PD-L1 nanobodies that bind to canine PD-1 and PD-L1 receptors. From this panel, we have selected three cross-reactive anti-PD-1 nanobodies and one cross-reactive anti-PD-L1 nanobody that recognizes both canine and murine targets. These nanobodies were cloned into the SPB-015 vector and used to generate Expi293F-based stable cell lines for the production of recombinant proteins, followed by purification using affinity chromatography. ELISA and flow cytometry confirmed specific, high-affinity binding to both canine and mouse PD-1 and PD-L1. In functional assays, these nanobodies demonstrated inhibition of the PD-1 and PD-L1 interaction, demonstrating robust checkpoint blockade activity. These findings support advancement to in vivo efficacy studies in syngeneic murine tumor models and highlight the potential of nanobody-based PD-1/PD-L1 inhibitors as a translational immunotherapy platform for canine oncology.

Natalia Hendrickson

Discipline: Psychology

Authors:

#1 Lesley Guareña, MA
#2 Lee Ryan, PhD

Abstract Name: Early Risk, Lasting Impact: Adverse Childhood Experiences and Executive Functions in Older Adults

Adverse childhood experiences (ACEs) have been extensively linked to a range of negative health outcomes throughout the lifespan, with recent research suggesting enduring cognitive effects in older adulthood. Executive functions, a set of cognitive processes including planning, inhibition, and cognitive flexibility, may be particularly vulnerable to early-life stress. While previous studies have demonstrated associations between ACEs and poorer cognitive functioning, few have investigated this relationship within diverse U.S. aging

populations. This study aims to investigate whether exposure to ACEs predicts executive functions among older adults, with an exploratory investigation into whether this association differs among Hispanic/Latino and non-Hispanic White adults of similar ages and education characteristics. Seventy community-dwelling adults aged 50 to 79 years, including an equal number of Hispanic/Latino and Non-Hispanic White participants, completed cognitive testing and psychosocial assessments as part of a larger longitudinal aging study. Of the executive functions, working memory updating was assessed using the Keep Track Task, inhibitory control and selective attention were assessed using the Flanker Task, and cognitive flexibility was assessed using the Letter Number Task. ACEs were measured using a modified version of the Childhood Trauma Questionnaire (CTQ). Linear regression analyses will be used to examine the association between ACE scores and executive functions performance. Models including race/ethnicity will also be implemented to assess for racial/ethnic group differences. Based on prior evidence linking higher ACE exposure to long-term deficits in executive functions, we hypothesize that higher ACE scores will predict poorer executive functions performance overall. Additionally, given documented racial/ethnic disparities in ACE exposure, we expect exploratory analyses to reveal that Hispanic/Latino participants show higher ACE scores and lower executive functions performance when compared to demographically-matched non-Hispanic White adults.

Owen Henke

Discipline: Psychology

Authors:

#1 Allison Malmquist

#2 Olga Lipatova

Allison Malmquist

Abstract Name: Sex hormones have differential effects in female and male rats on a reversal learning task.

It is often vital for organisms to visually discriminate between phenomena and to use that information to alter behavior in a process known as behavioral or cognitive flexibility. One aspect of behavioral flexibility is reversal learning, or reversing learned associations of the same stimuli modality. Areas of the frontal cortex are primarily responsible for these behaviors, including the medial prefrontal cortex (mPFC), implicated in learning associations with visual phenomena, and the orbitofrontal cortex (OFC), implicated in reversal learning. Many factors influence learning and reversal learning, including previous experience, stress, and hormones. To examine differential effects of the circulating gonadal hormones on each sex in rats, we conducted a touchscreen-based pairwise visual discrimination and reversal learning study on gonadectomized rats implanted with slow release capsules of testosterone, estrogen, and vehicle control. Rats had to select one of two visual stimuli with different frequencies. Once the rat learned an association (defined by 80+ correct trials in a 70 minute session), the conditioned stimulus switched in a subsequent session. Sessions until criterion were continued for both initial learning, and subsequent reversal(s). These data, and others, are still being collected and analyzed. Preliminary results suggest that gonadal hormones did not appear to have any effect on initial visual discrimination learning. However there it appears that estrogen and testosterone have differential effects on reversal learning in males and females. Estrogen treatment resulted in an increased number of sessions to reach the criterion for reversal learning in females compared to males, while testosterone appears to have increased the number of sessions the rats needed to reach criterion for reversals in males compared to females. These results may be attributed to the differential influence gonadal hormones have on the mPFC and OFC in each sex.

Ryan Henning

Discipline: Mathematics

Authors:

#1 Renee Marquez

#2 Chanaka Kottegoda

Abstract Name: Ensemble Modeling for H1N1

The H1N1 “swine flu” virus caused the first influenza pandemic of the 21st century in 2009, spreading rapidly across seventy-four countries and highlighting the urgent need for accurate disease forecasting tools. In time series forecasting, ensemble models have been proven to be superior to individually strong models and are widely used across various modeling problems. In this REU project, we sought to compare a variety of mathematical, statistical, and machine-learning models against a baseline Naïve Persistence Model (NPM) and employ an ensemble method to effectively predict future H1N1 surges. Using CDC H1N1 case data for the ten U.S. Health and Human Services regions, we implemented six forecasting models. These models were trained and tested using a sliding-window approach to simulate real-time deployment, and predictions were combined into a single ensemble model. When tested across all regions, we found that our ensemble outperformed the NPM at both 1-week and 4-week forecast horizons. Our results show that integrating diverse H1N1 forecasting models into a single ensemble produces superior predictions, validating existing ensemble research and providing valuable predictive power for H1N1 disease forecasting, which could better support public health decision-making. Furthermore, the region-dependent approach we employ supports localized disease management and can inform research of regional impacts on disease spread and model predictions.

Rachel Henninger

Discipline: Biology

Authors:

#1 Rachel Henninger

#2 Marguerite Bishop

#3 Jodi Valencic Zieverink

Abstract Name: Sunscreens in the Sea: Quantifying Wash-Off to Protect Skin and Aquatic Ecosystems

This study investigates which sunscreen formulation, mineral, reef-safe mineral, or sport, remains on the skin most effectively during water exposure. The purpose of the research is to determine which type provides the strongest water resistance for human skin protection while minimizing chemical release into surrounding aquatic environments, a growing concern in marine ecosystem health research. Building on prior findings that sunscreen ingredients can accumulate in marine environments and harm coral reefs, this project contributes a comparative, laboratory-based analysis of wash-off rates under controlled conditions. Skin samples were rehydrated and treated with 0.1 g of each sunscreen type. Standard curves for each formulation were generated using serial dilutions and spectrophotometric analysis to enable precise quantification. Treated samples were then submerged in agitated water designed to simulate natural ocean wave motion, and water samples collected at timed intervals over 35 minutes were analyzed to measure sunscreen released. Preliminary results indicate clear differences in wash-off rates among formulations. The reef-safe mineral sunscreen adhered to the skin the longest and produced the lowest concentrations in the water, suggesting it may offer both superior water resistance and reduced environmental impact. These findings will be discussed in relation to consumer sunscreen choices, environmental protection, and the need for continued evaluation of sunscreen ingredients in aquatic systems.

Paige Hepfer

Discipline: Environmental Science and Sustainability

Authors:

#1 Sara Ashcraft

Abstract Name: A Slimy Situation: Landscape effects on Slimy Sculpin (*Cottus cognatus*) morphology within West Branch Susquehanna River watersheds

Freshwater sculpin are a small-bodied, benthic fish species found in cool-to cold-water rocky streams. They can be a useful environmental indicator due to their partial tolerance to turbidity and siltation as well as intolerance to warmer temperatures, chemical pollution, and acidification. Slimy Sculpin *Cottus cognatus* (Richardson, 1836) is distributed within West Branch Susquehanna River watersheds. We vouchered specimens in the field within the Loyalsock Creek, Pine Creek, and Kettle Creek watersheds. Then we examined specimens for meristics such as fin ray counts, pore counts, and spine counts as well as morphological characters such as caudal peduncle length, palatine teeth presence, and the connection of the last two rays of the dorsal and anal fin rays. Previous research within these watersheds showed variability in traits among sites. We are investigating if landscape characteristics are influencing the variability of expressed traits. We hypothesize that there will be an increase in variability in traits depending on landscape characters like elevation and distance of the site from the main stem.

Grit Her

Discipline: Economics

Authors:

Abstract Name: The Impacts of COVID on Achievement Test Scores

This research will determine the extent to which state-level education spending per pupil affects SAT and ACT scores, controlling for other factors. By understanding the relationship between public education spending per pupil and how it affects achievement scores, we can see how effective funding is, determine whether there is a real need for public funding, and give policymakers insights. It also allows us to move in a direction that could lead to actual improvements in learning and programming, such as reduced class sizes, hiring higher-quality teachers, and providing tutoring support. In this research, we will determine the relationship between the yearly aggregated per-pupil spending and achievement scores on the SAT and ACT by running a multiple regression analysis. Two separate regression analyses, one for SAT scores and one for ACT scores, will be run (to conclude findings and compare results). The independent variables will be average per-pupil spending, exam participation percentage, teacher-to-student ratio, median household income, and state-level demographic percentages. The per-pupil expenditure data represents the total aggregate spending for that year within each state. All non-demographic variables are measured by state, spending and income are adjusted for inflation, and geographical and COVID dummy variables are also included. My data sources are composed of the Federal Reserve Bank of Minneapolis (for CPI), KIDS COUNT Data Center at the Annie E. Casey Foundation (for per-pupil expenditures data), and the National Center for Education Statistics (for mean SAT and ACT scores, and participation rates). Additionally, the research includes geographical dummies for the regions in the United States (Northeast, Southeast, Midwest, Southwest, and West as reference) and examines how this relationship is represented before and after COVID, because the pandemic caused major disruptions in both school funding and student performance. Preliminary results show a negative impact of COVID on achievement test scores

Donna Hercules

Discipline: Biology

Authors:

#1 Liza Wilson

Abstract Name: The Role of Xyloglucan in Arabidopsis Root Growth

Arabidopsis thaliana is a fast-growing plant in the mustard weed family (Brassicaceae) that is widely used in plant research; its genome has been fully sequenced and is available online, making it a 'model' system for plant cell wall growth. Our focus for this study was to look at the genes that are involved in xyloglucan synthesis and study the mutants where one or more of these genes are deleted. Xyloglucan, a hemicellulose, is found in all vascular plants and is a polysaccharide (sugar) that has a glucose backbone with other sugars of xylose, galactose, and fucose forming side chains of varying lengths. Xyloglucan is involved in cell wall formation, wall integrity, and overall growth of the wall. Many studies have shown that xyloglucan directly interacts with the cellulose in the cell wall during growth. We used the wild-type seeds and measured seed germination rates, primary root lengths, root hair formation, and lateral root counts, and compared that to three *Arabidopsis* mutants that lack xyloglucan. Wild type and mutants (xxt1xxt2, xxt1xxt2xxt5, and cscl4,5,6,8,12) were surface sterilized and grown on media plates to score germination rates and root growth measurements. We used a stereo microscope to capture images of the seedlings at specific time points, used ImageJ to measure lengths, manually counted root hairs and lateral roots, and then used Excel to plot all graphs. We hypothesize that by deleting these specific xyloglucan genes (XXT and CSLC), we can reduce primary root growth and the number of root hairs in these mutants. This will tell us that xyloglucan is directly regulating cell wall growth in root tissue in *Arabidopsis*. By studying these gene deletions, we gain a better understanding of how a plant can be modified to affect function.

Alexandra Hermanson

Discipline: Interdisciplinary

Authors:

Lauren Ness-Schrupp

Abstract Name: Observing the Impact of Hamline University's Infrastructure on Bird Populations: Bird Strike Mitigation Project

Anthropological and environmental inquiry has sought to document the relationship between the built human environment and the other species that inhabit these spaces. Using this lens, the researcher examines the infrastructure of Hamline University's campus in Saint Paul, Minnesota, to observe its influence on the local bird populations by discovering potential solutions to decrease the number of bird deaths on campus, noting the influence birds and humans have on each other, and advocating for change in a meaningful way. In this study, an ethnographic approach is used to evaluate the health of the bird population by surveying bird species throughout Minnesota, conducting surveys on the Hamline University campus, and observing mitigation strategies in collaboration with institutional and community partnerships in Saint Paul, Minnesota. When considering mitigation solutions, a "do it yourself" approach can be extremely effective in reducing bird deaths on the Hamline University campus. It was recognized that this approach is accessible and inexpensive for institutions and individuals who are working towards decreasing bird collisions, and helps foster community engagement through creative expression of a significant issue. Additionally, administrative support of environmental and sustainability programs at local academic premises is crucial in protecting the well-being of bird species, showcasing the importance of students advocating for change on their campus. This research has worked in collaboration with another Hamline University undergraduate researcher who

focused on explaining the results of the surveys conducted, as well as investigating the types of birds that live on our campus, to increase general awareness of the waning bird population and broaden the scope of anthropological and environmental research. By utilizing a holistic approach, human influence on our environment can be examined in tandem with various mitigation strategies to decrease campus bird collisions and stress the importance of interdisciplinary work and collaboration within communities.

Isabella Hernandez

Discipline: Psychology

Authors:

#1 Melissa Caballero

Yesenia Ramirez

Michelle Carbajal-Hernandez

Abstract Name: Family Matters: Cultural Mismatch, Familial Support and Latine College Students

Literature on cultural mismatch highlights the negative impact on well-being for first-generation and Latine college students with collectivist backgrounds when universities primarily emphasize independence (Stephens et al., 2012; Vasquez-Salgado et al., 2015). Recent work also shows that cultural mismatch can be addressed. Latine first-generation (FG) students who experience a cultural connection to their college have a higher sense of belonging (Dueñas & Gloria, 2017). Separate literature highlights the importance of a supportive family for FG students for a higher sense of belonging in college (Roska et al., 2020). While experiencing a cultural match and family support are linked to belonging separately, research has yet to examine how they work together to predict belonging in the transition to college. This exploratory study examines this relationship for Latine FG students in their first year of college through secondary analysis of survey data of Latine FG college students (n=62) in their first year of college. The survey was part of a larger mixed-method longitudinal study focused on the college transition experiences of high school graduates. Using hierarchical linear regression analysis, we tested our two hypotheses. First, we hypothesized that a cultural match and family support would each positively predict belonging. Second, our main hypothesis was that family support would moderate the relationship between a cultural match and belonging, such that family support would buffer the negative effect of a low cultural match on belonging. Results showed that family support did not significantly predict belonging and did not moderate the relationship between cultural congruity and belonging. However, cultural congruity significantly predicted students' sense of belonging. This study highlights the need for further investigation of how universities can meet student needs culturally and emotionally. Insights show we can work toward creating ways to improve the college transition for both first-generation Latine students and their families.

Rosalia Alexis Hernandez

Discipline: Chemistry

Authors:

#1 Alexa Figueroa

#2 Jennifer Rosati

#3 Rabi Musah

Abstract Name: Mass Spectral Characterization of Blow Fly Pupae for Species Determination

Blow flies (Family: Calliphoridae) are often the first insects to colonize decomposing remains, making them

vital for estimating the postmortem interval (PMI) in forensic investigations. A back calculation method exists to enable forensic investigators to estimate the PMI by correlating species identity, environmental conditions, stage of decomposition, and species-specific life stages timelines. However, visual identification of the phenotypic features of the adults, which is the method most commonly used to identify species, is not suitable for the immature life stages most often encountered in forensic case work. Furthermore, insect species identification by DNA analysis is impractical for many crime labs and is time-consuming, limiting its use in casework. In this study, we explored the ambient ionization technique Direct Analysis in Real-Time High-Resolution Mass Spectrometry (DART-HRMS) as a means by which to identify species-specific metabolome profiles of blow fly pupae, one of the life stages encountered as forensic evidence. Pupae from several forensically-relevant were analyzed, and their distinct chemical fingerprints were compared using multivariate statistical tools. Application of Support Vector Machine (SVM) to the mass spectral data from 240 samples of 12 forensically relevant blow fly species revealed species level classifications with accuracies of 97.50% (leave one out cross validation) and 95.10 percent (external validation). Several key metabolome markers were also identified, including molecules whose presence or absence reliably distinguished species. Presence markers included nominal m/z 520, 536 and 546 which were specific for *Lucilia cuprina*, *Phormia regina* and *Calliphora livida*. Overall, these findings show that DART-HRMS offers a fast, non-destructive way to analyze insect evidence with the potential to improve PMI estimations, while overcoming some of the limitations of the traditional approaches to species identification.

Makayla Hernandez

Discipline: History

Authors:

Abstract Name: Libertatis Cunabula: Slavery in San Antonio Project

This research project discusses information that nobody else wants to discuss or acknowledge, whether that be important figures like Sam Maverick's role as an enslaver or the numerous monuments that don't represent the entirety of American history. This research project covered the Bexar County Tax Assessment Records from 1837 to 1862 and totaled around 1,200 pages. People have said that slavery wasn't a big deal since it wasn't as prominent within Bexar County/San Antonio, but these documents say otherwise. With the help of these documents, we can account for 11,096 enslaved people, 2,397 enslavers, and \$6,228,409 worth of taxable. Early scholars have consistently argued for independence, while later scholars claimed that Mexico was wronged by an illegitimate war initiated by the United States. However, no scholar has ever consulted any primary sources to see the impact that slavery had within San Antonio. These documents are an essential part of telling us the truth; slavery was not only here in Bexar County, Texas, but also prevalent within these specific years. Not only were men buying and selling enslaved people, but women were also participating in this. Another interesting fact that comes to light through these tax assessment records is that some of the famous historical figures in Texas were also enslavers, some even being those who enslaved the most people for specific years. Although this research topic is sensitive, it is imperative not to forget about this intensely realistic history. Another thing that became very common within these documents was that the majority of enslaved people were children under the age of 18.

Nathan Hernandez

Discipline: Biochemistry

Authors:

#1 Lee Solomon

Abstract Name: Integrating Flavin Cofactors into Peptide Amphiphiles for Electron Transport

Flavin is a redox cofactor found in many biological systems. Its ability to support electron transfer makes them a valuable tool to study this process in nature. In this project, I am synthesizing an Fmoc-protected flavin amino acid for use in peptide-based model systems that mimic redox-active proteins. This work is part of a broader effort to design an artificial system that isolates the biological properties underlying natural protein functions while being free from the complexity of evolutionarily affected systems. While working toward incorporating the flavin amino acid into peptide amphiphiles, I am learning techniques in organic synthesis, chemical purification, and NMR spectroscopy. These simplified systems will ultimately help us understand redox behavior in proteins and contribute to the development of next generation bioelectronic materials.

Diana Hernandez

Discipline: Engineering

Authors:

#1 Zoltan Sternovsky

#2 Austin Smith

Abstract Name: Analysis of Space Dust Impact Waveforms on the Parker Solar Probe

Magnetic signatures measured by the Parker Solar Probe's (PSP) Fields search-coil magnetometers (SCM) are known to coincide with impacts of interplanetary dust, but the physical mechanism that links dust impacts to the observed waveforms remains poorly constrained. This project investigates whether a physics-based model of the expanding impact plasma plume can reproduce and interpret these magnetic signals, with the goal of using SCM data as a new diagnostic of dust populations near the sun. Building on recent electrostatic models that successfully explain dust-impact signals on spacecraft antennas, this work applies a similarly detailed description of the plasma plume geometry and ion kinematics to the PSP and SCM system. Using CST Studio, a simplified CAD model of the spacecraft and magnetometers is constructed to enable rapid electromagnetic simulations of the magnetic field perturbations generated by a moving, expanding cloud of charged particles. By varying key fitting parameters, such as impact location on the spacecraft, plume orientation, and effective dust charge and mass, the study will assess which physical configurations best reproduce the timing, amplitude, and multi-sensor structure of the measured signatures. The expected outcome is a validated modeling framework that links specific features of the SCM waveforms to properties of the impacting dust and its interaction with the spacecraft. Such a framework would establish PSP's search-coil magnetometers as a complementary dust-sensing instrument, provide new constraints on dust populations in the inner heliosphere, and contribute to a more complete understanding of how dust impacts shape the electromagnetic environment of spacecraft operating close to the sun.

Adrian Hernandez

Discipline: Biochemistry

Authors:

#1 Rebecca Dubois

#2 Anisa Ghosh

Abstract Name: Determining the Binding Affinity of mAbs 17A5 and 24C10 to the GII.4 Norovirus P Domain

Norovirus is the leading cause of acute gastroenteritis worldwide. A major challenge in its control is the constant evolution of the virus, which enables it to escape existing population immunity. The protruding (P) domain of the norovirus capsid facilitates binding to host histo-blood group antigens (HBGAs), and antibodies that block this virus-host interaction generate immune pressure that drives viral evolution. Therefore, the quantitative investigation of antibody-P domain interactions is critical for understanding this evolutionary process and for developing effective vaccines. In this study, we expressed and purified the recombinant P domain from a 2012 Sydney GII.4 norovirus strain with an avitag in *E. coli*, then biotinylated the protein. The binding affinity of two monoclonal antibodies, 17A5 and 24C10, which target distinct immunodominant sites, will be characterized using Bio-Layer Interferometry (BLI). This technique allows us to quantitatively determine the association and dissociation rates, and calculate the equilibrium dissociation constants for both antibodies. We anticipate that this research, in combination with our structural studies of these antibody-P domain complexes, will contribute to a more detailed understanding of norovirus immunodominance and evolution, providing insights for next-generation norovirus vaccine development.

Sara Hernández

COL - EAFIT University

Discipline: Law and Legal Studies

Authors:

#1 Camilo Arango

#2 Gineth Alejandra Suárez

#3 Manuela Ruiz

#4 María José Mesa

#5 Irene Agudelo

#6 Valentina Zambrano

#7 Tatiana Bedoya

#8 Catalina Vallejo

#9 Esteban Gómez

Abstract Name: Mycelium Conversations: Legal Protection of Funga in Colombia

The project "Mycelium Conversations: Legal Protection of Funga in Colombia" focuses on analyzing how the Colombian legal system protects the fungi inhabiting the country and regulates human interaction with these organisms for obtaining benefits. This research arises from the evident lack of recognition and specific studies on the legal protection of fungi, a fundamental component of biodiversity and ecosystems, which has been historically marginalized compared to traditional fauna and flora. The project's context is framed within a renewed international interest in incorporating fungi as an independent biological kingdom within global conservation agreements, reflected in initiatives such as the Convention on Biological Diversity (CDB) and the [Fungal Conservation Pledge]. Colombia, despite its biological wealth and leadership in biodiversity, lacks explicit regulations protecting fungi, limited to indirect inclusion within environmental regulations and general biodiversity legal instruments. The methodology employed in the study is mixed and predominantly qualitative. An exhaustive review of national and international legal sources, jurisprudence, and scientific literature was conducted, complemented by comparative law to identify successful cases of legal protection. Additionally, interdisciplinary collaboration with mycology experts, such as mycologist [Aida Vasco], was undertaken, along with field trips to Medellín ecosystems to observe fungal species and understand their ecological role, reinforcing the need for a legal-biological approach. The results show that fungi protection in Colombia is insufficient and mainly limited to commercial aspects, ignoring their crucial ecological role. It is concluded that it is essential to develop specific policies and regulations, including their incorporation into environmental licensing processes, and to promote public education to recognize their importance. This study proposes pathways to strengthen regulation, anticipating political and resource-related challenges.

Gael Hernandez Martinez

Discipline: Chemistry

Authors:

#1 Armando Avalos Tello

#2 Mindy Capes

Abstract Name: Effect of Acidic and Basic Treatments on the Adsorption Capacity of Avocado and Lemon Peels

Throughout the globe, lakes and rivers have been contaminated by synthetic dyes such as methylene blue that poses public health risk and environmental damage. While engineering-based water treatments exist, many are highly expensive and inaccessible for communities with limited resources. This study explores whether fruit biopeels can serve as an effective low cost bioadsorbent. Lemon and avocado peels were treated with a basic (sodium hydroxide) or an acidic (phosphoric acid) solution to evaluate their adsorption of methylene blue. Peels were washed, prepared, then soaked dilutions of sodium hydroxide or phosphoric acid. After treatment, samples were oven-dried at 60°C for two hours. Adsorption of methylene blue was monitored by a spectrophotometer. Sodium hydroxide treated peels showed the highest adsorption of methylene blue across both peels, on the contrary phosphoric acid treated peels performed lower than both the control and the sodium hydroxide group. Treated in dilute sodium hydroxide, avocado had an efficiency of 65.2% removal and 0.33mg/g maximum adsorption capacity. In comparison, lemon peels efficiency was 46.8%, and 0.311mg/g maximum adsorption capacity. These discoveries suggest that sodium hydroxide treated avocado and lemon peels, specifically avocado, are accessible, sustainable and promising bioadsorbents for removal of methylene blue from contaminated water. These waste materials may offer an affordable and efficient treatment option for communities lacking advanced water purification infrastructure.

Melissa Hernandez Pacheco

Discipline: Chemistry

Authors:

#1 Thao Vy Le

#2 Allison Moreno

Abstract Name: Seasonality of Nutrients in The Monterey Bay

Biological productivity is reliant on light, atmospheric carbon dioxide (CO₂), and nutrient availability. Nutrients are taken up in set amounts for a variety of phytoplankton- a plant-like single celled organism. Monterey Bay is home to many different functional groups and species, creating one of the world's most diverse locations. Nutrient availability in seawater is a key to the function of the marine food web, Earth's oxygen production, and climate regulation through CO₂ absorption. Previous research shows a link between phytoplankton's growth rate, and upwelling. In our study, we analyzed the nutrients concentrations in Monterey Bay. Monthly samples were collected at four different locations (Monterey Bay Harbor, Moss Landing, Santa Cruz Wharf, and Half-moon Bay). Seawater samples were filtered and frozen. Before analysis, samples are thawed and mixed. A SEAL nutrient analyzer is then used to measure levels of nitrate, nitrite, phosphate, and silicate. Our findings show variation in nutrient concentrations among the locations. Additionally, nutrients follow a seasonal cycle with higher concentrations during the upwelling season. As

such, we expect that phytoplankton productivity would also be high during upwelling since the nutrients stimulate their growth.

Sophia Herndon

Discipline: Health and Human Development

Authors:

Abstract Name: Tailoring Social Activities In Memory Care Units For Urban Demographics: Using Art Therapy, Meditation, Exercise Programs, And Music Therapy To Decrease Cognitive Decline In Alzheimer's Patients

Alzheimer's disease is a progressive, degenerative brain disease that slowly reduces cognitive functions such as memory, thinking, and communication. Alzheimer's disease is the most common form of dementia and while it impacts the entire population, one of the main populations impacted by Alzheimer's disease are nursing home patients, specifically memory care patients, with Alzheimer's disease being one of the leading causes of death in these facilities. Though a cure has not been found for Alzheimer's disease, there are many treatments to slow the progression of this disease. Non-pharmacological treatments have been found to be increasingly more beneficial than medication in recent years. Implementing a plan that uses different social activities for each stage of Alzheimer's disease for patients in memory-care units may be beneficial to effectively reduce cognitive decline and may benefit patients from socializing with one another during planned activities. Memory care units in urban areas have specific barriers they have to overcome in patient treatment because factors such as city noise, limited space, and previous patient backgrounds have to be considered when creating a plan for patients. This literature review creates a plan with four social activities (exercise, meditation, art therapy, and music therapy) to be used in urban memory care units for Alzheimer's patients. This literature review aims to propose how promoting social activities such as exercise, meditation, art therapy, and music therapy may be able to reduce cognitive decline in Alzheimer's patients in urban memory care units by applying these activities to the specific stages of Alzheimer's disease (mild cognitive impairment, mild Alzheimer's disease, moderate Alzheimer's disease, and severe Alzheimer's disease).

Sebastian Herrera Vargas

Discipline: Biochemistry

Authors:

#1 Neeraja Gajendran

#2 L. Andrew Lyon

Abstract Name: Quantitative Morphological Analysis of Collagen Networks in Alginate-Crowded Pastes

Alginate-based biomaterials are promising in regenerative medicine and tissue engineering applications given their biocompatibility, biodegradability, non-toxicity, and accessibility. These biomaterials have significant drawbacks as pure alginate-based gels demonstrate insufficient mechanical strength for surgical handling along with non-optimal biological activity, hindering their efficacy in clinical applications. We have explored alginate-composite gels to elucidate the full breadth and viability of the materials in the field. Prior work in the Lyon group (Neeraja Gajendran) has illustrated noticeable morphological changes in collagen fibrillogenesis induced by alginate in collagen: microgel composites. These observations have been largely qualitative to this point. Thus, quantitative collagen fibrillogenesis analysis techniques to quantify observed fiber growth differences in samples are needed. The morphological analysis technique utilized FIJI, an open-

source ImageJ software application for bioimaging applications. A custom data filtering and processing method was developed to permit differentiation of collagen fibers from background in differential interference contrast images. This technique was applied to 4 different compositions with the goal of understanding the behavior of collagen in the respective samples. The conditions studied were a pure collagen gel (control condition), alginate:collagen composite gel, collagen:microgel paste composite gel, and finally alginate:collagen:microgel paste composite gel. Thicker collagen fibers were observed in both the alginate:collagen systems, with the thickest observed in the alginate:collagen microgel paste gel. These qualitative observations were supported utilizing the FIJI-based analysis, and bolstered the hypothesis developed from previous projects in the Lyon Group of alginate:collagen composites polymerizing thicker collagen fibers due to molecular crowding effects. Future directions are applying this technique to understand the robustness of collagen in microgels to understand if alginate promotes self-healing, resistance to shear, etc of the collagen fibers, fostering a stronger understanding of the viability of alginate composites and their usage in clinical settings.

Hunter Hersey

Discipline: Visual Arts

Authors:

#1 Hunter Hersey

Abstract Name: As Indies Rise, Innovation Thrives

Since the 1990s, video games have been one of the most popular forms of entertainment in human history. The reason games have become so well-known is the monumental franchises they have spawned. The industry wouldn't be the same without games like Mario, Sonic, Kirby, and more. A lot of these well-known games are made by companies that fall under the Triple-A category. Triple-A companies are industry giants that have a ton of money to make bigger and greater games. Since the spawn of the industry, Triple-A companies have been known for their innovation and creativity, but recently, something changed. In 2025, Triple-A companies are losing money on their projects, and people want to support a different kind of company. Indie companies are the new talk of the town, but what exactly are they? An Indie company is small in size and doesn't have a massive budget to work with when developing games. If Indies are making games that are smaller and cheaper, then how are they even competing with the big Triple-A companies? The rise of Indies isn't just a coincidence; it's a direct result of layoffs, crunch, price, greed, and drive being problematic within Triple-A companies. Everything that Triple-A does is motivated by money, while Indies focus on innovation and creativity. The public is siding with Indies because they care about improving and building upon the industry to make it even greater. The gaming industry can only survive if people are willing to do the work, not because of money, but because they care.

Mallory Herzog

Discipline: Nursing and Public Health

Authors:

#1 Andrew Quanbeck

Abstract Name: Health System and Payer-Level Decision-Making Factors in the Adoption, Integration, and Sustainability of Digital Health Tools

Alcohol Use Disorder (AUD) results in numerous health and economic burdens for millions across the United

States. Despite this, accessible treatment options remain limited due to barriers such as stigma and geographical constraints. Digital health tools have emerged as a promising option to overcome these barriers by expanding reach, supporting patient-driven self-care, and improving treatment outcomes. A recent study demonstrated that Tula, a smartphone-based intervention for individuals with mild-to-moderate AUD, reduced heavy drinking days across three support models in a hybrid effectiveness–implementation trial. Despite widespread interest in mHealth apps, their adoption and integration in health systems remains limited, and little is known about how health systems and payers decide whether and how to adopt and sustain tools like Tula. This qualitative study addressed this knowledge gap through ten semi-structured interviews with senior leaders across clinical, operational, behavioral health, and public and private payer roles within a large academic health center. Interview questions explored the organizational context in which digital health implementation occurs, including current AUD management, decision-making processes, perceived value and fit of digital interventions, barriers to adoption, and long-term sustainability. Data were analyzed using thematic analysis in Dedoose. Preliminary analysis highlighted several themes: requirement for robust evidence; importance of seamless workflow/electronic health record integration; payer emphasis on cost and return on investment; criticality of clinician champions; need for ongoing feedback loops; and recognition that stigma and accessibility challenges make implementation of digital tools particularly difficult for AUD. Results suggest the need for identifying core decision-making principles, considering barriers and facilitators to adoption, and creating conditions that promote long-term sustainability. Overall, this project provides insights into how digital tools like Tula can be integrated into complex healthcare systems to meet clinical, operational, and payer demands to improve the management of AUD and other chronic conditions.

Allie V. Hesler

Discipline: Environmental Science and Sustainability

Authors:

#1 Allie V. Hesler

#2 Steven T. Goldsmith

Abstract Name: How does nutrient and trace metal availability in streams affect metal bioaccumulation in biofilms found on plastics?

Plastic pollution is a pronounced threat to aquatic ecosystems. Plastics physically degrade during transport and become microplastics (< 5mm in diameter), which can be easily ingested by marine life. These plastics can accumulate biofilms, communities of microorganisms, on their exterior that can bioaccumulate metals from the surrounding waters. These metals can then be released into the organisms that ingest these microplastics, with substantial impacts to aquatic food webs. Despite these environmental health risks, few studies have investigated the factors that control biofilm growth (nutrient availability) and their metal bioaccumulation potential (dissolved trace metals in streamwater). This research investigates the relationship between nutrient and trace metal availability in freshwater streams and the accumulation of metals in biofilms on plastics using incubation experiments conducted over 14 and 28 days. Water samples were collected from nine local streams in Pennsylvania exhibiting a range of nutrients and metal concentrations. Plastic incubations were performed by placing replicates of known plastic materials, polyethylene (PE) sheet and polyethylene terephthalate (PET) plastic water bottles, in stream water under artificial light for a total of 14 and 26 days. The plastic samples were then analyzed for their exchangeable trace metal concentrations using an acetic acid extraction. Study results highlight the risk of metal bioaccumulation in aquatic ecosystems resulting from improper waste disposal.

Brianna Heuiser

Discipline: Environmental Science and Sustainability

Authors:

Abstract Name: Run From Water: Community vs. Household Level Flood-Preventive Infrastructure in Harris County, Texas

Rising sea levels from human-caused climate change have resulted in an increase in flooding that poses an immense risk to coastal communities. In Harris County, Texas, recent severe flooding events such as Tropical Storm Allison in 2001 and Hurricane Harvey in 2017 led to a reemphasis on flood-preventive infrastructure. Despite these investments by the city, county, and state, major flooding events continue to impact the Harris County area negatively approximately every two years. When faced with a hurricane or other extreme flooding event, “run from water” is the advice given to residents by the county; yet, population trends do not correlate with this advice. Despite an increase in the frequency and intensity of flooding events, the population in Harris County’s most flood-prone areas has remained fairly stable. While Harris County has invested in flood prevention technologies such as drainage infrastructure, bayou expansions, and wetland restoration, flooding continues to result in loss of life and property, prompting the development of household-level flood adaptation methods. These household-level investments include raising the elevation of the house above historic flood-levels, yet this investment is quite costly, raising the question: does income level greatly impact a community’s flood disaster resiliency in equally flood-vulnerable areas? This project uses Geographic Information Systems [GIS] mapping technology to map both population trends and housing design trends in response to flooding within Harris County’s Special Flood Hazard Areas. Research uses data from the American Community Survey, Harris County Appraisal District, and FEMA “Harvey Damage Assessments and Claims.” Surveying housing designs within specific neighborhood case studies provided additional data. This project argues that in Harris County, Texas, income level greatly impacts a community’s flood disaster resiliency in equally flood-vulnerable areas, with ineffective community-based adaptation methods prompting the development of individualized adaptation methods in the form of raised homes.

Kaitlyn Hevrin

Discipline: Psychology

Authors:

#1 David Jewett

Vivienne Lewis

Abstract Name: ESTABLISHING THE DISCRIMINATIVE STIMULUS EFFECT OF NALTREXONE IN FEMALE AND MALE RATS WITH CHRONIC-INTERMITTENT ACCESS TO SUCROSE

We previously demonstrated that male Sprague Dawley rats maintained under chronic, intermittent sucrose learned to discriminate between subcutaneous (s.c.) injections of the opioid antagonist naltrexone (1 mg/kg) and saline. Sucrose produced a long-term change in opioid function. Substituting water for sucrose one hour before the session did not affect naltrexone’s discriminative stimulus effects. After two weeks of water consumption, naltrexone no longer served as a discriminative stimulus. In the present study, we sought to establish discrimination in both female and male rats. Rats were trained to lever press in an operant chamber. Rats then received 12-hour access to 25% sucrose solutions for two weeks. After, discrimination training began. One hour before sucrose access, female (n=11) and male (n=12) rats were trained to discriminate between naltrexone (0.32 or 1.0 mg/kg) or saline. After naltrexone administration, left lever responses were reinforced with a sucrose pellet and right lever presses were punished by eight seconds of darkness. The contingencies were reversed following saline administration. After the training session, rats received sucrose solutions in their home cages for 12 hours. Training continued until 80% or more condition-appropriate responses were emitted before the first consequence (and for the total session) for 8 of 10 daily sessions. Relatively few rats (2 females and 3 males) acquired the discrimination within 80 sessions. Both males and females learned the discrimination (M = 67 sessions for both). During generalization tests, responses toward

either lever were reinforced. Smaller doses of naltrexone produced discriminative stimulus effects in females. In sum, female rats acquired the naltrexone discrimination similarly to males. Naltrexone was more potent in producing discriminative stimulus effects in females. Although access to chronic, intermittent sucrose solutions produces long-lasting changes in opioid function, access to sucrose before the training session appears to be a necessary condition for training this discrimination.

Hannah Heyse

Discipline: Environmental Science and Sustainability

Authors:

#1 Dale Splinter

Abstract Name: Seasonal and Diurnal Examination of Dissolved Oxygen in Bluff Creek, Wisconsin

Multiple water quality variables were examined within Bluff Creek, a spring-fed stream and a tributary to Whitewater Creek in southeast Wisconsin. The examination of how dissolved oxygen (DO) changed over a 12-month period (June 2024 to May 2025) was the central focus of this study. Bluff Creek is an exceptional water resource in southeast Wisconsin and serves as a Class 1 trout stream. Dissolved oxygen was measured once a month at a sampling site along Bluff Creek using a YSI meter. Monthly data indicate significant diurnal variation. July 2024 had the largest range (88.2%; 36.1% to 124.3%). Other monthly ranges were: June 72.4%, August 75.9%, September 67.3%, October 40.5%, November 30.5%, December 21%, January 16%, February 12.6%, March 29.9%, April 38.1%, May 64.5%. Seasonal averages revealed clear patterns; summer (June–August) showed the highest DO peaks (122.5%) and means (95%), followed by fall (109.9%, 93%), spring (108.8%, 94%), and winter (87.9%, 80%). Corresponding seasonal DO ranges were 78.8% in summer, 46.1% in fall, 44.2% in spring, and 17% in winter. Higher dissolved oxygen concentrations are typically associated with cooler water temperatures, but Bluff Creek does not consistently show this. In July, a minimum temperature of 17.7 °C corresponded to 36.1% DO, while its peak of 21.4 °C was related to 124.3% DO. Overall, the highest DO concentrations occurred when water temperature was also at its highest (e.g., June 20°C and 128.9%; August 17.5°C and 129.1%). This trend (seen in late spring through early fall) likely results from increased photosynthesis from submerged aquatic vegetation. These parameters will continue to be monitored and analyzed monthly through 2026.

Emma Grace Hicks

Discipline: History

Authors:

Abstract Name: The Propaganda of China's Population Control Campaign

From 1979 to 2015, China's One Child Policy reshaped the nation's demographic structure and redefined the concept of family life. While most scholarship focuses on the policy's human cost — such as gender imbalance, forced sterilizations, and the psychological impact on the “only child” generation — this research examines how the Chinese government justified and enforced such a radical social experiment through propaganda. Using a collection of state-issued posters, slogans, and visual media from the 1980s to early 2000s, this project explores how the Chinese Communist Party employed moral, patriotic, and gendered messaging to persuade citizens to comply with population control measures. This research analyzes recurring symbols such as the idealized “model mother” and the family of three. Beyond printed media, propaganda was reinforced by local officials and family planning workers who promoted compliance through rewards,

public praise, and social pressure. By framing reproduction as an act of national duty, propaganda transformed obedience into virtue and sacrifice into honor. Ultimately, this project argues that propaganda surrounding the One Child Policy did more than inform, it redefined morality itself. By convincing citizens that compliance was patriotic and dissent was shameful, the state changed the way people valued life itself, persuading families to accept, or even justify, the abandonment or death of their own children. By examining these visual and rhetorical strategies, this study reveals how propaganda can alter human nature, molding personal belief into political obedience.

Emma Grace Hicks

Discipline: History

Authors:

Abstract Name: The Page Act of 1875: Moral Panic and Racial Control

The Page Act of 1875, the first federal law to restrict immigration to the United States, used the language of morality to justify the targeted exclusion of Chinese women. Though framed as a measure to prevent prostitution and forced labor, the act primarily functioned as a racialized and gendered screening system that judged Chinese women as inherently suspicious. This project examines how the Page Act reshaped American understandings of Chinese womanhood and laid the groundwork for later exclusionary policies. Focusing on political rhetoric, interrogation practices, and immigration records, this study highlights how officials used very subjective moral judgments to control entry. Chinese women were routinely interrogated about their sexual histories, families, and intentions. These practices effectively halted female immigration, producing extreme gender imbalances, and hurting the formation of Chinese communities in America. This project argues that the Page Act operated less as a moral safeguard and more as an early instrument of racial exclusion. Its legacy is visible in later federal policy and in long-standing stereotypes surrounding Asian women. Understanding its impact offers insight into how gendered narratives have shaped American immigration systems from their earliest foundations.

Christian Hicks

Discipline: Health and Human Development

Authors:

#1 Wei Li

Abstract Name: Purkinje Cell Mecp2 Loss Selectively Impairs Cerebellar Learning in a Female Mouse Model of Rett Syndrome

Rett syndrome (RTT) is a severe neurodevelopmental disorder caused by mutations in the X-linked gene MECP2. Because these mutations are typically lethal in males, female mice with mosaic X-chromosome inactivation were used to model the human condition. The purpose of this project was to determine how the loss of Mecp2 specifically in cerebellar Purkinje cells contributes to motor and learning impairments associated with RTT. Previous research implicates both cerebellar circuitry and altered neurotrophic signaling in RTT, yet the cell-type-specific role of Purkinje cells in behavioral outcomes remains unclear. To investigate this question, we compared behavioral performance in female heterozygous (Mecp2 Het) mice and Purkinje cell-specific Mecp2 conditional knockout (PC-KO) mice. A series of behavioral assays assessed locomotion, sociability, motor coordination, and cerebellar-dependent associative learning. These tests included open field exploration, the three-chamber social assay, grip strength, ladder walking, accelerating rotarod performance,

and delay or trace eyeblink conditioning. We also evaluated whether enhancing TrkB signaling with the small-molecule agonist 7,8-dihydroxyflavone (7,8-DHF) could improve learning-related behavioral outcomes. PC-KO mice displayed normal locomotion, social behavior, and basic motor coordination across multiple assays. However, they showed a pronounced deficit in eyeblink conditioning, indicating a selective impairment in cerebellar-dependent learning. In contrast, Mecp2 Het mice demonstrated broader behavioral deficits and reduced neurotrophic signaling. Treatment with 7,8-DHF partially improved learning in Het mice but did not rescue deficits in PC-KO mice, suggesting that Purkinje cell-specific loss of Mecp2 cannot be compensated by TrkB pathway enhancement. These findings identify a critical role for Purkinje cell Mecp2 in supporting cerebellar learning and provide insight into cell-type-specific mechanisms contributing to motor dysfunction in Rett syndrome.

Nasya Hidayat Sadikin

Discipline: Chemistry

Authors:

#1 Nasya Hidayat Sadikin

#2 An Nguyen

#3 Matthew Tjondro

#4 Philbert Halim

Abstract Name: Thermal Degradation of Vitamin C in Freshly Squeezed Orange Juice

A single change in temperature can significantly reduce the amount of vitamin C contained in everyday foods. Vitamin C plays an important nutritional role, but its chemical structure makes it highly sensitive to heat, light, and oxygen. This experiment investigates how heating affects the concentration of vitamin C in freshly squeezed orange juice using iodometric titration with potassium iodate. Orange juice samples were heated within the range of 20-70°C and titrated with a standard potassium iodate solution to determine their ascorbic acid content. The titration result depicts an inverse relationship between temperature and the vitamin C concentration. As the temperature increases, there are less titrants needed which indicates greater degradation of vitamin C. This shows the vitamin C breaks down rapidly at higher temperature as a result of oxidation and structure instability. The findings emphasize the urgency of minimizing heat exposure to preserve the nutritional value in foods that contain vitamin C. Overall, this experiment shows that excessive heating significantly reduces the ascorbic acid content in orange juice which eventually lowers its nutritional value.

Jonah Higdon

Discipline: Mathematics

Authors:

#1 Jonah Higdon

#2 Samantha Allen

Abstract Name: Equivalence in Almost L-Space Knots

Mathematicians use knots (similar to those you tie in your shoelaces) to study and to understand the shape and structure of spaces. By looking at how knots interact with 3-dimensional spaces, we uncover surprising connections between geometry, algebra, and the way spaces can be organized. The L-space conjecture is a central open question in the field low-dimensional topology that connects three seemingly distinct properties

of irreducible rational homology 3-spheres: (not) being an L-space, admitting a taut foliation, and having a left-orderable fundamental group. This can be thought of as uniting the topological, analytic, and algebraic properties of these spaces. To study these mathematical objects, we focus on L-space knots. A mathematical knot is a (possibly) knotted up loop in three-dimensional space. A specific type of knot, L-space knots, play a key role in understanding the structure of L-spaces. In this project, we instead study almost L-space knots (knots related to objects called almost L-spaces) in order to test the boundaries of this conjecture. Using the Heegaard Floer knot complex, we compute the Upsilon function, a powerful knot invariant packaged as a piecewise linear function, for this infinite family of knots and compare the results to the Upsilon functions of L-space knots.

Keely Higgins

Discipline: Physics and Astronomy

Authors:

#1 Colleen Countryman

Abstract Name: The Development of Guiding Principles for Supplementary Instructional Videos

Supplementary instructional videos have proven beneficial in a wide range of disciplines, however, there are very few resources containing guiding principles for their creation. The goal of this research is to determine and communicate best practices on the production of these supplemental videos. Supplemental videos have proven particularly useful among audiences that require additional resources to succeed in the classes. We will discuss our video production methods, including media principles and equipment that facilitate student engagement in online instruction. For example, we target video lengths of five to six minutes, focusing on only one topic per video. This encourages students to watch a video on the exact topic they are struggling with instead of watching more generalized videos that may not be as specific to their needs. We will also discuss our utilization of special equipment such as a lightboard so students can see the presenter's face while watching written content delivery. We will use, as a case study, a general elective Physics of Music class, primarily composed of non-STEM majors taking the class to fulfill a requirement in natural sciences. This audience represents those that would tend to struggle with material in an introductory physics course and might benefit the most from supplementary resources. Our videos can provide extra time with the material to aid these students with no prior background in physics. They provide additional problem-solving practice and explanations of core concepts. We will present feedback from student focus groups to assess the impact that these videos have on students' understanding of core concepts and further inform future video creations.

Maci Higgins

Discipline: Health and Human Development

Authors:

#1 Vikas Mishra

#2 Kara Newby

#3 Alicia Powers

Abstract Name: Doubling up on Healthy eating: Evaluation of a Healthy Incentive Program and Fruits and Vegetable Consumption.

Americans from low-income households often buy fewer fruits and vegetables than those from high-income households and face a higher risk of diet-related chronic diseases. To increase produce consumption among low-income households, the Double Up Food Bucks (DUFb) Alabama, a program supported by the United States Department of Agriculture-Gus Schumacher Nutrition Incentive Program (GusNIP) initiative, matches produce purchases for those participating in Supplemental Nutrition Assistance Program (SNAP)-- up to \$40 at farmers markets, and up to \$10 at grocery stores. This program operates by partnering with select Alabama grocery stores and farmers markets in seven counties. This study aims to examine how DUFb has helped low-income SNAP households access more fruit and vegetables. We focus on two questions: (i) how much of the available incentives participants have redeemed and (ii) how the program has influenced fruit and vegetable consumption. To answer the first question, we use four years of transaction-level data on fruit and vegetable purchases by SNAP households at grocery stores and farmers markets. Specifically, the incentives redeemed by SNAP households are summarized to measure the uptake of the program. Then, we compare incentives redeemed at farmers markets and grocery stores. For the second question, we use four waves of survey data collected as a part of a marketing campaign to SNAP households in the counties where DUFb operates. It provides information on the participation of SNAP households in the DUFb program, food security, and the frequency of fruit and vegetable consumption. We compare participants' product consumption with that of nonparticipants. We expect that participants' redemption of incentives has increased over the program years, and DUFb has improved the fruit and vegetable consumption of participating households.

Ella Higgs

Discipline: Architecture, Construction Management, and Interior Design

Authors:

Abstract Name: Designing for Retinitis Pigmentosa: An Accessible, Multisensory Residential Design

As visual function decreases, routine tasks and safe navigation within the home become increasingly challenging. Consequently, the housing design must respond to these evolving needs by creating a living environment that emphasizes safety, clarity, multisensory engagement, and long-term adaptability. This residential design aims to support the daily living needs of an individual with retinitis pigmentosa (RP), a progressive genetic condition characterized by night blindness, peripheral field loss, and eventual tunnel vision. Research informing the design, including precedent studies, literature on visual impairment, and insights from a professional working with individuals who are blind or have low vision, have helped establish key accessibility priorities. The resulting three-bedroom, two and a half bath layout is organized with simplicity and predictability, using defined walls, intuitive circulation paths, and a straightforward room sequence provide cognitive and visual stability, that reduces confusion and enhances orientation. Lensed can-lights minimize glare through soft, even illumination and task lighting helps to identify key areas for the user.

High-contrast wayfinding elements, like bold color differentiation at door frames, varied floor and wall textures, and subtle acoustic changes between areas support navigation using both residual vision and auditory cues. Smooth floor transitions further enhance safety, while acoustic treatments improve spatial awareness and aid in navigation. Integrated smart-home technologies, including voice-activated lighting, automated blinds, and climate control, promote independence for a resident who may also utilize tools such as canes, guide dogs, screen readers, and UV-blocking eyewear. The open layout ensures the home and furniture can evolve as RP progresses. Blending modern accessibility with the older colonial architecture, this project creates a balance of function, comfort, and dignity. This demonstrates how thoughtful residential design can meaningfully enhance quality of life for individuals with low vision.

Madeline Hill

Discipline: Chemistry

Authors:

#1 Rebecca Sanders

#2 Deisy Perez

Abstract Name: Optimizing Dye Removal from Water Using Exhausted Coffee Grounds: Effects of pH, Particle Size, and Adsorption-Desorption Cycles

Textile and dye industries discharge over 700,000 tons of dyes annually, contaminating waterways, blocking sunlight penetration, and disrupting aquatic ecosystems. Conventional treatment methods, like activated carbon adsorption, are effective but economically and environmentally unsustainable for large-scale use. This study explored exhausted coffee grounds (ECGs) as a sustainable, low-cost biosorbent for removing methylene blue, a common cationic dye, from water. This research investigated how pH and particle size (106-300 μm , 300-500 μm , 500-710 μm , and 710-1000 μm) influence adsorption efficiency and evaluated the reusability of ECGs through multiple adsorption-desorption cycles to assess performance over repeated use. It was hypothesized that higher pH levels and smaller particle sizes would enhance dye adsorption capacity. Batch experiments over 240 minutes supported these predictions. At pH 6, adsorption varied by particle size: the 106-300 μm ECGs showed the highest adsorption capacity (95 mg/g), while the 710-1000 μm particles exhibited the lowest (67 mg/g). When examining pH effects independently, both particle sizes performed substantially better under basic conditions, with the 106-300 μm ECGs reaching 163 mg/g at pH 12 and the 710-1000 μm particles reaching 167 mg/g. Under acidic conditions (pH 2), adsorption decreased for both sizes, dropping to 13 mg/g for the 106-300 μm particles and 9 mg/g for the 710-1000 μm particles, reflecting reduced electrostatic attraction between methylene blue and the biosorbent. Reusability trials over 60 minutes showed that the 106-300 μm ECGs consistently retained more methylene blue, increasing from an average of 98 mg/g initially to 113 mg/g by the third cycle. The larger 500-710 μm particles retained far less, averaging 19 mg/g initially and rising to 42 mg/g after the third cycle. These studies highlight the need to optimize pH and particle size to improve ECG use and reuse in dye-contaminated water treatment.

Annabelle Hill

Discipline: Political Science

Authors:

#1 Annabelle Hill

Abstract Name: The Impact of U.S. Migrant Returnees on Socioeconomic Conditions in Latin American Countries of Origin

While changes in U.S. deportation flows have remained a key component of scholarly discussion in the field of migration, the impact of these shifts on countries of origin has received significantly less attention. Latin American countries of origin are of particular interest as, in the last 15 years, Latin American migrants have accounted for over 90% of individuals deported from the U.S. Furthermore, the potential these individuals face of being deported has increased significantly within the past several decades; from 1997 to 2016, 5.7 million people were deported from the U.S., twice the total of all deportations from the U.S. before that point. As U.S. policies surrounding deportation and removal continue to shift, this study examines the challenges Latin American countries of origin face in receiving migrant returnees from the U.S. through the lens of observable impacts on socioeconomic indicators, such as employment, education, crime, and remittances, using a mixed methods approach. First, through quantitative analysis of U.S. Department of Homeland Security data on removals alongside key socioeconomic indicators within the University of Gothenburg's Quality of Governance dataset, the study examines possible correlations and notable fluctuations in U.S. deportations and socioeconomic indicators in Latin American countries of origin from 2003 to 2022. The qualitative portion will entail a week-long period of field study in Mexico in early 2026, interviewing reintegration professionals on their experiences and observations related to the challenges they may face in reintegrating returnees into education, employment, and other systems within Mexico— their country of origin. This mixed methodology, with potentially conflicting results, will contribute to a more accurate narrative on the experiences of returnees, reintegration professionals, and their countries of origin, lending additional nuance to scholarly discussion on U.S.-Latin American migration dynamics.

Richard Hill

Discipline: Physics and Astronomy

Authors:

#1 Kerry Kuehn

Abstract Name: Determining the Conductivity of Copper Experimentally using the Heat Diffusion Equation

The thermal conductivity of copper has been studied extensively, in part due to its many applications in thermal management and electronics. In this presentation, a method is described that first applies a brief heat pulse to one end of a copper rod and then measures the temperature as a function of time at discrete locations along the rod. The thermal conductivity and heat capacity can be extracted from the collected data by analyzing a solution to the one-dimensional heat diffusion equation. This project is a refinement of an undergraduate laboratory experiment on the use of computer instrumentation in the physics laboratory. One of the leading causes of error is heat loss from the rod to the ambient air. Such heat loss can be curtailed by hanging the rod within a vacuum chamber, thereby thermally isolating the specimen. Unfortunately, the thermal conductivity of copper determined by using this method differed by 56% from the accepted literature value. This deviation highlights the sensitivity of environmental factors, model assumptions, and data collection techniques. These systematic errors can be addressed by modifying the vacuum chamber design, rod length, and data acquisition electronics. With these modifications, we aim to improve accuracy and reproducibility, offering a valuable extension to this undergraduate laboratory experiment.

Nathaniel Hille

Discipline: Chemistry

Authors:

#1 Jeffrey Bell

#2 William Mcleod

#3 Kaylie Mccracken
#4 Sireesha Pedaballi

Abstract Name: Improving Capacity Retention in Anode-Free Aqueous Zinc-Bromide Batteries with Magnetic Fields

Zinc-ion batteries are an ideal alternative to lithium batteries, as zinc-based electrolytes are aqueous, non-volatile, and relatively earth abundant, promoting safety and reduced cost. However, the benefits of zinc-based batteries are constrained by limited reversibility, energy density, and capacity fading. In most batteries, metal foil is used as an anode with up to 90% of the active material not utilized during battery operation. The alternative—anode-free aqueous zinc battery configurations—are promising because a current collector made of copper or carbon can serve as the anode in which zinc can reversibly plate and strip on the surface. Pairing this current collector with carbon-based cathode materials will reduce expenses while maintaining a conductive and stable battery for durable cycling. Additionally, magnetic fields will be incorporated behind the electrodes to suppress growth of dendrites, which will improve the batteries reversibility through efficient plating and stripping of Zinc during battery operation. These disk magnets require zero energy input, are inexpensive and are infinitely reusable as they do not actively participate in the battery's chemical reactions. To explore the versatility of this configuration, a Zinc-Bromide battery will be investigated by mixing alkylated ammonium bromide complexing agents into the graphite cathode slurry and utilizing a Zinc-Bromide based electrolyte. Manipulating the chain-length of the complexing agent will provide tunable control over the viscosity of the electrolyte such that the diffusion of ions can be optimized to mitigate capacity fading over demanding cycling requirements. This anode-free Zn-Br battery configuration is an ideal candidate for grid scale applications, as the non-volatility of aqueous electrolytes and the use of carbon electrode materials results in a battery that is inherently safe. The incorporation of magnetic fields in the battery will extend cycle life without additional energy input, with the overall configuration boasting increased coulombic efficiency and reduced capacity fading.

Elizabeth Hiltz

Discipline: Biology

Authors:

#1 Kaitlyn Kinslow
#2 Rommel Pagkalinawan
#3 Robby Buck
#4 Grady Fleming
#5 Alexis Thai-Nguyen
#6 Jei Huddle
#7 Jacob Young
#8 Maia Tankersley
#9 Madeline Witt
#10 Ronald Quinlan
#11 Ronald Quinlan
#12 Andrew Velkey
Kaylee Wahl

Abstract Name: Anti-Predation Responses in Zebrafish (*Danio rerio*): Impact of Cold Storage Conditions on the Behavioral Potency and Chemical Stability of the Synthetic Alarm Substance, Hypoxanthine-3N-oxide ($C_5H_4N_4O_2$; H_3NO)

Zebrafish (*Danio rerio*) display complex social behaviors and social communication, making them a valuable model for behavioral neuroscience. Predation injuries cause zebrafish skin cells to release a chemical alarm substance known as “shreckstoff” that induces anti-predation responses in neighboring zebrafish (e.g.,

darting, freezing, and negative geotaxis). The synthetic version of the alarm substance, H3NO, triggers the same responses. Recent research has indicated that cold storage of naturally-derived alarm substances results in diminished behavioral potency, but the impact of storage conditions on the behavioral potency of H3NO has not been explored. The degradation pathways in H3NO are uncharacterized, raising additional concerns regarding the behavioral potency of H3NO after long-term cold storage. The existing literature suggests that storage conditions will not affect the potency of H3NO in evoking anti-predation responses in zebrafish, although no reported studies have directly investigated this effect. The present study investigates anti-predation responses in individual zebrafish exposed to 5.0nM concentrations of H3NO that had been stored in three different storage conditions: fresh, frozen overnight, and frozen for a month. Subjects' responses were recorded for 10 minutes pre-administration and 10 minutes post-administration, and video analysis will be conducted using DeepLabCut to provide positional data that will subsequently be analyzed with Python code. High-performance liquid chromatography is used to characterize stable H3NO as well as potential breakdown products to determine any chemical differences between fresh and frozen samples. Characterizing the potential impact of cold storage on behavioral potency, in addition to analysis of potential breakdown products of H3NO, will provide valuable information on the stability of this synthetic alarm substance. These findings will have useful implications for research on the chemosensory mechanisms for alarm signaling, anti-predation responses in social fish, as well as the utility of H3NO as an alternative to alarm substances derived from live animals.

Saifalla Hindam

Discipline: Business

Authors:

#1 Saifalla Hindam

Abstract Name: Navigating Empty Shelves: The Role of Financial Incentives in Medicine Availability and Patient Search Costs in Egypt

Access to essential medicines varies widely across global markets, with distribution channels ranging from traditional pharmacies to online platforms and in some areas of the world, major retail outlets. Ideally, pharmacists are expected to dispense available treatments, guide patients toward suitable alternatives when necessary, and provide reliable information during periods of shortage. In Egypt, however, weak regulatory oversight developed over several decades has contributed to persistent gaps in medicine availability and transparency, particularly during episodes of acute scarcity. This paper examines financial conflicts of interest within community pharmacies such as not dispensing certain medications due to profitability. It looks at patient access to medications under constrained supply conditions such as the manufacturing delays during 2016. Drawing on field observations, stakeholder interviews and a review of the current literature, the study explores how profit-driven incentives can shape dispensing behavior, limit the provision of truthful information about stock levels, and undermine patient trust. It further analyzes how price controls, currency instability, and distribution bottlenecks intensify pressures such as medication hoarding during price changes and lengthen patient search times. This research aims to identify practical mechanisms that can help customers locate essential medicines, obtain effective substitutes, or at least receive clear guidance during shortage events. This would maintain patient trust and ensure faithful dependence on community pharmacies during acute episodes of medication scarcity. By highlighting the tension between patient welfare and pharmacy profit motives, this paper underscores the public-health importance of ensuring transparent, patient-centered pharmaceutical care in Egypt's evolving healthcare landscape. This paper will explore the current assumption that pharmacists withhold medication for financial gain and prioritize profit over humane customer wellbeing.

Mary Hinely

Discipline: Environmental Science and Sustainability

Authors:

#1 Thorsten Knappenberger

#2 Christopher Anderson

Abstract Name: IRIS Performance in Coastal Blackwater Wetlands

Blackwater wetlands are important ecosystems along the Gulf Coast of the Southeastern US. Blackwater is characterized by an increased dissolved organic carbon (DOC) concentration in comparison to freshwater wetland systems. Increased DOC levels could affect the removal of iron or manganese oxides from IRIS films because the removal rate depends on anaerobic conditions, the microbial community, and a carbon source. We hypothesize that IRIS films deployed in blackwater systems have higher iron and manganese removal rates due to the elevated DOC levels. We deployed iron and manganese IRIS films in blackwater and non-blackwater wetlands along the Alabama Gulf Coast. Soils were sampled and characterized for soil texture, total and organic carbon, pH, and EC. Porewater was sampled at the time of deployment and retrieval of IRIS films and tested for pH, EC, turbidity, dissolved oxygen, dissolved nitrogen, and DOC. Porewater samples were further analyzed in UV-Vis and fluorescence spectroscopy.

Misty Hines

Discipline: Criminology/Criminal Justice

Authors:

#1 Misty Hines

Abstract Name: The Overrepresentation of Black Youth in Foster Care: How Structural and Implicit Bias Shape Child Welfare and Court Outcomes in the U.S.

Black youth in the U.S. foster care system experience disproportionately high involvement at every stage of child welfare and juvenile court processing. According to the American Bar Association, black children face higher rates of investigation, are removed from their families more frequently, receive fewer appropriate services, and are less likely to achieve permanent placement. More than half of Black children experience a child-welfare investigation before age eighteen, and youth of color remain consistently overrepresented in juvenile justice referrals. These disparities are rooted in structural inequality, discretionary decision-making, and implicit bias embedded within child welfare and court systems. This project examines how normal adolescent behaviors—such as conflict, defiance, or emotional expression—are more likely to be interpreted as criminal or problematic when exhibited by Black foster youth. Using a mixed-methods approach, the study combines: (1) a policy analysis of U.S. child welfare and juvenile justice reporting practices; (2) statistical analysis of publicly available datasets documenting racial and ethnic disparities; and (3) a qualitative review of literature capturing the lived experiences of system-involved youth. By identifying how structural and implicit biases influence professional decisions, surveillance practices, and pathways into the court system, this research seeks to explain why Black foster youth are disproportionately penalized. The findings aim to inform policy reforms that reduce racial disparities and promote a more equitable system of justice for all youth.

Emma Hobel

Discipline: Nursing and Public Health

Authors:

#1 Hera Khan

#2 Georgi Hirschegger

Abstract Name: The Relationship Between Illicit Stimulant Use, Perceived Interpersonal Connections, and Academic Performance in College Students

Illicit stimulant use is an epidemic throughout the United States in college-aged students. These students are the majority of illicit stimulant users due to high stress levels, pressure to succeed, perceived competition among peers, and normalization. While students believe illicit stimulants will boost focus and GPA, research has shown that use is correlated with a lower GPA. This study examines relationships between illicit stimulant use, academic performance/preparedness, and interpersonal connections. It is hypothesized that illicit stimulant use is correlated with lower academic performance and weakened interpersonal connections. This survey study was conducted anonymously on Google Forms, and distributed through campus outreach and social media. Our study collected 1409 responses, mostly ages 18-29 in North/Central America. The study included self-reported data on substance use, interpersonal connections and academic performance. Illicit ADHD medication use was evaluated through the Substances and Choices Scale (SACS). Strength of social ties was assessed using The Social Connectedness Scale. Academic performance was evaluated using the Academic Performance Scale. The data was analyzed in SPSS, Version 28.0, using Pearson's Correlation Coefficient. Illicit stimulant use is positively correlated with feeling distant from others ($p < 0.01$). Negative correlations were found between initiating projects when assigned and illicit stimulant use ($p < 0.01$) and between punctual assignment completion and illicit stimulant use ($p < 0.01$). Ensuring preparedness in all subjects is negatively correlated with perceived lack of togetherness with peers ($p < 0.01$). Results suggest that illicit stimulant users have worsened perception of their relationships with others and lower levels of academic preparedness. Those that feel less connected with their peers are less likely to have positive behaviors in academic performance. These results suggest a relationship between poor academic habits, weak interpersonal connections, and the illicit use of stimulants. This research has not received any funding.

Leila Hoeschen Ehrbright

Discipline: Nursing and Public Health

Authors:

#1 Angela Ekwonye

#2 Sophi Cahalan

#3 Leila Hoeschen Ehrbright

Leila Hoeschen Ehrbright

Sophi Cahalan

Abstract Name: Evaluating the impact of an eight-week positive psychology intervention in improving the subjective well-being of Nigerian university students: A mixed-methods pilot study

The well-being of students in Nigerian universities is deteriorating, with many facing limited access to traditional mental health services due to financial barriers, low awareness, associated stigma, and concerns about service quality. There is an urgent need for accessible, non-stigmatizing mental health resources that go beyond clinical care. While positive psychology interventions (PPIs) can help individuals mobilize their psychological capacities to enhance their well-being, they remain largely underutilized among Nigerian university students. This study aimed to evaluate the effectiveness of an eight-week education + positive psychology intervention, compared to an education-only control, in enhancing the well-being of Nigerian university students. In this randomized controlled pilot study, 40 undergraduate students were randomly assigned to either an education-only control group ($n=20$) or an education + positive psychology intervention group ($n=20$). Mental well-being, positive affect, negative affect, and resilience were measured at baseline

(T1) and after the eight-week intervention (T2). Chi-square tests showed no significant baseline group differences in gender, age, level, or program of study. Post-intervention t-tests revealed that the intervention group scored significantly higher in mental well-being, positive affect, and resilience than the control group, while no significant differences were found in negative affect. ANOVA indicated significant main effects ($\eta^2p = 0.20-0.63$) for all outcomes and time-by-group interactions for positive affect ($\eta^2p = 0.18$) and resilience ($\eta^2p = 0.45$). Moderate effect sizes for mental well-being, positive affect, and resilience suggest the intervention had a meaningful impact, enhancing emotional well-being and the ability to cope with stress. Qualitative reflections from students further supported these findings, highlighting positive reframing as particularly effective for strengthening emotional resilience and shifting perspectives during adversity. The findings of this study highlight the need for mental health professionals and researchers to incorporate diverse, synergistic activities rather than relying on isolated techniques to improve university students' subjective well-being.

Regan Hoffman

Discipline: Biology

Authors:

#1 Kasey Aceves

Kaylynn Bacon

Abstract Name: Improving Distribution Records for Rare and Underreported Mayfly (Ephemeroptera) Species in Wisconsin

Mayflies (Ephemeroptera) are vital and diverse members of aquatic food chains. Sensitive to environmental fluctuations and pollutants, they are useful indicators of ecosystem health. Despite their importance, information on the ecology and distribution of mayflies in Wisconsin is limited. Our objective was to collect distributional data on Wisconsin mayfly species. Using existing Wisconsin mayfly records and various conservation reports, a list of 69 rare or underreported species was created to guide sampling efforts. To ensure a more complete survey of aquatic biodiversity, we targeted under-sampled microhabitats often missed by standard Department of Natural Resources (DNR) protocols, including root masses, woody debris, riffles, stones, and sand. Field sampling involved entering streams in waders and using D-framed and drift nets to sample such microhabitats for nymphs. Approximately 20 to 45 minutes was spent at each site. Samples were preserved in 70% ethanol in the field, then sorted by taxa in the lab. Species identifications were made by Dr. Tom Klubertanz under a microscope. We collected 93 species of mayflies across 54 sites in 16 counties. We also collected 23 of the 69 species on the target list. We tallied 104 first-ever state or county records, including *Caenis hilaris*, a squaregill mayfly found for the first time in Kenosha County. Among them was also the first Chippewa County record of *Hexagenia rigida*, a species classified as highly imperiled on the Midwest Regional Species of Greatest Conservation Need list. These results will be published in an upcoming paper. While more research is needed to document mayfly diversity in Wisconsin, our findings will aid conservation efforts and species ranking of the DNR and other agencies. They will also help improve assessments of current and future ecosystem health.

Robert Hoffman

Discipline: Engineering

Authors:

#1 Leo Ortiz

#2 Isaac Prieto

#3 Sean Curry

#4 Karen Garcia
#5 Robert Hoffman

Abstract Name: Design and Simulation of TalonX: A Student-Developed Subsonic Fiberglass Launch Vehicle Optimized for 10,000-ft Flight Using OpenRocket and Computational Analysis

TalonX is a student-designed fiberglass rocket developed at the University of Texas Permian Basin for entry into the 2026 International Rocket Engineering Competition (IREC) 10,000-ft Commercial Off-The-Shelf (COTS) category. The project serves as a senior design capstone for the design team and applies the complete engineering design process from concept through simulation and preliminary testing to produce a competition-ready vehicle. TalonX is a subsonic, minimum-diameter launch vehicle with a 4.25 in outer diameter and 102 in total length powered by an AeroTech M1340W solid motor. Its airframe, composed of a symmetric five-ply G10 fiberglass layup, achieves high stiffness and low weight within IREC's nonmetallic-material restrictions. The design employs OpenRocket as the primary simulation platform to predict flight stability, apogee altitude, thrust-to-weight ratio, and aerodynamic performance under varying conditions. Iterative simulations allowed optimization of the nose-cone shape, fin geometry, and mass distribution to meet the 10,000-ft target altitude with a stable center-of-pressure-to-center-of-gravity relationship. Supporting analyses were conducted using SolidWorks Fluid Simulation and MATLAB for structural validation, fin-flutter modeling, aerodynamic refinement, and Monte Carlo landing spread simulations. The rocket uses NACA 0012 symmetric fins, a dual-deployment recovery system controlled by a Featherweight Raven 4 altimeter, and integrated avionics consisting of SparkFun GPS, barometric, and IMU sensors powered by a LiHV battery. Experimental data from low-speed wind-tunnel testing in UTPB's AeroLab Educational Wind Tunnel provide supplementary validation of simulated aerodynamic coefficients. Through this project, students gained direct experience in computational simulation, systems integration, and interdisciplinary teamwork. TalonX demonstrates how accessible, open-source modeling tools can guide practical design decisions and produce reliable results in collegiate rocketry.

Hannah Hoffman

Discipline: Architecture, Construction Management, and Interior Design

Authors:

Abstract Name: Using Contrast, Shape, and Tactile Wayfinding to Promote Safe and Independent Living for a Client with Glaucoma

With glaucoma affecting more than 80 million people globally, accessible housing is crucial for supporting independence and quality of life for those living with the condition. Glaucoma progressively narrows peripheral vision, creating challenges in depth perception, contrast recognition, spatial navigation, and hazard identification within the home. The goal of Canyon Vista is to design a single-family residence that promotes independent living for a 35-year-old adult with glaucoma. Drawing on case studies of visually accessible environments, expertise from a professional who works directly with individuals with visual impairments, and literature reviews on inclusive design, low-vision guidelines, and biophilic strategies to foster connection to nature. The home features an open layout with wide circulation paths to reduce unnecessary movement and lower the risk of disorientation. Matte and honed finishes, paired with an earth-toned, high-contrast color palette, enhance visibility, minimize glare, and contribute to a restorative atmosphere. Rounded corners improve safety by reducing the risk of injury, while layered ambient and task lighting provide consistent illumination and limit shadows that may confuse individuals with peripheral vision loss. Tactile wayfinding is supported through high-contrast wainscoting and textured wallcoverings to guide movement and enhance spatial orientation throughout the home. Daylighting controls, such as automated roller shades layered with window treatments, help maintain safe navigation and reduce visual strain as lighting conditions shift throughout the day. By integrating connections to nature, intuitive circulation, and low-vision design strategies, this residence promotes independence and restores confidence in daily living.

Bryanna Hoffman

Discipline: Biology

Authors:

#1 Bryanna Hoffman

#2 Marcia Miller-Rodeberg

Abstract Name: Engineering Luciferase-Based Bioluminescent Reporters in *Pseudomonas aeruginosa* and *Escherichia coli* to Monitor Glucose Uptake

Bioluminescence is a natural phenomenon in which living organisms emit light through a chemiluminescent reaction. This occurs in organisms such as algae, marine vertebrates, fungi, bacteria, and several others. Although bioluminescence arises naturally in some species, it can also be engineered into non-bioluminescent organisms. When a luciferin-related gene system is introduced into bacteria, the resulting light emission can be used for various measurements, including gene expression, metabolism, responses to environmental changes, infection tracking, and other cellular processes. Coupling the luciferase–luciferin system with a promoter linked to a specific biological pathway enables luminescence to report changes in that pathway’s activity. The goal of this work is to introduce a luciferase-based bioluminescence system into *Pseudomonas aeruginosa* and *Escherichia coli* and to produce detectable light in these strains. The bioluminescent reporter will then be coupled with a glucose-transport promoter to measure glucose uptake. The *P. aeruginosa* and *E. coli* strains will be grown in appropriate media, and a transformation method will be used to introduce the target genes. After incubation, the presence and intensity of bioluminescence will be measured. The results of this experiment will be presented.

Jake Hofstetter

Discipline: Biology

Authors:

#1 Jake Hofstetter

#2 Caitlin Williams

Abstract Name: Evolution of Antibiotic Resistance Demonstrated with *E. coli*

Escherichia coli, a common laboratory bacteria, is readily used in Adaptive Laboratory Evolution experiments. This makes performing genetic evolution experiments involving bacteria and antibiotics incredibly successful and time efficient. Sub-inhibitory doses of antibiotics select for beneficial mutations and allow genetic adaptation to occur. As time goes by, mutations accumulate and the bacteria become more adapted to antibiotics, requiring higher doses of antibiotics to inhibit them. In this experiment, we found the minimum inhibitory concentration of antibiotics for both wildtype and antibiotic-adapted *E. coli* populations using both broth and test strip methods. We observed that the minimum inhibitory concentration of antibiotic required to prevent bacterial growth was much higher (in both the broth and test strips) for the antibiotic-adapted *E. coli* than the wildtype *E. coli* (average 14.8-fold increase, range 4-to 32-fold). We also observed cross-resistance to other antibiotics in six of seven adapted populations, indicating evolution of broad mechanisms of resistance. Whole genome sequencing was used to analyze the developed mutations in each population. On average, each population had only 9.5 mutations. About half of these mutations were single nucleotide polymorphisms (SNPs; 45%) and half were insertions or deletions of one or more nucleotides (INDELs; 55%). Populations with evolved resistance to the same drug had few shared mutations and many

unique mutations, indicative of the randomness of genetic changes during evolution. Using two kanamycin-adapted populations as examples, mutations in expected genes arose (e.g., translation machinery) as well as mutations in many other proteins with currently unexplored connections to antibiotic resistance: porins and transporters, two-component systems, and metabolic pathways. By understanding how bacteria evolve antibiotic resistance in vitro, researchers can better combat the evolution of antibiotic resistance in natural environments.

Lincoln Hogan

Discipline: Engineering

Authors:

#1 Ahmedullah Aziz

#2 Mazharul Islam

Abstract Name: Mitigation of 2DHG Generation and Thermal Boundary Resistance at Diamond:H/GaN Interface Through Interlayer Development for GaN Based Devices

Diamond, with its exceptional thermal conductivity, is widely explored as a heat spreader to improve thermal management in GaN-based power and RF electronics. In this work, we use Sentaurus TCAD to model AlGaIn/GaN HEMTs with integrated diamond heat spreaders, incorporating advanced physical models such as thermal boundary resistance (TBR) and temperature-dependent band-gap narrowing. While diamond significantly enhances heat dissipation, our simulations reveal an important but often overlooked tradeoff: electrostatic modulation at the diamond and semiconductor interface. This modulation arises from Fermi-level pinning and the dielectric contrast at the bonded surface, which together generate strong local band bending. As a result, a two-dimensional hole gas (2DHG) forms at the GaN surface, altering hole transport, shifting the threshold voltage, and weakening gate control in short-channel devices. These results indicate that although diamond improves thermal performance, it can also actively influence the electrostatics of the transistor. To address both the elevated TBR and the undesired interfacial band bending, we propose the incorporation of an engineered interlayer. Building on our TCAD results, we outline an investigation of several material candidates including AlN, SiC, BN, and other wide-band-gap dielectrics to develop physical test structures that directly compare GaN and diamond interfaces with interlayer and diamond stacks. This approach aims to demonstrate interlayer effectiveness in simultaneously providing thermal efficiency and electrostatic isolation.

Raenell Holder

Discipline: Computer Science

Authors:

Abstract Name: Web Design As A Tool For Social Change

Many immigrants and refugees struggle to find jobs when they first arrive in the United States, often because of language barriers, limited computer experience, and confusion about how to search and apply for work. This project focuses on creating an easy-to-use, interactive website that helps newcomers served by the Refugee and Immigrant Support Services of Emmaus (RISSE). The website allows users to read job descriptions in their native language, explore job openings in the Capital Region, and follow clear instructions on how to apply for the jobs they are interested in. The goal is to help newcomers feel more confident and independent while also reducing the amount of time volunteers may spend going through every

step. To build the website, I spoke with RISSE employment volunteers, observed the challenges newcomers faced during job-search sessions, and used my knowledge in web design to make a simple and understandable website. I focused on making the layout clear, the wording easy to follow, and the instructions broken down into small steps. I also added visual guides and built-in translation so users could learn and move at their own pace. I expect that newcomers who use the website will feel more comfortable searching for jobs, better understand what employers are asking for, and be able to complete more applications on their own. This may also make volunteer work easier, since volunteers can spend their time offering support rather than repeating the same instructions. This project is important because it supports independence, confidence, and long-term success for newcomers to America. By offering a simple tool that helps people overcome language and technology challenges, the website can make the job search process more fair and accessible for everyone.

Lyndey Holding

Discipline: Architecture, Construction Management, and Interior Design

Authors:

Abstract Name: Improving Wayfinding and Fostering Independence in a Home for Visually Impaired

Visual impairment affects 7 million people in the United States which directly interrupts their daily lives and routines. Among them, nearly 27,000 suffer from achromatopsia. Achromatopsia is a rare genetic disorder that ultimately causes total monochromatic colorblindness or seeing in shades of gray. With no treatments available to correct this disorder, individuals living with achromatopsia must use other senses for navigation, recognition, and daily tasks. For this reason, the purpose of this project is to design a single-family home that incorporates sensory-based wayfinding strategies to enhance the functionality for a user living with achromatopsia. Implementing a variety of materials, textures, and colors creates necessary contrast to aid in the user's ability to navigate the space they inhabit. Research shows that texture-based wayfinding can significantly improve functionality of spaces for the visually impaired, while also increasing the visual appeal for those with full vision. This approach aligns with the increasing implementation of universal design into the built environment. Design strategies that emphasize the intentional use of surface sensory details have the potential to change the environment of interiors, as they support user orientation. These components also create spaces that are subtly, but purposefully, balanced in accessibility and aesthetics. Through case studies, a specialist interview, and a review of accessibility codes, a programmatic design framework was developed and incorporated into the design process of this project. The primary design solution is to create a layout that promotes ease and independence as the user moves from one space to another. To achieve this, each individual room features a contrasting color, while having a consistent flooring color for circulation areas, to support clear wayfinding. Triangular tiles are used along all travel paths, with color variations that correspond to each room, guiding users. Overall, the design promotes navigation and independence throughout the home.

Loghan Holland

Discipline: Biochemistry

Authors:

#1 Loghan Holland

#2 Carly Sanders

Abstract Name: How will PTAL Overexpression Affect Arabidopsis thaliana Phenylpropanoid Production

Phenylpropanoids are secondary metabolites produced by plants that are important for both plant and human

sustenance. Phenylalanine ammonia lyase (PAL) catalyzes the entry step of the phenylpropanoid pathway by converting phenylalanine to trans-cinnamic acid. PAL forms a metabolon with the next enzyme in the pathway, cinnamate-4-hydroxylase (C4H), which converts trans-cinnamic acid to p-coumaric acid. Phenylalanine tyrosine ammonia lyase (PTAL) enzymes have been found in grasses that are able to convert tyrosine to p-coumaric acid in one step, while retaining the ability to convert phenylalanine into trans-cinnamic acid... While this “metabolically flexible” PTAL has been shown to function in the *Nicotiana benthamiana* transient expression system, the effects of this enzyme when stably expressed in *Arabidopsis thaliana* are unknown. *Arabidopsis* typically does not accumulate high levels of tyrosine, but the Maeda Lab possesses unique tools to increase tyrosine in plants. We will be creating stable transgenic *Arabidopsis* plants expressing PTAL and analyzing the effects on the phenotype and metabolite profile. We hypothesize that expressing this enzyme in *Arabidopsis* in a background high in tyrosine will allow us to increase and direct phenylpropanoid production in these plants.

Joshua Hollingshead

Discipline: Chemistry

Authors:

#1 Jason Bennet

Abstract Name: Indirect Electrochemical Detection of Chlorophenols Using Hypervalent Iodine Reagents

Phenolic compounds are used in a variety of processes both industrial and academic, but are toxic if introduced into the environment. Compounds such as 2-chlorophenol are used in the manufacturing of pesticides, herbicides, and wood preservatives, which can easily be exposed to the environment. The possible presence of these compounds in the environment give need for rapid and continuous means of monitoring for exposure prevention and cleanup. Electrochemical monitoring is an attractive method due to the inherent sensitivity and cost effectiveness. However, this method of detection involves the oxidation of these compounds which often leads polymerization and subsequent electrode fouling thus inhibiting further use of the electrode surface. Previous work in our group has shown that hypervalent iodine reagents, such as hydroxy(tosyloxy)iodo benzene (HTIB), can initially oxidize simple phenolic compounds into a quinone that can then be electrochemically reduced. This project explores adapting these findings to more complex and environmentally relevant compounds such as chlorophenols. This presentation will focus on using HTIB to potentially detect 2-chlorophenol and 4-chlorophenol indirectly, via cyclic voltammetry and square wave voltammetry.

Ren Hollis

Discipline: Health and Human Development

Authors:

#1 Shruti Syal

Abstract Name: Addressing Eco-Ableism in Richmond, Virginia's Urban Master Plan

As Richmond, Virginia, approaches its 300th anniversary in 2037 and continues implementing Richmond 300: A Guide for Growth, questions remain about whether individuals with disabilities are equitably represented in the city's future planning. Richmond 300 is the comprehensive plan guiding Richmond's policies, programs, zoning changes, and redevelopment. This master plan is a “living document” that will evolve as the city grows, meaning revisions and improvements are possible before its full implementation.

This study asks: Is eco-ableism present in Richmond 300: A Guide for Growth, and how could the City of Richmond address this issue? Ableism refers to discrimination against individuals with disabilities, whether explicit, such as denying equal employment, or implicit, such as the absence of ramps, sensory supports, or accessible pathways. The term eco-ableism expands this idea to environmental design and planning, highlighting how disabled individuals are marginalized through inaccessible infrastructure, exclusion from decision-making, and limiting narratives or beliefs. This builds on the planning concept of “spatializing disability,” or analyzing how people with physical or cognitive differences navigate spaces shaped by historical and structural forces. This study conducts a master-plan review of Richmond 300, focusing on disability inclusion with respect to vision, sensory, and ambulatory disabilities as defined by the U.S. Census Bureau. Using Critical Discourse Analysis (CDA), the plan will be examined for embedded power structures, whose voices are included or omitted, and whether accessibility is meaningfully prioritized. A Textual Analysis Approach (TAA) will guide coding for keywords, themes, and discourse patterns related to eco-ableism. The hypothesis is that Richmond 300: A Guide for Growth includes approved accessibility measures that equitably address the needs of disabled residents. This research aims to identify existing strengths and gaps to support more inclusive future planning.

Jessica Hollis

Discipline: Biology

Authors:

#1 Dr. Jacqueline Jones

#2 Ja'Dazia Posey

#3 Samantha Ruwuya

Abstract Name: FOXI3 as a Molecular Switch Regulating BMP4 and TGF- β Responses in Prostate Cancer

FOXI3 has emerged as an important regulator of epithelial–mesenchymal dynamics in prostate cancer (PCa), a process closely linked to tumor invasion and metastasis. Previous work in our laboratory showed that knocking out FOXI3 in C42B prostate cancer cells reduces migration and promotes a more epithelial-like phenotype, especially in response to TGF- β , a major inducer of epithelial–mesenchymal transition (EMT). However, it is not known whether FOXI3’s role is limited to TGF- β –driven EMT or whether it also influences pathways that help maintain epithelial identity. This project examines how FOXI3-deficient C42B cells respond to BMP4, a growth factor associated with supporting epithelial characteristics and compares these responses to TGF- β treatment. Wild-type and FOXI3-knockout C42B cells were treated with TGF- β or BMP4, and differences in migratory behavior were assessed. qRT-PCR analysis revealed changes in the expression of key EMT-associated genes, including E-cadherin, N-cadherin, FOXI3, and CXCR4. Our results show that FOXI3^{+/-} prostate cancer cells behave differently when exposed to BMP4 compared to TGF- β , suggesting that FOXI3 interacts with both EMT-inducing and epithelial-reinforcing pathways. Notably, FOXI3-deficient cells exhibit a delayed transcriptional response to growth factor treatment relative to FOXI3-expressing cells. This delay indicates that FOXI3 may be required for rapid activation of pro-metastatic signaling programs. Overall, these findings suggest that FOXI3 participates in a broader signaling network that contributes to prostate cancer progression. Understanding FOXI3’s role in balancing epithelial and mesenchymal states may help identify new regulatory mechanisms involved in prostate cancer aggressiveness and future therapeutic strategies.

Ren Hollis

Discipline: Environmental Science and Sustainability

Authors:

#1 Hayston Wines
#2 Jackson Nivera
#3 Corinne Tsou
#4 Patrick O'Shea
#5 Shruti Syal
Kira Miller
Cynthia Lin

Abstract Name: A Sustainable & Universal Redesign of Hickory Hill Park in Richmond, Virginia

Urban green spaces provide essential environmental, psychological, and physical benefits, yet access to these resources is often inequitable. Cities are increasingly vulnerable to climate change, highlighting the need for adaptive design. This study focuses on the redesign of Hickory Hill Park in Southside Richmond, selected through a combination of site suitability analysis and qualitative survey. The guiding research question is: How can a park in Richmond be designed to optimize environmental resilience, accessibility, and community benefits? The selection of a research location and scope used a mixed-methods approach integrating spatial analysis, environmental assessment, and community engagement. A site suitability analysis was conducted using a combination of an Analytic Hierarchy Process, SVI scores, and accessibility factors on potential parcels. Equity criteria were incorporated through spatial and social equity modeling. A qualitative onsite tour identified Hickory Hill Park as the primary research location based on its open space, neighborhood characteristics, and potential for development. Community perspectives were collected through a combination of written surveys and interviews with residents and community center staff, both on-site and within the neighborhood. The resulting redesign integrates community-identified needs with universal design and climate-resilient features. Guided by the American Society of Landscape Architects, UCLA's Guidelines for Senior-Friendly Parks, and ADA regulations, the design supports people of all ages and abilities. Features include an amphitheater for public gatherings, an accessible main entrance, an intergenerational playground and quiet area, improved transit amenities, and inclusive recreation spaces. Green infrastructure, pervious surfaces, rain gardens, expanded vegetation, solar lighting, and heat-reducing materials strengthen stormwater management and mitigate urban heat island effects. Expected results suggest a redesigned Hickory Hill Park would improve environmental performance, increase accessibility, and address underrepresented community needs. This project provides a model for how community-driven, equity-centered park redesign can support long-term sustainability and public well-being in urban contexts.

Tamara Holmes

Discipline: Psychology

Authors:

#1 Tamara Holmes

Abstract Name: The Cognitive Consequences of Fatherlessness

Fatherlessness is a growing issue that is plaguing society as we know it, and the only thing that is examined is how it is correlated with behavioral challenges. However, there is little research on the very thing that is responsible for those behaviors to even occur, cognition. This presentation will address the question: What are the cognitive consequences of fatherlessness? This presentation will bring a psychological lens to the social issue of fatherlessness and examine how a father's absence may influence decision-making and concept formation in a child. All the information that will be gathered will be a byproduct of a literature review. This research will result in taking the necessary steps to take this question and create a framework that will in the end foster a dialogue on how family structures could shape cognitive outcomes and lessen the number of absent fathers.

JoeLiah Honeycutt

Discipline: Biology

Authors:

#1 JoeLiah Honeycutt

#2 Johnasha Stuart, Ph.D

Abstract Name: The Effectiveness of Natural Preservatives in Reducing the Growth of Microbes

Have you ever bought fresh fruits or vegetables, only to find them spoiled a few days later? You're not alone — food residuals are one of the most commonly wasted items in Georgia, contributing to approximately 12% of all solid waste and creating environmental and economic challenges. This study explores whether natural preservatives, lemon and vinegar, can effectively reduce the growth of microbes on produce, thereby extending freshness and preserving its quality. Both substances are known to inhibit microbial growth and reduce the risk of foodborne illnesses. To test antimicrobial properties, strawberries and cucumbers were soaked in three solutions: a commercial fruit preservative solution, a vinegar-and-water solution (3:1), or a lemon juice-and-water solution (3:1). The microbial characteristics from each solution were measured on TSA plates. The solution without any preservative contained the highest number of microbial growth. Overall, both vinegar and lemon juice reduced microbial growth on produce. The reduction of microbial growth from strawberries treated with vinegar or lemon juice was comparable. However, cucumbers treated with lemon juice showed a greater reduction in microbial growth and diversity compared to those treated with vinegar. Interestingly, the commercial fruit preservative was less effective than the natural options and showed the most diverse growth in color, form, elevation, and margin. Our findings suggest that simple, safe, and natural methods could help households reduce food waste and improve food safety. Future studies could explore a wider variety of produce or combinations of natural preservatives for household use.

wongee hong

Discipline: Computer Science

Authors:

#1 wongee hong

Abstract Name: Robust 3D Cell Segmentation for Imbalanced Volumetric Electron Microscopy Using a Hybrid Loss

Over the past 20 years, machine learning has made significant progress and is now used in every sector of industry. Deep learning is a subset of the machine learning and is a foundation of large language models such as ChatGPT. However, deep learning is not limited to large language models. Due to its powerful ability to automatically learn features from images, audio, and video, it is widely used in biomedical fields. When applying deep learning, it is important to address imbalance in dataset as imbalanced datasets present a significant challenge in biomedical image segmentation. One common approach is to use specialized loss function and selecting an appropriate loss function is critical to enhance the performance of deep learning models. This study compares the performance of individual loss functions and their linear combinations using a 3D ResNet architecture on volumetric electron microscopy data from the Janelia Research Campus OpenOrganelle dataset. It then introduces a hybrid loss function, Focal Tversky++ loss, that is designed to improve model performance in imbalanced datasets. Experimental results show that the proposed method enhances segmentation performance by approximately 20% compared to simple linear combination of two different loss functions. This finding provides practical insights into selecting effective loss functions and developing techniques that improve upon basic linear combinations.

Ashton Hoo

Discipline: Visual Arts

Authors:

Sophia Zhou

Tyler Ricks

Abstract Name: INFRARED SIMULATION

BackgroundImage recognition for infrared images is more challenging than it is for visible spectrum, due to a lack of high quality infrared images to use for training. Also, the images used have lower resolution due to IR bands just having longer wavelengths than the visible spectrum. These constraints could be avoided by simulating infrared images with temperature simulation-driven rendering. Some applications of this include but are not limited to, monitoring health, heat detection within engines or buildings, thermal regulation, process control throughout engineering workflows and a ton more. Streamlining infrared simulations has plenty of valuable properties for a variety of different tasks

Deenaydra Hood

Discipline: Health and Human Development

Authors:

#1 Deenaydra Hood

#2 Dr. Ann-Catherine Sullivan

#3 Brandon Matthews

Dr. Ann-Catherine Sullivan

Brandon Matthews

Abstract Name: Elevating Advocacy: Experiences of State APE Teachers of the Year

This study explored the underexamined experiences of state-level Adapted Physical Education (APE) Teachers of the Year (TOY) recipients through a mixed-methods investigation designed to highlight both quantitative and qualitative dimensions of professional recognition. Using a purposive sample of awardees, identified through publicly available data, participants completed a 44-item survey addressing key demographic, professional, and recognition-related variables. The survey provided a broad understanding of participant backgrounds and the structural context of state-level recognition programs. To add depth and perspective beyond numerical trends, semi-structured focus groups were conducted to capture the participants' personal reflections and experiences. Thematic analysis of the focus group data revealed three major findings: Professional isolation, the role of self-advocacy, and variability in recognition procedures across states. Professional isolation emerged as a recurring theme, with participants describing limited peer collaboration and few opportunities for connection within their districts. Many awardees emphasized that self-advocacy was a vital skill for promoting APE visibility and gaining access to resources that are often overlooked in traditional physical education programs. Additionally, participants discussed how recognition processes differed greatly from state to state, revealing inconsistencies in nomination procedures, evaluation criteria, and levels of institutional support. These findings illuminate systemic inequities that continue to affect APE professionals and highlight the importance of developing more consistent, transparent, and equitable recognition practices. By strengthening institutional backing, increasing mentorship opportunities, and promoting awareness of APE contributions, educational systems can better support the retention and

professional growth of these teachers. Ultimately, fostering consistent recognition practices across states is essential not only for sustaining excellence within the field but also for advancing inclusive physical education opportunities for students with disabilities nationwide

Abigail Hoover

Discipline: English and Literature

Authors:

#1 Laurie Dashnau

#2 Susan Bruxvoort Lipscomb

Abstract Name: The Development of the Conservation Movement Throughout the Victorian Era, as told by Children's Literature

My research paper explores how the shift in views on conservation and animal extinction that occurs throughout the Victorian era can be seen in Victorian children's literature. In the early Victorian period, collecting and displaying natural elements was a celebration of the environment, as Lynn L. Merrill explains in her book *The Romance of Victorian Natural History*. Early Victorian children's literature, such as Tom Brown's *Schooldays*—published in 1857—shows this. From the young boys stealing a kestrel's eggs, to the character of Martin, who is a naturalist and collects taxidermy, bird eggs, animals, etc., to the support and even participation in this interest by Arthur, the novel's moral example, this tradition was encouraged by Thomas Hughes, the author of the novel, and was not viewed as a negative pursuit during the time. However, as the Victorian era progressed, there was a growing concern for how such practices were negatively impacting the environment. According to Henry M. Cowles in "A Victorian Extinction: Alfred Newton and the Evolution of Animal Protection," Alfred Newton developed the modern understanding of extinction in the 1860s and 1870s. Later Victorian children's literature, such as *The Jungle Books*, published in 1894, shows this shift. Kotick's story explores this issue of human disruption of animal species in "The White Seal," where Kotick observes his friends being violently hunted by men. Kipling writing from the seal's perspective gives a more disapproving view of the practice, displaying the shift from the views displayed in Tom Brown's *Schooldays*. Through Victorian children's literature, a change in views of conservation, from an exploration of nature through the disruption of it, to the advocacy against animal exploitation, is evident.

Caroline Hope

Discipline: Psychology

Authors:

Abstract Name: Portrayal of ADHD in Children's High-grossing TV and Movies and the Influence on Perceptions of ADHD: Percy Jackson and the Olympians, Shrek, and Finding Nemo

Attention-deficit/hyperactivity disorder (ADHD) is one of the most common neurological disorders that affects children, with about 11.4% of children aged three to 17 diagnosed in the US. ADHD has many negative stigmas, such as individuals are unruly, lazy, or intentionally choosing to be different or difficult, which are often enhanced by parents and educators; these perceptions can impact academic performance, social experiences, and psychosocial outcomes of children with this diagnosis. These negative narratives frequently emphasize behavioral conformity, focus on perceived deficits, and compare differences to peers and siblings, reinforcing the internalized stigma of children with ADHD. These experiences may shape children's self-concept and may lower self-esteem. On the contrary, increased representation of characters

with traits that align with ADHD in many movies and in popular media offers alternative narratives that challenge stereotypes. A literature review was conducted with peer-reviewed studies on childhood ADHD experiences, societal perceptions of ADHD, coping skills in children with ADHD, and social skills to determine whether the representation of ADHD in media can influence children's self-esteem and self-perceptions of ADHD. Percy Jackson and the Olympians, Shrek, and Finding Nemo demonstrated the positive attributes of ADHD represented by the children in these studies. The characters, Percy, Donkey, and Dory, are shown with behaviors that emphasize creativity, acceptance, and non-traditional problem-solving skills, reframing ADHD traits as strengths rather than deficits. The findings suggest that kids with a greater understanding of ADHD have a high acceptance level, better development of coping skills, and higher self-esteem. These findings suggest an association between representation and societal perceptions of ADHD, highlighting the potential value of increased, accurate representations of ADHD in children's media.

Christina Hope-Borges

Discipline: Chemistry

Authors:

#1 Christina Hope-Borges

Abstract Name: The Potential Synergistic Effects of Low Paraben Concentration on Estrogen Receptor Positive Breast Cancer Proliferation In-Vitro

Estrogen-receptor positive (ER+) breast cancer is the most common subtype of breast cancer (BC) that grows through the binding of estrogen. As estrogen binds to the ER, metabolic pathways are activated such as those related to cell growth and regulation. The specific pathway being studied is the PI3K/AKT pathway. MCF-7, an ER+ breast cancer cell line, contains a PIK3CA mutation, primarily impacting the PI3K/AKT pathway. The purpose of this research is to analyze how parabens, an endocrine disruptor chemical that binds to ERs, stimulates the proliferation of the PI3K/AKT pathway when introduced at concentration found in personal care products (PCPs). The basis of the methodology to analyze the effects of parabens includes culturing and producing a stock of MCF-7 BC cell lines. Next, conduct an Apoptosis/Necrosis assay to analyze cell death when MCF-7s are exposed to parabens. After, Reverse Transcriptase-quantitative Polymerase Chain Reaction (RT-qPCR) will be run to quantify the upregulation of genes specific to PI3K/AKT pathway, followed by Immunofluorescence to visualize if any structural changes to the cell has occurred. Thus far, a stock of MCF-7s has been produced and an experiment no longer being conduct, AlamarBlue, was in attempt to optimize. It is expected to observe increases in overall cell growth, thus possibly seeing increase cell death due to higher turnover rates of the cells. Additionally, gene expression RT-qPCR experimentation should increase as exposed to parabens. Lastly, it is hypothesized that structural changes will occur as high cell turnover rate increases likelihood of mutations. This project works to understand the potential synergistic impacts parabens have on an in-vitro cell environment mimicking the real body.

Ryann Hopp

Discipline: Biology

Authors:

#1 Bridget Jacques-Fricke

Abstract Name: Determining the Role of BRINP2 for Formation or Migration in Neural Crest Cells

Neural crest cells (NCCs) are multipotent stem cells unique to vertebrate embryos. After forming in the dorsal

neural tube, they migrate and differentiate into many different cells such as melanocytes (skin pigment cells), cartilage and bone cells in your face, and neurons and glia in the peripheral nervous system. Proper development of NCCs are crucial to prevent birth defects such as cleft lip and palate, Treacher-Collins Syndrome and more. While it's known that certain genes play a specific role in NCC development, there is still a large knowledge gap. Previous work in our lab identified 674 genes that are candidate regulators of neural crest development, including Bone Morphogenic Protein/Retinoic Acid Inducible Neural-Specific Protein (BRINP2). BRINP2 is in the same superfamily as Astrotactin 1, which plays a role in cell motility, but there is no known function of BRINP2. Using early embryo electroporation to inject morpholino, a chemical inhibitor of protein expression, BRINP2 function was knocked down on one half of the embryo to compare development on the electroporated and unaffected side. Using in situ hybridization, Sox10 gene was stained to analyze NCC development differences within an embryo. More data is needed to determine the role of BRINP2 in NCCs. However, this pilot study established that the process of early embryo electroporation, in situ hybridization and analyzing imaged results can be conducted in one summer at Hamline University.

William Hoppes

Discipline: History

Authors:

Abstract Name: The Ballad of Artist and Veterans Against the Vietnam War

The United States' involvement in the Vietnam War holds its place as one of the most controversial subjects in the history of the nation. The United States government was in a deep fear of communism after the McCarthyism era. If Vietnam fell to the communist forces of the Viet Minh, the United States government believed, then so would many others after it. However, many did not know in Vietnam that the United States military was killing and torturing innocent men, women, and children. The Ballad of Artists and Veterans against the Vietnam War tells the story of two groups who stood up and protested the United States government. The actions of the Artists' and Writers' Protest (AWP) from New York, and the Artists' Protest Committee (APC) from California, as well as artwork such as "Q: And Babies?" A: And Babies, Saigon, the Tattooed Dolls, and more, worked towards the protest efforts of the artist. On the side of the veterans, the organization known as the Vietnam Veterans against the War (VVAW) made significant efforts with the protest movements they did, such as Operation RAW, the Winter Soldier Investigation, and when they threw their medals at the capital. By looking at the efforts of both groups, one can see how veterans protested for similar reasons. The ballad of artists and veterans against the Vietnam War may have been different, but they sang the same song.

Timothy Horanic

Discipline: Health and Human Development

Authors:

#1 Hansen Mansy

Abstract Name: Effect of Plant-Based vs. Standard American Diet on Cardiovascular Parameters in College Students

This study examines how adherence to different dietary patterns—specifically a plant-based diet compared to the standard American diet—can influence physiological indicators tied to cardiovascular health, including heart rate variability (HRV), blood pressure (BP), and heart rate (HR). Among these markers, HRV is

considered especially sensitive to autonomic nervous system (ANS) regulation and may offer earlier insight into physiological stress or dysfunction than HR or BP alone. Although nutritional habits are widely believed to impact heart health, few investigations have focused on how specific long-term diets affect autonomic and cardiovascular metrics in healthy, college-aged adults. This study aims to investigate if early, diet induced changes in heart health can be identified in college aged individuals, through non-invasive measures such as electrocardiography (ECG), seismocardiography (SCG), and galvanic skin response (GSR). Because this trend has been observed in older adults, where diet influences heart rate, blood pressure, and heart rate variability, it is likely that similar diet-related effects could be detected in young, asymptomatic, college aged individuals as well. By treating diet as the main variable of interest, and targeting a younger demographic, this study provides insight into the earliest physiological effects of diet on heart health, supporting the development of preventative strategies before clinical symptoms arise. The findings could reinforce the role of dietary habits in supporting or undermining cardiovascular health early in life. By identifying physiological differences linked to distinct eating behaviors, this study may highlight diet as a low-cost, widely accessible strategy to reduce long-term disease risk and promote autonomic balance.

Taketo Horigome

Discipline: Education

Authors:

#1 Eric Vance

Abstract Name: Evaluating the Effectiveness of the LISA Model in Training Interdisciplinary Data Scientists

Undergraduate and graduate students often learn statistics and data science in isolation from real stakeholders, yet most applied work requires collaborating with domain experts to define questions, analyze appropriate data, and translate results into action. This project evaluates the Laboratory for the Interdisciplinary Statistical Analysis (LISA) model at the University of Colorado Boulder, which pairs formal instruction with mentored practice on real projects. LISA's curriculum is grounded in the ASCCR framework - Attitude, Structure, Content, Communication, and Relationship - and uses structured practices such as the Q1-Q2-Q3 content flow and Video Coaching and Feedback Sessions to help students develop human-centered, impact-oriented data science skills. We assessed program effectiveness using multiple surveys administered from Fall 2020 through Spring 2023 to both student collaborators and domain experts. Student data included a beginning-of-semester baseline survey, project-level reflection surveys, and a long-term follow-up survey. Domain expert data included end-of-semester project feedback and multi-year follow-up surveys on longer-term outcomes such as publications, grants, and changes in practice. Quantitative items used 1-6 scales and were analyzed descriptively; open-ended responses were coded thematically to capture perceived growth and program impact. Findings indicate meaningful improvement across all ASCCR dimensions, with especially strong gains in Communication - shared understanding and the ability to explain results in plain language-and Relationship-trust, reliability, and team effectiveness. Domain experts reported clearer research questions, actionable results, and sustained collaborations. Long-term student reflections highlighted increased career readiness, leadership confidence, and skill in managing interdisciplinary teams. Overall, this evidence suggests that structured collaboration training, integrated with authentic projects, effectively bridges theory and practice. The LISA model offers a scalable framework for preparing interdisciplinary statisticians and data scientists who not only perform sound analyses but also co-create solutions that generate tangible benefits for society.

Molly Horn

Discipline: Art History

Authors:
#1 Molly Horn

Abstract Name: That's Not Art! Artificial Intelligence in the Arts

Artificial intelligence (AI) has been deeply integrated into our modern lives: social media algorithms, email summaries, software to write essays, and tools to photoshop relatives out of family photos. This software is trained on countless data points sourced from our lives without permission, compensation, or accountability. This technology's rapid development coupled with its unknown limitations has prevented the implementation of effective regulations to address exploitation, copyright, and privacy rights. AI intersects many fields outside of its intended boundaries, the arts being this study's focus. The purpose of this project is to evaluate whether the products of AI can be classified as unique, independent works of art, and their creators, artists. AI art is a contentious topic, primarily due to the discourse over authorship and ownership of its creative works. AI's data gathering has scraped archives, artwork and art styles to develop generative software like ChatGPT or DALL-E. These allow people to create award winning art with a sentence, forcing artists to retroactively protect their works. Crucially, this devalues human-made art. Art is a reflection of society; it informs us of our history, our cultures, our desires and dreams. Art is innately human. If we claim the works of a machine as art, how do we define humanity? While I do not believe AI art should be considered equal to human-made art, I acknowledge its nuances, and the work of its emerging artists. With the pervasiveness of AI, we must work to integrate AI art in a regulated, open, and beneficial manner. Research for this study involved visits to collections and museums locally and regionally.

Libby Horner

GA - Kennesaw State University

Discipline: Education

Authors:
#1 Shamitha John
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Abstract Name: (Dis)Respect in the School Context: Adolescent Perspectives

Research has found that respect is a central part of building healthy relationships within secondary schools. For example, scholarship has found that adolescents who reported feeling respected in the school environment had higher levels of belonging and engagement and better academic performance than peers who reported lower levels of respect. Despite current research that highlights the importance and value of respect in schools, there have been limited investigations of adolescents' thoughts and feelings regarding respect and disrespect. Additionally, there is limited conversation around how macro-level forces (e.g. racism, classism, sexism) inform adolescents' understanding of (dis)respect and the way they show (dis)respect to people around them. Therefore, this research project investigates the ways adolescents conceptualize (dis)respect in schools. This work is framed by a theoretical model that claims that (dis)respect is informed by macro-level processes (Harris et al., 2025). This is a qualitative study that uses focus groups to learn about students' perspectives. The research was collected at two Boys and Girls afterschool Clubs located in the Southeast region of the United States, with approximately 25 participants at each site (N=50). Participants are

between 6th and 12th grade. At this point of the research, 2 focus groups have been conducted. Preliminary data has been analyzed using the constant comparison method. Within this data, two preliminary themes have emerged. First, 8th and 9th grade participants talked about how stereotypes were the utmost form of disrespect, while 6th and 7th grade students focused more on interpersonal interactions. Second, male and female participants reported having different expectations on how they should or could respond to (dis)respect in schools. These findings will highlight the factors that can create a culture of mutual respect among teachers, students, and administrators to create safer and more inclusive school environments.

Gwen Horzempa

Discipline: Interdisciplinary

Authors:

Abstract Name: Gun Violence & Data Science: Understanding the Gun Violence Death Rate Through Feature Importance and PCA

The United States is one of the wealthiest countries; however, it has a gun violence issue on par with some of the poorest nations. So, to understand this complex and multi-faceted issue, it seems useful to utilize machine learning techniques. In this study, I used feature importance scores and principal component analysis (PCA) to estimate if certain socioeconomic, demographic, and economic factors per state contribute to the knowledge of the gun violence death rate in America. To find feature importance scores, I assembled a database using information from the National Institute of Minority Health and Health Disparities, the Centers for Disease Control and Prevention, and U.S. Bureau of Economic Analysis and applied random forest regression, permutation feature importance, and gradient boosting regression. Across all machine learning models used, the percentage of people who have a bachelor's degree had the highest feature importance score by a large margin. This means that, out of the features I looked at, knowing the percentage of people who had a bachelor's degree per state was the most informative demographic feature to predict the gun violence death rate in that state. Additionally, PCA on the data revealed that the top two principal components are responsible for over 90% of the variance in the dataset, with the first principal component, representing socioeconomic conditions, having a 0.73 correlation with the gun violence death rate. Thus, a state's average level postsecondary educational attainment appears to capture the most information about the gun violence death rate, as well as socioeconomic conditions in general. Further, these findings demonstrate that viewing the issue of gun violence from different points of view may provide new paths towards reducing fatalities.

Sameen Hossain

Discipline: Biology

Authors:

#1 Sameen Hossain

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Abstract Name: Systematic Characterization of Ancestry-Associated miRNA Regulatory Pathways in Pancreatic Cancer

Pancreatic ductal adenocarcinoma (PDAC), the most common form of pancreatic cancer, has limited therapeutic options and a five-year survival rate between 10-13%. Previous literature suggests that post-

transcriptional regulation, particularly through microRNAs (miRNAs), can play a critical role in shaping tumor progression. MiRNAs regulate gene expression by binding to complementary sequences in the 3' untranslated regions (3'UTRs) of target transcripts (mRNAs). Therefore, disruptions to these interactions can alter the expression of oncogenic pathways. This study seeks to characterize miRNA variability and identify genomic variants that may influence miRNA–mRNA interactions by integrating whole-genome sequencing (WGS) and RNA sequencing data from a cohort of 21 patient-derived xenograft (PDX) models. We first performed presence–absence variability (PAV) analysis to identify miRNAs that have a variable presence across tumors, revealing 62 significantly variable miRNAs ($p < 1 \times 10^{-15}$). We will map predicted gene targets for each miRNA and assess the expression levels of these targets using our existing RNA-seq dataset, to better understand the miRNA regulatory pathways and functionality. In parallel, we will scan the WGS data for single-nucleotide polymorphisms (SNPs) located within miRNA seed sequences, as well as variants within the predicted 3'UTR binding sites that could disrupt or enhance miRNA–mRNA interactions. By integrating PAV results, gene expression profiles, and SNP variant data, we aim to uncover miRNA regulatory networks that highlight potential mechanisms driving PDAC heterogeneity and biology. Expected results include the identification of miRNAs and target genes whose altered regulatory pathways contribute to tumor signaling and progression. Overall, this work aims to uncover novel aspects of PDAC biology which may help inform future biomarker development or therapeutic strategies.

Reese Houck

Discipline: Biology

Authors:

#1 Reese Houck

#2 Dylan Brown

#3 Nannan Liu

Abstract Name: Poultry Litter Beetle Insecticide Resistance in the Southeastern United States

The Poultry Litter Beetle (PLB) is a growing issue within the poultry industry. PLB causes significant economic loss by spreading disease, causing indigestion, and destroying poultry house infrastructure. The cheapest and easiest management strategy is to apply insecticide; however, the overapplication of insecticide has caused widespread resistance. This resistance is currently not well monitored, but doing so would provide vital information for a producer's ability to create successful Integrated Pest Management programs. To provide this information to producers, we sampled PLB across 6 major poultry-producing states and performed insecticide bioassays to quantify resistance. Through Probit analysis, we found extremely high resistance to Malathion and Permethrin in most populations. Additionally, we seek to elucidate the genetic mechanisms underlying this resistance by sequencing resistance genes. We have sequenced the acetylcholinesterase gene (Malathion's target) from our insecticide susceptible control population, and further work will sequence related genes from resistant populations to elucidate how mutations confer resistance. We expect genetic mutations to confirm our bioassay results, and these newly sequenced genes may be used to develop new resistance sampling methods and treatments.

Trystyn Hovey

Discipline: Mathematics

Authors:

#1 Trystyn Hovey

#2 Fengrong Wei

#3 Qiongri Yao

Abstract Name: Revolutionizing Real Estate: The Impact of AI on Property Valuation, Marketing, and Sales

In this study, we examine the impact of artificial intelligence (AI) applications on real estate valuation, marketing, and sales performance. Specifically, we investigate whether the use of AI-enhanced or AI-staged listing images influences housing sale prices or time-on-market, after controlling for other established determinants of housing outcomes. Our empirical findings indicate that, overall, the adoption of AI-based image enhancement techniques does not exert a statistically significant effect on either sale price or selling speed. To further explore potential heterogeneity, we conduct subsample analyses by clustering properties according to geographic location and school district quality. The results remain consistent across these subsamples, with p-values generally exceeding 10%, suggesting that AI-driven visual enhancements have limited influence on transaction outcomes. A plausible explanation is that residential real estate purchases represent one of the most substantial financial commitments for households, and thus buyers' decisions are unlikely to be materially altered by aesthetically enhanced listing images alone.

Marie Howe

Discipline: Engineering

Authors:

#1 Marie Howe

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Aseel Ahmed

Abstract Name: RamanSpec Safe Margin Pen

Incomplete tumor margin detection during cancer surgery increases the risk of recurrence and the need for additional surgical procedures. Current intraoperative margin assessment relies on biopsies that must be processed in a laboratory, delaying results by 20–30 minutes and limiting real-time surgical decision-making. To address this limitation, we are developing a disposable, handheld Raman spectroscopy pen for immediate detection of cancerous tissue during surgery. The device incorporates a 2.1 mm fiber optic cable housed within a stainless steel inner tube and a biocompatible resin outer shell, enabling safe optical signal transmission while maintaining sterility and disposability in the surgical environment. Key design objectives include optical lens compatibility, reduction of Raman signal interference, and mechanical protection of the fiber optic cable to ensure consistent signal performance. Multiple CAD-based design iterations were completed to optimize ergonomics, inner-tube geometry, and overall structural stability for surgical usability. Material comparison analyses evaluated fused silica, plastic, glass, and calcium fluoride lenses based on optical clarity, durability, signal transmission efficiency, and cost-effectiveness. Disposable body materials were also assessed to balance strength, safety, and manufacturability. These iterative design refinements improved both functional performance and clinical practicality. Experimental validation will be conducted using standardized chicken tissue and formalin-fixed biological samples to evaluate Raman signal strength, spectral precision, and repeatability. Testing will establish baseline performance thresholds for tissue differentiation under controlled conditions. The successful development of this Raman spectroscopy pen has the potential to improve real-time surgical margin assessment, reduce reoperation rates, and enhance patient outcomes through more precise tumor resection. This project integrates biological engineering, optical physics, and medical device design to address a critical unmet need in oncologic surgery.

Ella Howell

Discipline: Psychology

Authors:

#1 Lauren Luther

#2 Gregory Strauss

Abstract Name: Affect Valuation and Beliefs about Emotion as Mechanisms Underlying Negative Symptoms in Schizophrenia

Introduction: Negative symptoms such as anhedonia, avolition, and asociality are core features of schizophrenia (SZ) and are characterized by disrupted processing of positive emotions and reduced reward-seeking behavior. Currently, negative symptoms remain an unmet treatment need. One theory that could advance the identification of novel treatment targets for negative symptoms is Affective Valuation Theory (AVT), which suggests that people act to reduce gaps between how they ideally want to feel versus how they actually feel. Initial research suggests that greater negative symptoms are associated with increased discrepancies between one's ideal and actual affective states. However, the exact processes underlying how affect discrepancies impact negative symptoms are unclear. This study examined whether dysfunctional beliefs that emotions are uncontrollable or useless mediate the association between affect discrepancies and negative symptoms. Methods: Forty-one individuals with SZ and thirty-five psychiatrically healthy controls completed the Brief Negative Symptom Scale (BNSS), Affect Valuation Index (AVI), and Emotion Beliefs Questionnaire (EBQ). Analyses included t-tests, bivariate correlations, and regression-based mediation. Results: Increased beliefs that emotions are uncontrollable and negative emotions are useless were associated with negative symptom severity; however, there was no significant relationship between affect discrepancies and negative symptoms. Affect discrepancies were not significantly associated with emotion beliefs in SZ. Mediation hypotheses were not supported. Conclusions: Results suggest that dysfunctional emotion beliefs, rather than discrepancies between how one wants to feel versus how they actually feel, may be stronger mechanisms of negative symptoms. Treatments targeting these beliefs via strategies such as emotion regulation could improve negative symptoms.

Keith Howerton

Discipline: Computer Science

Authors:

Abstract Name: Smart Speakers, Smart Ads: A Study of Voice Inputs and Advertising Algorithms

As voice assistants become ubiquitous in modern households, they raise significant privacy concerns about potential eavesdropping and targeted advertising. The study will help identify correlations between specific voice inputs on Google Home assistants and the appearance of related advertisements on Google services such as YouTube and Google Search engine. Three Google Home devices were used in the experimental design. One device served as a baseline of the experiment and did not receive any voice inputs. The other two devices were tested with specific voice commands towards travel and health to assess whether voice interactions influence targeted advertising. The data were manually collected on three computers for four weeks. The first advertisements shown were recorded, including dates and URLs, and compiled in an Excel database. These records were then analyzed using a custom Python-based tool to detect patterns and potential correlations between voice inputs and ad content. Preliminary results suggest that there is no strong evidence that there is a correlation between the specific voice inputs devices and targeted ads. Future research could further examine the conditions under which voice data may be used for advertising purposes and explore more advanced privacy protections for consumers.

Derek Hsu

Discipline: Biology

Authors:

#1 Jason Lo

#2 Yun Fang

Abstract Name: Validating Gene Targets and Increasing Stability of ω RNA to Enhance Gene Editing

Gene editing performance has been dependent on advancements of editing efficiency. The IscB- ω RNA system, an evolutionary precursor system of CRISPR/Cas, has a compact size and is mechanistically similar to Cas9 but limited by poor editing efficiency in mammalian cells. Existing research into IscB has been developing more efficient nucleases and stable ω RNA but these have only been experimentally used in plasmid form, not through transiently expressed systems, such as mRNA or RNPs, which would be more clinically relevant due to safety concerns. In the case of Cas9 sgRNA, researchers have used chemical modifications to improve sgRNA stability. These techniques can be applied to ω RNA to further probe the effects of chemical modifications to ω RNA for enhanced stability and possible effects to gene editing performance. Preliminary results have shown synthetic ω RNA incorporating chemically modified 2'-O-methyl-3'-phosphorothioate (MS) at the 5' and 3' ends has significantly increased expression levels and longer half-lives as seen in RT-qPCR. Preliminary sequencing data has shown promise for indel generation using the IscB- ω RNA system as an mRNA platform in validated guide locations. Furthermore, we screened for several different target sequences for potential therapeutic knockout of genes, which were selected from current targets of CRISPR therapeutics, PCSK9 and TTR, and atherosclerosis, TXNDC5. This system has been applied to the target sequences and shows long-term potential of IscB- ω RNA system in in vivo gene editing.

Jessie Hsu

Discipline: Computer Science

Authors:

#1 Orit Peleg

#2 Richard Terrile

Abstract Name: Temporal Analysis of Defect Formation in Honeycomb Under Geometric Frustration

Honeybees are known to optimize their storage space and minimize the amount of wax material they need to produce by building hexagonal cells. However, prior research indicates that in sub-optimal conditions with geometric frustrations, such as those found in natural structures, they adapt their construction process to their immediate surroundings, resulting in the formation of merged and non-hexagonal cells. While these spatial adaptation patterns are increasingly well documented, the temporal dynamics of how such defects emerge and propagate during the construction process remain poorly understood. My work seeks to address that gap by investigating the effects of misalignment angles on honeycomb development over time. We implemented this experimental setup by placing 3D-printed experimental frames with controlled misalignment parameters in active hives and regularly photographing these frames throughout the construction period. Ongoing work involves processing this imaging dataset through an optimized image registration pipeline, enabling the creation of accurately aligned temporal sequences of honeycomb growth. The next phase of the study focuses on leveraging a range of neural network architectures to build a temporal machine learning model that effectively emulates how honeybees adjust their construction patterns under varying misalignment conditions. We expect the analysis to uncover quantitative and algorithmic rules governing the decisions honeybees make to modify structural components of honeycomb cells in response to geometric frustration. Altogether, the

conclusions of this study are expected to extend beyond characterizing honeycomb defects and into a broader understanding of how distributed biological systems achieve robust construction under uncertainty. Not only are these findings relevant to understanding the behavior of honeybee colonies, but also for informing theoretical models of collective organization and decision-making, which hold potential applications in bio-inspired engineering.

Connie Huang

Discipline: Health and Human Development

Authors:
#1 Sayana Isaac

Abstract Name: Leading Causes of Mortality in Japanese Americans, National Vital Statistics System: 2005 - 2022

Background: Japanese Americans represent one of the most established Asian American subgroups in the United States, especially in the state of Hawai'i, where JAs represent a historically unique diaspora. This study characterizes mortality trends for JAs in Hawai'i and in the continental US. Methods: We analyzed mortality data from the National Center for Health Statistics (2005–2022) and population estimates from the 2000–2020 censuses. Age-standardized mortality rates were calculated for the leading causes of death among JAs, stratified by sex, geography, and nativity. Temporal trends were evaluated via joinpoint regression analyses. Non-Hispanic Whites and Asian Americans/Pacific Islanders (excluding JAs) served as comparison groups. Results: Heart disease (22.2%), malignant neoplasms (21.9%), and cerebrovascular disease (7.8%) were the leading causes of death among JAs. Overall JA mortality was lower than that of NHW (AMR 648 for JAs vs. 1191 for NHWs), with consistent female advantages (AMR 552 for JA females vs. 808 for JA males) across nearly all causes, with particularly large gaps in heart disease, cerebrovascular disease, and Alzheimer's disease. Hawai'i residents had higher all-cause mortality than counterparts in the continental US (AMR 694 for JAs in Hawai'i vs. 627 for JAs in the continental US). Cause-specific trends revealed mixed results, with lower heart disease and cancer but higher Alzheimer's and influenza/pneumonia rates. Foreign-born JAs exhibited the lowest mortality across all leading causes, while U.S.-born JAs showed increasing Alzheimer's, diabetes, hypertension, and accident mortality rates. Conclusion: Disaggregated analyses reveal distinct JA mortality trajectories shaped by sex, place of residence, and nativity. The elevated Alzheimer's and pneumonia mortality in Hawai'i, and the rising aging-related mortality among U.S.-born JAs, point to the influence of environmental exposures, lifestyle shifts, and differential access to care. These patterns underscore the importance of moving beyond aggregated Asian American categories to understand how cultural contexts contribute to longevity.

Victoria Huang

Discipline: Biology

Authors:
#1 David Meriwether

Abstract Name: Impact of Oxidized Polyunsaturated Acids on Macrophage Efferocytosis Capacity

Efferocytosis, the process by which macrophages engulf and digest apoptotic cells, is essential for maintaining tissue homeostasis and resolving inflammation. Impairments in efferocytosis are implicated in the progression of chronic inflammatory diseases, including inflammatory bowel disease (IBD) and

atherosclerosis. Oxidized polyunsaturated fatty acids (PUFAs), specifically hydroxyeicosatetraenoic acids (HETEs) and hydroxyoctadecadienoic acids (HODEs), accumulate at high levels in inflamed intestinal tissue, though their impact on macrophage efferocytosis remains largely unexplored. In this study, we investigated how exposure to oxidized PUFAs at varying concentrations alters efferocytosis capacity in human macrophages. Across a group of HETEs and HODEs, we found that several oxidized fatty acids including 12-HETE, 15-HETE, and 13-HODE significantly suppressed apoptotic cell binding and uptake by macrophages across a 1-hour timeframe. We further tested whether this effect was mediated by the leukotriene receptor BLT2. To investigate, we performed pharmacologic manipulation using BLT2 agonists and antagonists. Pharmacologic BLT2 agonism reproduced the inhibitory phenotype, while BLT2 antagonism rescued 12-HETE induced defects, supporting a BLT2-dependent mechanism. Efferocytosis capacity was quantified using a fluorescence-based assay in which macrophage–apoptotic cell interactions were imaged after 1 hour, and the ratio of bound/internalized apoptotic neutrophils to macrophages was determined. Together, these findings suggest that oxidized PUFAs impair early macrophage efferocytosis through BLT2 signaling, offering a potential mechanistic link between lipid oxidation and defective inflammation resolution in IBD. By clarifying how specific lipid mediators disrupt efferocytosis, this work contributes to identifying therapeutic targets aimed at restoring macrophage resolution programs in chronic inflammatory disease.

Connie Huang

MD - Johns Hopkins University

Discipline: Health and Human Development

Authors:

#1 Jeanette Nguyen

Abstract Name: Racial Disparities in Total Hospitalization Costs, Length of Stay, and Post Hospital Destinations, National Inpatient Sample: 2016 - 2021

Background: Non-Hispanic Black (NHB) and Hispanic patients experience inconsistent hospital stays, higher total costs, and fewer referrals to higher-level post-discharge services compared to Non-Hispanic White (NHW) patients. This study examines disparities in total costs, length of stay, and post-discharge destinations across racial groups over a six-year period. Methods: In this cross-sectional study using the National Inpatient Sample (HCUP-NIS), we included NHW, NHB, Hispanic, Asian American/Pacific Islander (AAPI), and Other adults hospitalized between 2016 and 2021 for the 10 leading non-elective hospitalization causes in the US. We determined median total costs, median length of stay, and non-home discharge rate by race. Using NHWs as a reference group, we calculated adjusted costs and odds ratios. Adjusted regression analysis stratified by insurance type was conducted. Generalized linear models with a log link and quasi-Poisson variance structure were used for total cost outcome variables. Multivariable logistic models were used for non-home discharge and length-of-stay variables. Results: Of 156,693,091 hospitalizations, 66.5% were NHW, 16.6% were NHB, 11.0% were Hispanic, 2.4% were AAPI, and 3.5% were Other. Among Medicare hospitalizations, cost ratios ranged from 1.044 (95% CI: 1.031, 1.058) to 1.297 (95% CI: 1.274, 1.319) for all race groups compared to NHW. Among Medicaid hospitalizations, cost ratios ranged from 0.894 (95% CI: 0.880, 0.909) to 1.190 (95% CI: 1.166, 1.217) for all race groups compared to NHW. Among privately insured hospitalizations, cost ratios ranged from 0.952 (95% CI: 0.936, 0.968) to 1.264 (95% CI: 1.238, 1.292) for all race groups compared to NHW. Discussion: Insurance status modifies the total hospitalization cost among racial minority groups. These findings offer opportunities to address insurance-driven hospitalization cost disparities for racial minority groups.

Ty Hubert

Discipline: Engineering

Authors:

#1 Kenneth Brown

Abstract Name: Unintended Bistatic Signature Detection/Processing

The central purpose of this research is to validate the process of detecting, characterizing, and tracking high-interest items in Low Earth Orbit (LEO) using bistatic detection. The increasing density of objects in LEO necessitates developing capabilities to effectively geolocate and track objects of concern. Bistatic detection provides a unique contribution because it leverages existing systems without the requirement of building a new detector. For the project, we utilized the Northern California DX Foundation (NCDXF) International Beacon Network as the transmitter component of the bistatic system. This network comprises 18 beacons, distributed around the globe, with five beacons transmitting simultaneously at five unique frequencies every 10-second interval of the day. The core challenge was to reliably confirm the presence of these weak beacon signals within a noisy operational environment, forming the foundational step for subsequent geolocation efforts. The primary research focused on processing 3 TB of acquired data to isolate the transmitted beacon signals. Data processing was accomplished using a match filter technique, correlating the received signal with

a known reference signal, a replicated beacon emittance at the specific frequency and pattern of the transmitted message. The research successfully confirmed the existence of 13 out of the 18 NCDXF beacons within the collected dataset, confirming the reliable identification of the known transmitters in currently operational systems. It confirms that they have the sensitivity required to detect the beacon signals in a high-noise environment. The verified beacon identification established the necessary foundation for the subsequent phase of the project: finding and identifying the reflected beacon emissions. With the reflected and original transmissions, the time difference of arrival and frequency difference of arrival can be calculated to accurately establish the geolocation of the reflecting objects.

Andrew Hubl

Discipline: Psychology

Authors:

#1 Kathryn Langston

#2 Riley Gustafson

#3 Ivan Flores

Abstract Name: The Role of MTHFR Gene Mutation in Neurodevelopmental Disorders

Diagnosis of Attention-Deficit/Hyperactivity Disorder (ADHD) is currently unstandardized. The variability of diagnostic methods and potential comorbidity with other psychopathologies present a challenge in securing an accurate diagnosis and appropriate treatment. Physiological measures could provide an objective way to corroborate ADHD diagnoses. Methylenetetrahydrofolate reductase (MTHFR) is an enzyme expressed by the MTHFR gene. It has a key role in regulating levels of folate and homocysteine. Imbalances of these molecules have been linked to adverse effects in the central nervous system, including schizophrenia and neural tube defects. A single point mutation (C677T) has been linked to reduced activity of the MTHFR enzyme, and in patients with myelomeningocele, a neural tube defect, this mutation has also been associated with attention-deficit/hyperactivity disorder (ADHD). We hypothesize that the presence of the C677T mutation would positively correlate with reported symptoms of ADHD. We also aim to examine possible associations between this specific mutation and symptoms of Generalized Anxiety Disorder (GAD) as well as Major Depressive Disorder (MDD). We tested 51 participants aged 18-68 years old for C677T using loop-mediated isothermal amplification (LAMP) and compared their genotypes to their scores on questionnaires used to screen for the aforementioned conditions: the Adult ADHD Self-Report Scale (ASRS V1.1), Generalized Anxiety Disorder-7 (GAD7), and the Personal Health Questionnaire-9 (PHQ9). The ASRS V1.1 was used to derive ADHD subtype scores: inattentive or hyperactive. Preliminary ANOVA results show a significant association between the high inattentive scores in homozygous mutant individuals when compared to homozygous wild-type individuals, but not when compared to the heterozygous group. Currently, there are no other significant differences between the groups, including the hyperactivity score. Our current sample size remains a limitation that we aim to mitigate by testing more samples.

Cheridan Hudson

Discipline: History

Authors:

#1 Cheridan Hudson

Abstract Name: Crisis and Consequence: Sulla's March on Rome and the Institutional Decline of the Roman Republic

In 88 BC, Lucius Cornelius Sulla marched on Rome. While his seizure of Rome and the resultant laws were relatively successful in staying the deleterious effects of the Roman Revolution, their collective impact proved fleeting, as the Republic would ultimately collapse within a few brief and violent decades. I argue that, while a range of individuals and their collective actions contributed to the collapse of the Republic, it was Sulla's march on Rome and his role of Dictator that accelerated its dissolution perhaps more than any other, as it played a central role in (re-)directing the trajectory of the Roman Revolution and established a myriad of new precedents (e.g., politicizing the army; seizing the capital; declaring oneself dictator; enacting proscriptions; etc.) upon which others would thereafter model their own approaches. In this work, the root causes that led Sulla toward the decision to march on Rome are analyzed, with a particular attention on the marches effects on governmental systems and the extent to which his methods influenced other key actors contributing to the fall of the Republic. In short, this work builds upon and challenges present assessments regarding the extent of Sulla's role in the foundational change in the Roman Republic and its ultimate collapse into monarchy.

Jackson Hull

Discipline: Interdisciplinary

Authors:

#1 Jackson Hull

Abstract Name: Hoosier Horse Sense: An Examination Of The Effects Of Material Culture On Political Power Through Earl F. Landgrebe

Behind every political leader stands an array of material goods that act as vessels of symbolic authority. This paper examines one such object — a crystal water pitcher belonging to Earl F. Landgrebe, who represented Indiana's 2nd Congressional District during the 91st through 93rd sessions of Congress — as a case study in the material culture of political power. Born into a modest agricultural family, Earl F. Landgrebe rose through the ranks of local Valparaiso, Indiana, politics to become a staunch defender of Richard Nixon during the Watergate scandal. His crystal water pitcher, crafted from crystal and etched with a modified version of the U.S. House seal, embodies the illusion of political legitimacy through both its material composition and its aesthetic embellishments. By situating this object within the broader context of political material culture, this paper explores how the physical properties and visual qualities of political artifacts help to naturalize and reinforce authority within democratic systems. Comparative examples, including other congressional pitchers of the period and contemporary political symbols, reveal a recurring dynamic in which material objects both authenticate and amplify perceived power. Ultimately, this analysis points toward a larger, more troubling pattern: while objects like Landgrebe's pitcher help officials internalize their roles and connect with institutional authority, they also risk creating a feedback loop where perceived power eclipses genuine, constitutionally granted authority. In the current political climate, Landgrebe's pitcher — offering what he might have called a touch of "Hoosier horse sense" — serves as a reminder that political authority is as fragile as the materials used to represent it.

Katherine Hull

Discipline: Political Science

Authors:

Abstract Name: Mobilizing the Next Generation: Social Media's Impact on Youth Political Engagement and Efficacy

This study seeks to answer the question: How do social media platforms influence political engagement and voter participation among young adults in the United States? The purpose of this project is to examine the ways in which social media sites, like TikTok or Instagram, shapes political behavior, decision-making, and civic participation within a generation that consumes much of its political information online. Existing research highlights social media's growing role in political communication and mobilization, yet few studies focus specifically on how these platforms affect the quality and form of participation among youth voters. This study contributes to that gap by analyzing how digital platforms both reinforce and transform traditional patterns of political engagement. Using the software Stata 13, a quantitative analysis is conducted of the 2024 American National Election Studies (ANES). The research focuses on respondents aged 18 to 29, historically the least likely to vote, but increasingly active in recent elections. Statistical correlations are used to assess the relationship between social media use and levels of political engagement. Preliminary findings suggest that social media exposure is associated with increased political awareness and participation among young voters, while also fostering new, non-institutionalized forms of activism that disrupt traditional political pathways. These results will be discussed within the broader context of democratic participation and generational change, offering insights for policymakers, educators, and advocacy organizations aiming to strengthen civic education and youth voter outreach.

Nikela Hulton

Discipline: Business

Authors:

#1 Nikela Hulton

Abstract Name: Earnings-Surprise Anomalies in U.S. Equity Markets (2000-2024)

Firms' earnings announcements are concentrated on bursts of information release that in theory should be fully incorporated into stock prices instantaneously when disclosed. Decades of empirical work, however, provide evidence that some equity prices continue to drift after earnings news. This study examines the behavior of stock returns following earnings surprises for U.S. common equities between January 1, 2000, to December 31, 2024, using daily stock data from the Center for Research in Security Prices (CRSP) merged with Bloomberg measures of expected and actual earnings metrics. The analysis will test if abnormal returns around earnings announcements are best explained by systematic risk exposure, behavioral attention constraints, or liquidity provision of frictions. "Abnormal" returns are measured by comparing realized returns around announcement dates to typical returns for each stock, after accounting for general market movements. I then study whether these abnormal returns can be explained by compensation for risk, by limits to investor attention, or by frictions in how liquidity is provided in the market. The study builds upon four foundational strands of prior research. The first has found a price "announcement-risk" factor connected to aggregate cash-flow news. The second strand presents evidence that investor inattention at low-attention times can generate underreaction to earnings. The third finds that context-dependent contrast effects shape how investors interpret sequences of earnings surprises. The fourth research shows that compensation for inventory risk can produce short-term return reversals around earnings events. Through using the various insights within a unified framework, this paper can reassess whether post-announcement return anomalies reflect rationally priced risk or persistent market inefficiency.

Moira Humphrey

Discipline: Economics

Authors:

Abstract Name: Political Instability and Economic Growth: The Role of Foreign Aid

Political stability is generally viewed as a prerequisite for sustainable economic growth and development. At the same time, foreign aid is often promoted as a tool that supports economic growth, but its effectiveness may depend on institutional and policy environments. This raises an important question of whether aid can offset the negative effects of political instability on economic growth. I estimate the effect of political instability on economic growth in 148 low- and middle-income countries from 1996 to 2023, and test whether aid moderates this relationship. I use two-way fixed effects regressions to control for time-invariant unobservables and global shocks. I include an interaction term between political instability and aid flows to estimate how aid flows affect the association between instability and economic growth. Findings will indicate the effect of political instability on growth and whether this effect is conditional on the level of aid a country receives. Results will offer new evidence to inform development policy on how aid is allocated in different political stability conditions.

Roy Humphreys

Discipline: Physics and Astronomy

Authors:
Simon Sulonen

Abstract Name: Seismometer Analysis of Military Campus Activity

The seismograph created serves to measure nearby pedestrian activity in order to determine what movements are happening. Through future development this could be a tool for military application capable of detecting vehicles, troop movement, and other human activity through vibrations in the earth. Three sensors will be tested in order to determine the most effective in the given frequency range. The three different methods explored are a hall effect sensor, a geophone and a force sensor. With these methods the goal is to create a compact ground-vibration detection system capable of identifying and differentiating events across The Citadel's campus. Events include class changes, drill performances, and military parades. An accelerometer was used to determine the range of frequencies of different human movements. Initial testing showed human activity typically produces signals in the 1–10 Hz range, with walking generating relatively smooth patterns and actions like jumping producing more erratic data.

Abigail Hunter

Discipline: Nursing and Public Health

Authors:
Vicky Alves-Wilson

Abstract Name: Using the Theory of Planned Behavior to Design and Implement Emergency Winter Preparedness Among Unsheltered Populations

Purpose: This intervention utilized the Theory of Planned Behavior (TBP) to improve the preparedness and self-efficacy of unsheltered individuals during extreme cold weather events. We implemented a winter preparedness initiative leveraging a local nonprofit's existing outreach infrastructure to provide winter-safety

education, connect unsheltered individuals to local resources, and distribute emergency kits among unsheltered individuals. Nationally, unsheltered individuals have an all-cause mortality rate 5-10 times higher than the general population, largely due to exposure, chronic disease, and lack of medical care. In Northern Arizona, severe winters dramatically increase the risk of cold-related illness and death. This non-profit organization provides essential support for unsheltered individuals, including access through mobile outreach and shower bus, food and clothing distribution, employment assistance, and housing navigation. Despite their vital role, they face growing challenges due to rising demand, limited resources, and harsh winter conditions. Methods: We implemented an evidence-based intervention comprising three unique activities. First, to increase knowledge, we created and distributed pamphlets containing information on symptoms and prevention methods on hyperthermia and frostbite and 40 winter preparedness kits to unsheltered individuals in the Northern Arizona community. Second, to improve social norms, health education was provided to our partner organization's staff, including materials on frostbite, hypothermia, respiratory illnesses, and emergency contact cards to sustain the longevity of the intervention. Finally, to improve self-efficacy, winter kits were distributed. Results: Pre-test and post-test surveys were conducted among unsheltered individuals during the distribution of kits to determine the perceived level of preparedness for extreme weather events, knowledge gained on symptoms and prevention methods for frostbite and hypothermia, and the perceived self-efficacy around winter kit use. Surveys showed that individuals demonstrated a 100% increase in ability to correctly identify at least 2 signs and 2 symptoms of frostbite and hypothermia. Additionally, 90% of individuals demonstrated increased self-efficacy.

Zakaria Hussain

Discipline: Biology

Authors:

#1 Tania Maldonado

#2 Hadi Hamze

#3 An Yao

#4 John Ryan

Abstract Name: PRL-3 and Rheb1: Novel Prenylated Proteins Controlling Mast Cell Function

Allergic diseases, including eczema, seasonal allergies, and food allergies, affect nearly 40% of Americans. These conditions often arise from a Type 2 inflammatory response, triggered when an allergen binds to IgE antibodies attached to the FcεRI receptor on mast cells. IL-33, an alarmin released during cellular stress or tissue damage, also contributes to this response by binding the ST2 receptor on mast cells. Activation of these pathways drives a pro-inflammatory intracellular signaling cascade marked by cytokine secretion and the release of inflammatory granule components. Isoprenylation, a protein modification that attaches a hydrophobic lipid tail, allows proteins to properly localize to membranes. This process is critical for cell signaling, but the proteins involved are only partly understood. To identify isoprenylated proteins potentially involved in FcεRI and ST2 signaling, we used the HumanPrenBase and RNA-sequencing data from bone marrow-derived mast cells (BMMC; in collaboration with Warren Leonard, NHLBI). We identified two prenylated protein candidates, PRL-3 and Rheb1. Neither have been studied in mast cells, but the literature links them to inflammation and to PI3K–Akt–mTORC1 signaling, a central axis in FcεRI- and ST2-mediated mast cell function. We treated BMMC with inhibitors of PRL-3 or Rheb1 prior to stimulation with IL-33 or IgE antigen crosslinking and observed significant reductions in IL-6 and IL-13 cytokine secretion as well as decreased degranulation. These findings support the hypothesis that PRL-3 and Rheb1 are key regulators of mast cell activation. These proteins may represent novel therapeutic targets for allergic inflammation.

Hiba Hussein

Discipline: Physical/Occupational Therapy and Speech Language Pathology

Authors:

#1 Hiba Hussein

#2 Marie Ramos

#3 Melanie Homan

#4 Joshua Guggenheimer

Marie Ramos

Abstract Name: Examining the Impact of the SAIL Program and Occupational Therapy on Fitness and Balance Confidence

Background: Falls are one of the leading causes of injury in older adults, 20% of which result in serious injury. Stay Active and Independent for Life (SAIL) is a community-based fall prevention exercise and education program. Previous studies demonstrated that SAIL classes may improve strength, balance, and activities of daily living in older adults. The objective of this study was to examine the impact of SAIL program participation and individual occupational therapy (OT) sessions on balance confidence, occupational performance, satisfaction and fitness outcomes. Methods: Eight participants (average age 86) conducted an initial assessment using the Senior Fitness Test, Canadian Occupational Performance Measure (COPM), and the Activities-specific Balance Confidence (ABC) Scale. All participants completed two 60-minute SAIL exercise classes weekly for six weeks. Four participants received two 30-minute OT sessions during the study; four received OT sessions after the study. All participants completed at least 75% of the SAIL classes, with five participants attending 100% of classes. On-site classes and rapport between students and study participations may have attributed to greater compliance. Results: The results indicated that there were no statistically significant differences ($P > 0.05$) between pre- and post-test performance for either group. However, there were some positive trends towards clinical significance for COPM satisfaction (6.04 vs. 7.6) and 6-minute walk performance (483m vs. 528m). Conclusions: Despite the low sample sizes, a ceiling effect in the ABC scale, and a range of physical capabilities among participants, this study indicated that SAIL, coupled with OT sessions, can have a positive impact on fitness for older adults, showing promise as a program. Future studies should aim to increase the sample size and focus on alternative assessments that tease out discrete differences in balance confidence and the impact that pain and satisfaction have on activities of daily living.

Jadon Hutchins-Love

Discipline: Film/Photography Studies

Authors:

Abstract Name: Spike Lee's Bamboozled & The Spectre of Minstrelsy

My research centers around a critical analysis of the film Bamboozled, directed by Spike Lee. Released in 2000, Lee's satire follows a struggling TV writer whose attempts to escape his contract backfire when the modern-day minstrel show he pitches to his boss gains unexpected success. The presentation will explore the film's themes of the legacy of minstrelsy in American entertainment and the psychic, dehumanizing toll of antiblackness on both an individual and community level. I will explore these concepts through Bamboozled's allegorical characters and discuss what they represent, while connecting the movie's themes to the writings of various black scholars. I will also discuss areas of today's media landscape where the messages of Bamboozled still resonate, and what we can take away from the film as writers, citizens, and academics alike.

Ryder Hutchinson

Discipline: Biology

Authors:

#1 Efrain Rivera-Serrano

Abstract Name: Identification of Reoviruses with Enhanced Oncolytic Potential Against Lung Adenocarcinoma

Lung adenocarcinoma is the most common form of non-small cell lung cancer, accounting for approximately 40% of cases. Despite existing treatments, new therapeutic approaches are needed, particularly for patients who do not respond to conventional chemotherapy. Oncolytic viruses, such as reoviruses, are a promising option because they can selectively infect and kill cancer cells. The well-studied T3D strain is currently in clinical trials against common cancers, yet the potential of other naturally occurring reovirus variants remains largely unexplored. Here, we investigated the ability of several reovirus strains to infect and kill human lung adenocarcinoma (A549) cells. Using metabolic assays to measure cell viability, we found several strains that significantly reduced cell viability relative to control at 4 days post-infection. Similarly, immunofluorescence analysis revealed that these same strains exhibited robust infectivity, with strain KC150 showing the highest infection rate. Together, these results suggest that multiple reovirus variants possess enhanced oncolytic potential against lung adenocarcinoma cells, with KC150 emerging as a particularly effective candidate for further studies. As the next step, we will test a panel of chemotherapeutic drugs and determine their optimal concentrations in A549 cells to eventually identify potential drug–virus combinations that may enhance therapeutic efficacy. This work shows the importance of expanding beyond the current T3D strain and exploiting the natural genetic diversity of reovirus.

Elaine Huynh

Discipline: Art History

Authors:

Abstract Name: The Evolution of Visual Design in Video Games

The paper reviews the timeline of visual design in video games, from the early days of pixel-based games to the complex, AI-enhanced games of today. The study highlights the influence of technological advancements, graphic design principles, and innovations in both the functional and aesthetic aspects of games. In early arcade games, designers relied on pixel art and bitmaps, which taught them to convey emotion and gameplay through simple designs. During that period, game visuals were low-resolution and pixelated, as seen in games such as Pac-Man and Street Fighter. As technology progressed, more intricate layouts and typography enabled the development of more interactive gaming experiences. The latest innovation, artificial intelligence, has transformed the design process, allowing games to be produced faster, visuals to become more realistic, and prompting designers to explore their artistic identities. However, this also poses challenges: some artists worry that their visual styles could be replaced by AI, leading to job losses. The paper also highlights small, underrated developers who create stylized and experimental games, emphasizing lesser-known titles outside mainstream media. This underscores that even failures are part of the historical landscape, as not every game achieves mainstream success. Their research demonstrates how game visuals are shaped by a dynamic interplay of technology and creativity, influencing both player experience and the broader scope of interactive game design. Overall, the visual design of video games has evolved from simple pixel art to more sophisticated, AI-influenced creations that reflect the expanding relationship between technology and graphic design in enhancing player engagement.

Michael Hvizdak

Discipline: Biology

Authors:

#1 Joseph Balczon

Abstract Name: Investigating the Microbial Diversity and Alcohol Tolerance of College Hand Sanitizer Dispenser Organisms

This study aims to investigate the microbial diversity and potential alcohol tolerance of deposited bacteria colonizing hand sanitizer dispensers at Westminster College (New Wilmington, PA, U.S.), specifically within public spaces such as the Hoyt Science Center and Patterson Hall. Hand sanitizer dispensers, particularly manual ones, are frequently touched surfaces that may harbor diverse bacterial populations due to repeated contact from a plethora of users. The research seeks to survey the bacterial species present on dispenser fixtures and assess their alcohol tolerance. Given the exposure of bacteria to ethanol-based formulations near dispenser nozzles, there is the likelihood that some species may exhibit adaptation, raising concerns about sanitizer efficacy. To address these questions, dispensers will be swabbed, and bacterial samples will be cultured and isolated for further analysis. Then, DNA extraction, polymerase chain reaction (PCR) amplification, and Sanger sequencing will be used to identify bacterial species, while tolerance assays will be utilized to determine alcohol tolerance levels across varying ethanol concentrations. It is expected that a wide range of bacterial species will be recovered, and some may display reduced susceptibility to ethanol exposure due to contact with sanitizer formulations. The findings can inform institutional sanitation strategies, contribute to knowledge on bacterial colonization of high-touch surfaces, and provide insight into microbial adaptation to biocides. Additionally, the study may have broader implications for public health practices related to hand hygiene and the development of effective antimicrobial formulations. Ultimately, this research will aid in understanding microbial persistence in hygiene-focused environments and help provide insight into protocols for reducing bacterial transmission.

Concepcion Ibarra

Discipline: Biology

Authors:

#1 Concepcion Ibarra

#2 Anna Salazar

#3 Hunter Moore

#4 Owen Henke

#5 Catlynh Pham

#6 Emma Sebastian

Abstract Name: The impact of gut health on brain and muscle decline

Previous research in fruit flies has discovered a relationship between increasing age and a deterioration in gut health, with developing intestinal barrier dysfunction tightly linked to mortality. Because of this tight association between organismal health and gut function, several markers of aging have been investigated in order to determine the role of barrier integrity on aging phenotypes. This study examines whether intestinal barrier deterioration can impact protein aggregation within the brain and muscles. Protein aggregates are a specific aging phenotype associated with several diseases of aging and neurodegeneration, such as Parkinson's Disease and Alzheimer's Disease, with an increase in age associated with elevated protein aggregate levels. This research utilizes the knockdown of the protein Snakeskin (Ssk) in the midgut of *Drosophila melanogaster*, with Ssk knockdown inducing intestinal barrier permeability and numerous

hallmarks of aging in young flies. Ssk is a septate junction protein, equivalent to mammalian tight junctions, important for maintaining the integrity of the connections between adjacent gut epithelial cells. Ssk mislocalizes in aging flies, perturbing these junctions and causing intestinal permeability. Knocking down its expression in the gut, using the GeneSwitch Gal4/UAS system in young flies, causes a decrease in barrier function and a severely reduced lifespan, in addition to other markers of aging such as gut microbiota dysbiosis, inflammation, stem cell overproliferation, and metabolic dysregulation. These experiments investigate whether manipulating Ssk expression in the gut can impact protein aggregate formation in tissues outside the gut in order to understand whether unhealthy or aging guts exhibiting barrier dysfunction may be associated with neurodegenerative diseases linked with protein aggregation in the brain and muscles. Behaviors associated with these aging phenotypes are also analyzed. Ideally, these insights will fuel a focus on intestinal health in the studies of several diseases with accompanying protein aggregation.

Pedro Ibarra Mejia

Discipline: Gender, Ethnicity, Diversity, or Cultural Studies

Authors:

Abstract Name: Indigenous Blood Quantum and Its Demographic Impact: A Historical and Legislative Analysis

Repeatedly Native Americans are required by the United States government to prove their respective tribal affiliations through blood quantum in order to receive their entitlement to lands and resources. The measurement of Indigenous blood quantum is a strategy imposed by the United States Federal Government to limit Native citizenship and disempower Indigenous Americans. It dates back to the late 18th century as the official method for classifying “Indianness.” In the midst of the reservation period, legislative and federal regulations for legitimizing “Indian blood” were carried out by the Bureau of Indian Affairs. As the bureaucracy increased, so did the elimination of the “blood” status of Native Americans for federal benefits, protection, and recognition. This paper examines the continued use of this Indigenous blood quantum to assign citizenship in a Native American tribe and its dire consequences. In addition to tracing its historical use, this research evaluates the legislative structures that uphold blood quantum and explore proposed policy alternatives that might mitigate its destructive demographic impact. This matters because blood quantum operates as a stand-in device for Indigenous elimination, a genocidal tool of Native American culture, as characterized by the Native American activist and scholar, Ward Churchill. For Native Americans, blood quantum is part of the “colonial erasure tactics,” as Kylie Rice (Mohawk and Algonquin) argues. Take, for example, how Congress has estimated that by the year 2080, less than 8 percent of Native Americans will have less than one-half or more Native “blood.” Historically, in the 1950s and 1960s, certain tribes deemed too small were terminated by the federal government, and they also lost status and subsequent benefits. Thus, it is important to call attention to how blood quantum will lead to further erasure of Native American communities as sovereign nations.

Araksan Ibrahim

Discipline: Nursing and Public Health

Authors:

Abstract Name: Understanding Autism in the Somali Community: Cultural Factors and Diagnostic Challenges in Minnesota

Autism diagnoses have increased over the past two decades, yet disparities in diagnosis and access to services remain, among immigrant communities. While prior studies have investigated disparities in autism care, few have focused on the unique intersection of culture, language, and healthcare access in the Somali community and how culturally responsive practices may improve outcomes for underserved populations. In Minnesota, Somali families have raised concerns about a relatively high autism prevalence and delays in diagnosis, emphasizing the need to examine; cultural and religious beliefs, linguistic barriers, stigma, systemic factors that shape autism understanding and access to care. This study builds upon a qualitative exploration of Somali community members' perceptions of cultural norms and beliefs about autism conducted in summer 2025. Themes from these qualitative data provided by parents and caregivers of children with autism and community leaders informed the development of the survey used in this study, a quantitative assessment of beliefs about autism and experiences in accessing related care. Participants will be recruited through community organizations and masjids with a target sample of approximately 60 respondents. Descriptive statistics will summarize beliefs and barriers, and chi square analyses will examine associations between individual characteristics and beliefs and experiences accessing care. The survey mirrors the key themes from the qualitative phase, and includes: (1) cultural beliefs, stigma, and misinformation; (2) autism being brought upon oneself; (3) personal, professional roles and lived experiences; (4) accessing the healthcare and support system; and (5) linguistic and communication barriers. It is expected that dual-role respondents will report greater familiarity with autism resources and fewer barriers, while single-role respondents (caregivers only) may report greater uncertainty and stigma. By integrating quantitative results with these themes, this research aims to support culturally grounded outreach and help inform equitable autism service access for Somali families in Minnesota.

Lillian Iden

Discipline: Education

Authors:

#1 Gina Kling

#2 Ella Williams

Abstract Name: The “How Many” Routine: Visual Imagery as a Catalyst for Computational Fluency

It is not uncommon to hear adults claim they are bad at math or always disliked the subject. This negativity often stems from early mathematical experiences which ranged from boring to highly discouraging and embarrassing. Thus a new emphasis in mathematics education recommendations is to change the narrative and help students develop joy, wonder, and curiosity about mathematics (MAISA & GELN, 2023). This is reflected in defining computational fluency (skill in carrying out arithmetic procedures like addition or multiplication) as comprised of flexibility, accuracy, efficiency, and appropriate strategy use (NRC, 2001). The “How Many” routine, in which a carefully-designed image of a collection of dice, dominoes, or other real world objects is shown and the class shares a variety of viable solutions, is one way to provide meaningful, engaging computational practice that not only supports learner understanding but also builds mathematical confidence and interest. Yet this routine is considered a “black hole” in mathematics education research, as there has been a great deal of related research that indicates its potential, but a significant lack of research directly studying the routine (Matney, 2020). Our study attempts to address this research gap by examining an intervention consisting of nine “How Many” mini-lessons that were conducted in four elementary classrooms during May 2025. Data collection and analysis (in collaboration with researchers at Northwestern University) included pre- and post-interviews with participating children to look for growth in fluency as well as detailed video analysis of the lessons to identify teaching moves for promoting rich mathematical discussion and learning. Quantitative analysis of the interview responses suggest that “How Many” activities have the potential for increasing student fluency.

Alyssa Idusuyi

Discipline: Nursing and Public Health

Authors:

#1 Dr. Kimberly Trout

Abstract Name: The Lived Experience of Black Birthing People in Philadelphia

Background: Maternal Mortality refers to the death of a person while they are pregnant or within 42 days of the end of their pregnancy. Black birthing people are up to three times more likely to die during childbirth or have maternal complications compared to their White and non-Black counterparts. Concerning the Philadelphia area, as of the 2024 Severe Maternal Morbidity Report, Non-Hispanic Black birthing people, who accounted for 42% of all births during this time, had the highest rate of Severe Maternal Morbidity (118 cases per 10,000 deliveries) compared to other racial and ethnic groups. **Purpose:** This research project aims to investigate these disparities and explore ways in which health care professionals can better support Black birthing people throughout their pregnancy, childbirth, and postpartum care. **Methods:** This study analyzed articles regarding Maternal Mortality and Severe Maternal Morbidity in Philadelphia within the context of the United States. National statistics were referenced and compared in relation to the Philadelphia area. **Conclusions/Implications:** This research suggests that social determinants of health (i.e., neighborhood environment, access to stable housing, nutritious food, and quality health care), along with accessible perinatal care, resources during pregnancy, and maternal education, are essential to the overall well-being of those giving birth. It is imperative that health care professionals consider these factors when caring for Black birthing people. **Further Research:** The next phase of the research will involve a phenomenological study of qualitative interviews with Black birthing people in the Philadelphia area. This qualitative portion will help address the lived experiences of these individuals and where improvements should be made regarding maternal health for Black people.

Lois Ijejeme

Discipline: Biology

Authors:

#1 Eric Brenner

Abstract Name: Circumnutation in *A. thaliana*: The Jasmonic Acid Pathway

Circumnutation is the helical movement of plant organs—leaves, stems, or roots—during its regular circadian (24 hour) growth period. It has been established that plants circumnutate for different reasons; each organ adapts this process for a different purpose (Stolarz 2009). The exact cause or reason for this action is yet to be fully understood as many hormones, stimuli, and pathways are involved. One of the hormones involved in plant-signalling is Jasmonic Acid ((1R,2R)-3-oxo-2-[(2Z)-pent-2-en-1-yl]cyclopentylacetic acid); JA. It is a lipid based phytohormone whose main constituent is Methyl Jasmonate or MeJA (methyl 2-[(1R,2R)-3-oxo-2-[(Z)-pent-2-enyl]cyclopentyl]acetate), and is the primary hormone involved in the repair of damaged plant tissues. Once there is damage to the plant, the site produces “defense molecules” constituting a pathway of jasmonates including JA. While these take effect, energy is consumed, particularly the energy that would normally be utilized for growth. Thus, growth is halted or slowed down and remains that way until much of the repair has been done. **Hypothesis:** Since circumnutation is a function of growth (mostly occurring as growth occurs) (Stolarz, 2009), a pause in the growth period will lead to shorter periods of circumnutation, characterized by narrower oscillations in the nutation wave. This means that the amplitude of each nutation (each helical movement) will be reduced or halted altogether. In short, I intend to discover whether JA directly pauses or halts the process of circumnutation in order to discern a specific pathway. **Results:** After data collection, I was able to establish that Jasmonic Acid may not have an immediate effect on

circumnutation in *A. thaliana*. In any case, it might promote it due to the hormone's ability to defend against stress responses. A positive control experiment, however confirms that it is able to inhibit root growth, and there may be possible interplay with other hormones.

Rawda Ikbariah

Discipline: Chemistry

Authors:

#1 Tanya Garain

#2 Souvik Banerjee

#3 Naime Gokce

Abstract Name: Rational Design and Evaluation of Quinoline Scaffolds as Next-Generation Tubulin Inhibitors

Microtubules are dynamic cytoplasmic proteins that play a crucial role in intracellular transport, cell division, and the formation of the cellular skeleton. They are made up of α - β heterodimers. Their ability to rapidly alternate between polymerized and depolymerized states is necessary for the development and function of the mitotic spindle during cell division. Disruptions in conventional microtubule regulation cause cancer cells to divide uncontrollably, making the microtubule network an important therapeutic target. Although various microtubule-targeting agents are often used in chemotherapy, many have severe limitations, including severe side effects such as neuro or cardiotoxicity, poor solubility or metabolic stability, and the rise of drug-resistant cancer types. These limitations underscore the need to develop novel tubulin inhibitors that can overcome some of these drawbacks. One such approach targets the colchicine-binding site (CBS) present at the interface of α - and β -tubulin, leading to the inhibition of tubulin polymerization and disrupting the proper functioning of microtubules. In this project, we have designed and synthesized a new class of phenyl(quinoline)methanone derivatives that can act as a CBSI or colchicine-binding site inhibitor. The core of these molecules allows for extensive structure-activity relationship studies, making it a suitable starting point for generating new tubulin-binding molecules. These analogs are designed to potentially enhance target engagement and exhibit improved toxicity and metabolic stability profiles. The synthesized compounds were tested for their capacity to reduce cancer cell survival using an MTT-based cell viability assay, and a few compounds proved to be bioactive. The future objective of this project is to perform iterative synthesis to obtain more potent analogs that can be further evaluated for their ability to directly inhibit tubulin polymerization and induce cancer cell death.

Arunav Ilangovan

Discipline: Physics and Astronomy

Authors:

Abstract Name: High-Temperature Superconductors for Efficient Spacecraft Attitude Control

Spacecraft Attitude Determination and Control Systems (ADCS) depend on electromagnetic actuators that generate torque using limited electrical power, and this creates a constant tradeoff between performance and efficiency. Some of the tradeoffs include high resistive loss within its coils, frictional wear in the bearings, and limited torque capabilities. High-temperature superconductors (HTS) offer a possible way to improve these systems because they can carry electrical current with almost no resistive loss at cryogenic temperatures. This allows an HTS coil to produce a stronger magnetic field or higher torque for the same

power input. The potential improved efficiency is promising, but it also raises questions on the feasibility of HTS being used in the environment that attitude control systems require. REBCO tapes, which are a common form of HTS material, are thin multilayer structures with a brittle ceramic superconducting layer. When the tape is shaped into a coil, cooled to its operating temperature, or subjected to launch vibration, the layers deform in different ways and can develop strain in the superconducting film. If the strain exceeds certain limits, the material could crack or lose performance. In this project, we are examining both the efficiency implications and the physical feasibility of using HTS in spacecraft attitude control. We will use analytical equations to estimate the strain that develops during coil winding and cooldown, and we will compare those predictions with physics simulations to understand how the tape is expected to behave under realistic conditions. The overall aim is to evaluate whether HTS-based activators could improve spacecraft attitude control while remaining mechanically reliable under operating conditions.

Asha Iman

Discipline: Biology

Authors:

#1 Asha Iman

#2 Johnasha Stuart, Ph.D

Abstract Name: Evaluation of Microbial Antibiotic Resistance from Water Systems in Clarkston, Georgia

Antibiotic resistance continues to be a growing global health concern. Environmental reservoirs, particularly water systems, may contain antibiotic-resistant bacteria due to contamination from agricultural runoff, sewage discharge, and urban pollution. Understanding the resistance profiles of microbes in various water sources in a particular geographical region may help document resistant microbial genetic profiles, raise public health awareness, and lead to the development of environmental management strategies. This project aims to investigate the antibiotic resistance patterns of bacteria isolated from various water sources in Clarkston, Georgia. The sources will include residential water areas, including two local creeks and a lake site. Water samples will be collected and inoculated on nutrient agar to culture bacteria. Distinct colonies will be subcultured to obtain pure cultures of bacterial isolates. Antibiotic susceptibility will be tested using the Kirby–Bauer disk diffusion method on Mueller–Hinton agar with commonly used antibiotics—ampicillin, ciprofloxacin, tetracycline, erythromycin—followed by the measurement of the inhibition zones. The resistance profiles will be compared between the water sources to determine whether surrounding human behavior may influence antibiotic-resistant bacteria and public health concerns.

Lauren Imasa

Discipline: Biology

Authors:

#1 Cassandra Holbert

Abstract Name: Polyamine Depletion and Cytokine Production in the Ovarian Tumor Microenvironment

Within a tumor microenvironment (TME), cancer cell proliferation and survival are dependent on polyamines. Polyamines are small protonated alkylamines that are involved in growth, transcription, and survival. Some cancers respond well to immunotherapy treatments and usually have more pro-inflammatory cells in the TME even though the cells may not be active. Immunotherapy augments the activity of these pro-inflammatory cells allowing the immune system to help clear the tumor. This treatment is not beneficial for

tumor types that have predominately anti-inflammatory cells in their TME. There are ways to reprogram these “cold” tumors to have more immune-permissive cells by increasing macrophage and T-cells levels. In this project, we focus on the impact of polyamine depletion on cytokine production by immune cells. Ivospemin, when used as a treatment of ovarian cancer-bearing mice promotes the infiltration of traditionally pro-inflammatory cell types, however it has not yet been determined if these cells retain their pro-inflammatory function. We evaluated cytokine production from cells of ovarian tumor-bearing mice that have been treated with Ivospemin, a drug that depletes polyamine levels as well as another polyamine depleting drug Doxorubicin. We then test the production of different cytokines via ELISA to determine which pro-inflammatory cells are most active in this model. This will lay the groundwork for other projects in the future looking at the combination of Ivospemin and immunotherapies in ovarian cancer. There are multiple types of immunotherapies: some of which activate macrophages and some that activate T cells. The work proposed in this application will inform us as to which types of cells are most important in the ovarian TME. If macrophage cytokines are more noticeably changed with treatment, then we can consider immunotherapies targeting macrophages. If T-cell cytokines are changed the most, we would investigate Ivospemin and T-cell therapies such as CAR-T or anti-PDL1 therapies.

Anthony Imbert

Discipline: Psychology

Authors:

#1 Anthony Imbert

#2 Haley Dresang

#3 Hayley Olson

Abstract Name: Comparative Analysis of Language Impairment in Left versus Right Stroke Patients: A Preliminary Study

Stroke is a leading cause of long-term disability worldwide, yet the characterizations of stroke laterality on naturalistic language function remains incompletely understood. This study investigated whether left-hemisphere strokes produce more pronounced language deficits than right-hemisphere strokes using aphasia severity mannerisms such as repetition accuracy, and pausing behavior. Seventeen participants were drawn from the Aging of Brain and Cognition Post Stroke cohort to participate in this study. Aphasia severity was assessed using the Western Aphasia Battery–Bedside, a language function evaluation test to obtain naturalistic speech samples from a picture description task. Repetition accuracy and both unfilled-pause and retracing behaviors were quantified from digital recordings. No significant differences emerged for unfilled pauses or retracing behaviors, and aphasia severity scores did not differ markedly between left- and right-stroke participants. These null findings likely reflect limited statistical power and potential compensatory recruitment of contralateral networks following left-hemisphere injury. Future work with larger samples and linear mixed-effects modeling—including covariates such as age, gender, lesion volume, and stroke type—will probe the interaction of neurobiological profiles with discourse measures. Improved understanding of these relationships may ultimately inform tailored rehabilitation strategies to enhance communication outcomes in individuals with post-stroke aphasia.

William Impagliazzo

Discipline: Biology

Authors:

#1 Antonio Izzo

#2 Kevin Schoonover

Abstract Name: Screening of Potential Pathogens of *Trichostema dichotomum*

Trichostema dichotomum (aka. "blue curls") is a herbaceous plant in the mint family that is commonly planted in gardens as an ornamental. Regional *T. dichotomum* plants were found diseased, with initial work pointing to a fungal pathogen; however, it was unclear which fungus might be causing the disease. The goal of this study was to isolate and identify fungi from diseased *T. dichotomum* tissue to begin the steps of identifying the true causative agent. After obtaining isolates in pure culture, we used molecular approaches (PCR and sequence analysis of the ribosomal RNA gene spacer region) to identify and compare fungal isolates. A total of 18 fungal isolates were obtained from the diseased plant tissue. DNA sequencing analysis allowed more precise identification of 17 of the isolates. Further background analysis of those species revealed that nine of them are known plant pathogens and therefore could potentially be the pathogenic agent. To test this, healthy *Trichostema* plants were inoculated with these potential pathogens and their pathogenic effects evaluated. , and thereby see whether or not this is a unique pathogen-host relationship that was previously unknown. Two pathogens induced disease progression: the isolate most closely matching *Diaporthe gaultherii* produced a substantial major stem impact, and the isolate most closely matching *Diaporthe stewartii* produced leaf lesions. Investigation is currently being done to determine if either or both of these fungi represent new pathogens to *T. dichotomum*. These findings will provide a foundation for future pathogenicity studies and highlight the broader ecological significance of fungal interactions with regional *Trichostema* populations.

Mikayli Ingram

Discipline: Anthropology and Archaeology

Authors:

Abstract Name: Seminole War and Its Untold Impact on Seminole Culture and Social Dynamics in Florida

The focus of this study will be on examining the Seminole Wars and other contributing events on the Seminole Tribe of Florida over time in regards to internal social and cultural dynamics and traditions, whilst also observing external relations with other minorities in the state of Florida and the Federal, State, and various local governments. Despite the Seminole Wars being an important part of Florida history, it is not well discussed or taught in schools, leading to the erasure of knowledge about it, which impacts various communities' abilities to interact with the descendants of the military conflicts. Using mixed-methodology research practices, including library research, interviews with descendants of the Wars—since much of Seminole history is recorded orally within the tribe—and those involved with its research, and in-field excursions to physical sites that were large parts of the Seminole War. Making sure to gather information from a variety of sources serves as a counterbalance to what is in the written record in libraries to account for any bias in my sources. Afterwards, the collected data will be analysed and further discussed in order to take steps in the present to best navigate current-day social and cultural dynamics relating to the Seminole Tribe of Florida and its internal groups, as well as the dynamics it has with other descendant groups and Federal, State, and local governments in modern times.

Asha Inman

Discipline: Biology

Authors:

#1 Johnasha Stuart, Ph.D.
#2 Asha Inman

Abstract Name: The Antimicrobial Efficacy of *Capsicum annuum* and *Capsicum chinense* on the growth of *E. coli* and *S. epidermidis*

The number of cases of foodborne gastroenteritis has increased in the United States. According to the CDC, consumption of foods and beverages contaminated with microbes has contributed to increased hospitalizations, causing up to 5,000 deaths every year among vulnerable populations, including the immunocompromised, young children, and the elderly. Bacterial pathogens such as *Salmonella*, *Campylobacter*, and *Staphylococcus* species are important agents of foodborne illnesses. Capsaicin, a chemical found in peppers, has been reported to have antimicrobial activity and may serve as a natural antimicrobial agent in food preparation to reduce illness. The pungency of capsaicin has a range of 0 – 16,000,000 Scoville Heat Units (SHU). This study explored the antimicrobial properties of bell pepper (*Capsicum annuum*, 0 SHU) and habanero pepper (*Capsicum chinense*, ~100,000 SHU) against *Staphylococcus epidermidis* and *Escherichia coli*. Sterile paper disks were soaked in pepper extracts and placed onto TSA plates containing *E. coli* and *S. epidermidis*. Ampicillin (10 µg) disks and TSB-soaked disks were included as positive and negative controls, respectively. After 48 hours, the zones of inhibition were measured to determine antimicrobial activity. While ampicillin-treated plates produced clear zones of inhibition for both bacterial species, none of the plates treated with pepper extracts produced measurable antimicrobial activity. Substantial widespread bacterial diversity was observed on all extract-treated plates, but not on ampicillin or TSB-control plates. These findings indicate that pepper extract solutions introduced additional bacterial species to the TSA plates. Furthermore, observation of differential microbial growth on plates with bell pepper and habanero extracts suggests differences in resistance and susceptibility to the antimicrobial properties in peppers. Further studies will explore alternative pepper extraction methods and testing of additional microbial species to evaluate antimicrobial activity. Findings could suggest using pepper extract as a natural preservative during food preparation to deter bacterial growth and reduce foodborne illness.

Autumn Irby

Discipline: Psychology

Authors:
#1 Marty G. Woldorff

Abstract Name: The Effect of Jigsaw Puzzles on Cognitive Flexibility and Visuospatial Attention Processes

Jigsaw puzzling is a common everyday activity that requires careful coordination of visuospatial and attentional control processes. Jigsaw puzzling has been previously suggested to help preserve these processes, especially in aging adults (cognitive resilience), but the affected neural mechanisms is unclear. The strength of visuospatial and attentional control processes can be indexed by modulations in alpha-based oscillatory power (8-12 Hz). Specifically, alpha power is known to decrease when people open their eyes and increase when people close them. The difference in alpha power is referred to as alpha reactivity. Alpha reactivity is thought to reflect how well the brain can flexibly shift attention and the strength of neural connections across the brain's cortex (cortical connectivity). The current study tested whether alpha reactivity could reflect a mechanism by which jigsaw puzzling impacts visuospatial attentional control processes. Eight young-adult participants completed a classic eyes-open-eyes-closed paradigm while electroencephalography (EEG) was recorded. Participants then completed a jigsaw puzzle for twenty minutes followed by another eyes-open-eyes-closed paradigm. Alpha reactivity was measured as the average difference in alpha power between the eyes-open and eyes-closed segments. Results showed classic alpha reactivity, with alpha power being lower during eyes-open segments than during eyes-closed segments. This alpha reactivity, though, decreased after jigsaw puzzling. This implies that visuospatial attentional control processes indexed by alpha reactivity were

taxed by jigsaw puzzling. This suggests a possible mechanism by which jigsaw puzzling can challenge visuospatial attention processes toward long-term adaptive improvements and ultimate cognitive resilience. These results contribute to our understanding of visuospatial attention processes and how jigsaw puzzles can be used as a potential mechanism to increase cognitive resilience.

Margaret Ireland

Discipline: Biology

Authors:

#1 Gregory Watkins-Colwell

#2 Gabrielle Corradino

Abstract Name: Investigating Skate Population Dynamics and Feeding Ecology through Museum Specimens

This project is investigating the population dynamics and feeding ecology of skates through preserved museum specimens. Some recent studies have explored skate ecology, but more research is needed to investigate changes in skate populations and diet over time. Museum collections can be used to fill this knowledge gap. A total of 110 specimens of three skate species (*Amblyraja radiata*, *Leucoraja erinacea*, and *Rostroraja eglanteria*) collected between 1907 and 2001 were sampled from the American Museum of Natural History, the Yale Peabody Museum, and the Harvard Museum of Comparative Zoology. Population dynamics were explored through the collection date, collection location, length, width, and sex of each specimen. Micro-computed tomography was used to visualize the stomach contents of 12 of these specimens to analyze feeding ecology of historical skates. Preliminary results have shown a skewed distribution of sizes across the museums, but an even number of males and females. Additionally, the μ CT scans have successfully shown the presence or absence of stomach contents. Further analysis of the collected data is expected to reveal trends in populations aligning with the collection location, date, museum, and sea surface temperature. More detailed processing of the μ CT scans will likely validate this method as a new tool for stomach content analysis, providing insight into historical skate diets. With this additional data, I anticipate that the results of this project will reveal a decline in skate populations and habitat area aligned with increased pressure from fishing, habitat degradation, and climate change. I also expect to find a shift in skate diets between historical specimens and modern records, possibly due to corresponding declines in prey populations. Ultimately, the results of this study will provide a long-term analysis of skate communities along the east coast of the US, which is crucial for effective conservation efforts of these organisms.

Holly Ireton

Discipline: Business

Authors:

#1 Holly Ireton

#2 Woongsun Yoo

Abstract Name: AI in Asset Management: A Performance Comparison Between AI-Powered Mutual Funds and Quantitative Hedge Funds

We examine the performance of artificial intelligence (AI)-managed mutual funds compared to quantitative and discretionary hedge funds from 2019 to 2024. We find that AI-managed mutual funds generate significantly higher cumulative returns than the overall hedge fund average, as well as quantitative and discretionary hedge funds specifically. Despite these superior returns, we observe a strong positive correlation

between the returns of AI-managed funds and both hedge fund strategies. Our risk-adjusted performance analysis indicates that none of the fund categories exhibit a statistically significant alpha. We attribute the superior gross returns of AI-managed mutual funds primarily to their higher factor loadings on systematic market risk, complemented by the relatively poor risk-adjusted performance of the hedge fund comparison groups. These findings suggest that the outperformance of AI-managed funds is likely attributable to their increased exposure to systematic risk rather than superior security selection or market timing capabilities.

Derenza Iriarte

Discipline: Social Work and Human Services

Authors:

#1 Guanlin Gao

Abstract Name: Understanding Food Security Strategies and Cultural Strengths Among NHPI Women in Hawai'i: A Hybrid Thematic Analysis Using the SOAR Framework

Native Hawaiian and Pacific Islander (NHPI) communities continue to face disproportionately high rates of food insecurity, shaped by Hawai'i's high cost of living, limited access to affordable groceries, and demands on working families. This qualitative study explores how NHPI women in Hawai'i experience and navigate food insecurity while drawing on cultural strengths, family networks, and shared community practices. Since women often serve as the primary grocery shoppers and meal planners in their households, their perspectives offer critical insight into daily decision-making around food. Using a hybrid thematic analysis that combines deductive coding from the SOAR (Strengths, Opportunities, Aspirations, Results) framework with inductive coding based on participant narratives, this study identifies how women balance cultural expectations, financial constraints, and time limitations. Many participants described struggling to prepare full meals because of long or irregular work schedules, leading them to rely on takeout even when it strained their budgets. Others highlighted the rising cost of staple foods in Hawai'i and expressed mixed experiences with the support and limitations of EBT benefits. Despite these challenges, participants emphasized resilience grounded in cultural values. Women discussed sharing food with extended family, preparing traditional meals when possible, and supporting one another during difficult periods. These practices provided emotional and practical support that helped families stretch limited resources. Participants also shared aspirations for greater access to affordable local foods, increased community gardens, and policy efforts that consider the lived experiences of NHPI households. By centering the voices of NHPI women, this study contributes to a deeper understanding of food insecurity in Hawai'i and highlights the importance of culturally informed solutions. The findings suggest that strengthening community-based support, expanding access to affordable groceries, and investing in culturally grounded food systems may improve food security and overall well-being for NHPI families.

Christian Irizarry

Discipline: History

Authors:

Abstract Name: Religion, The Klan, and Socialism in Oklahoma in the Early 20th Century

Oklahoma offers a unique opportunity to research three seemingly separate key movements: Christianity, the Ku Klux Klan, and Socialism. The purpose of this study is to determine if there is a correlation between The Klan, Socialism, and Religion in Oklahoma in the early 1900s. The basis for this research is to show how

something like the Bible can be used to justify things that would otherwise be seen as contradictory to the Christian message. Searching through archives for primary sources and researching secondary source writings on the subject at the Western History Collection and the Oklahoma Historical Society were the main two ways of gathering primary and secondary sources. The summative findings were that one's theological beliefs often proved to be the pivotal reason why someone would either choose to be a Socialist or a member of the Klan. In most instances both the Klan and Socialists were targeting the same group of people and one's theological framework could be a reason that they pivoted one way or the other. The economic state of the state and country left farmers searching for political and religious movements that could be the answer for the struggles that they faced in everyday life. The popularity of Socialism and the Klan can also be attributed to various Christian movements in America during the time, primarily Christian fundamentalism. This research reveals that Christianity was often used as both a moral compass and a political tool for individuals to reconcile their own or others' conflicting ideologies under a shared religious framework.

Gabriella Irizarry Negron

Discipline: Nursing and Public Health

Authors:

#1 Sara Moyer

#2 Patricia Kinser

Abstract Name: EPDS-US Initiative: Exploration of the psychometric properties of a culturally and linguistically adapted perinatal mental health screening tool within the community

Perinatal mental health (PMH) symptoms affect many pregnant and postpartum individuals, and early identification is important for supporting their well-being. However, commonly used PMH screening tools are often confusing, stigmatizing, or not culturally inclusive, especially for people from diverse backgrounds. Latina and Hispanic mothers often face additional language and cultural barriers that make it harder to accurately share their experiences or access appropriate care. To help address these issues, the EPDS-US was recently developed as an adaptation of the Edinburgh Postnatal Depression Scale that provides clearer and more culturally and linguistically appropriate screening questions using a respectful care and trauma-informed approach. The purpose of this project is to learn how pregnant and postpartum individuals, particularly Latina/Hispanic mothers, perceive the EPDS-US and to better understand their lived experiences with PMH symptoms and screening processes. This study uses an online survey hosted through an encrypted REDCap platform, along with optional semi-structured qualitative interviews conducted over Zoom. Through these methods, participants share their thoughts on how understandable the questions are, whether the screening feels supportive or comfortable, how well the questions reflect their cultural experiences, and how useful the adapted tool is overall. Recruitment relies on community-based outreach, including partnerships with local organizations, to encourage participation and prioritize engagement with diverse groups such as Latina/Hispanic mothers. Because data collection is still ongoing, my presentation will describe the types of quantitative information collected in the survey and share qualitative themes that emerge from the interviews. These may include feedback about EPDS-US wording, how participants interpret screening items, and what helps or makes it harder to talk about their PMH experiences. From these findings, I will highlight how accessible and useful the EPDS-US feels for participants and explore ways to improve and strengthen culturally sensitive, trauma-informed PMH screening in the future.

Alexander Irwin

Discipline: Biology

Authors:

#1 Alexander Irwin
#2 Todd Cook

Abstract Name: A Morphological and Histological Comparison between Neoselachian Taxa

Tooth serrations present along the edge of the tooth crown in many modern sharks (neoselachians) are sharp projections adapted for cutting the flesh of prey. Each serration consists of an inner dentine core that is surrounded by an outer enameloid coat composed of layers of long fluorapatite crystallites orientated in different directions. Several ancient sharks have independently evolved serrations; however, much less is known about the morphology and histology of these dental structures from the fossil record. Using acid etching techniques, sectioning, and scanning electron microscopy, this study performs a systematic comparison of the morphology and tissue composition of serrations in carcharhiniformes, anacoracid, and Lamniformes, all neoselachians. Several genera in carcharhiniformes will be examined, including *Galeocerdo* (tiger sharks), *Carcharinus* (requiem sharks), *Physogaleus*, and *Hemipristis* (weasel sharks). From anacoracid, *Squalicorax* (crow sharks) will be examined and from the lamniformes, *Carcharodon* (white sharks) and *Otodus* (mackerel sharks). In the *Galeocerdo* genus, *Galeocerdo cuvier* (modern tiger shark) was compared with extinct tiger shark species *G. mayumbensis*, *G. aduncus*, *G. clarkensis* and *G. eaglesomei*. Although having subtle differences in overall serration morphology, overall findings suggest that recently extinct *Galeocerdo* species and the extant *G. cuvier* have a similar enameloid histological organization. Findings suggest that ancestral *Galeocerdo* species have more differences in enameloid structure in comparison to *G. cuvier*. Preliminary findings suggest that there will be more similarities between genera in carcharhiniformes and greater differences to more distantly related genera in anacoracid or lamniformes. The comparison between and within each genus will be used to aid in taxonomic grouping and phylogenetic analysis.

Samuel R. Isaak

Discipline: Biology

Authors:

#1 Abbie C. Symanietz
#2 Makenzie R. Reed
#3 Beverly Victoria-Bolivar
#4 Devaleena S. Pradhan

Abstract Name: Learning to Parent: How Dads Parent Following a Sex Change in *Lythrypnus dalli*

Parental care is crucial for the reproductive success of many organisms. The high level of variation in parenting strategies among fishes has made them ideal to broaden our understanding of parental care. *Lythrypnus dalli* is a harem and sexually plastic marine fish where only males exhibit parenting behaviors, while females are cannibalistic. These fish organize themselves into social groups comprised of one dominant male and multiple subordinate females: the absence of a male triggers the most dominant female to undergo a sex change. This process is accompanied by a physiological and behavioral shift across the reproductive axis. The sexual plasticity of *L. dalli* provides us with the unique opportunity to observe the initiation of parental behaviors following a sex change. Parental behaviors exhibited by male *L. dalli* include spending time in the nest by fanning and rubbing, termed as “wagging” on embryos to aid in their development. We formed all-female social groups of 3 fish ($n=8$) and 4 fish ($n=2$) to induce a protogynous sex change in the dominant female. We monitored the nest tube daily until embryos had reached late-stage development, after which we conducted live behavioral observations. The parenting behaviors of the new males were compared to the behaviors of stable males and females. New males spent significantly less time in the nest than stable males. This indicates a tradeoff of time for newly transitioned males as they balance their attention between parenting and establishing hierarchy. As expected, there was a significant difference in wagging between females and both male morph types. These data provide evidence that some parenting behaviors are innately known in *L. dalli*. In future, we will investigate how embryos development stages influence the onset of

parenting behaviors and expression of genes associated with male-typical phenotypes compares across morph types.

Kaylie Istre

Discipline: Biology

Authors:

#1 Kaylie Istre

#2 Ronald Raab

Abstract Name: Investigating Do-It-Yourself Antibiotic Resistance and Its Implications for Biosecurity

Antibiotic resistance is one of the most pressing threats to global health and safety. This research investigates how easily bacterial populations can acquire antibiotic resistance under do-it-yourself conditions and considers the broader implications for biosecurity. Using Gram-negative *Escherichia coli* as a model organism, multi-fold ampicillin resistance was developed by serial dilutions and selective plating to quantify bacterial survival and resistance frequency. Additionally, the antibiotic ciprofloxacin is used to assess whether similar adaptive patterns occur when different antibiotic mechanisms affect adaptation. Observations indicate that *E. coli* can acquire stable resistance with relatively few selective cycles, demonstrating how easily bacterial populations evolve under constant antibiotic stress. These methods will be extended to Gram-positive bacteria, such as *Bacillus globigius*, to evaluate whether similar resistance patterns emerge in organisms with different cell wall structures, thereby broadening our understanding of how easily resistance can develop across bacterial species. The rapid acquisition of DIY resistance highlights that antibiotic-resistant organisms could have serious consequences for the public if accidentally or deliberately released.

Midori Ito

Discipline: Art History

Authors:

#1 Midori Ito

Abstract Name: A Comparative Study of Foxes in Art in the Edo Period and European Folktales

Animals have long been an important aspect of human culture and looking at the differences between how animals are represented by various cultures can shine a light on the ways that distinct cultures' views on the world differ. This comparative study examines the cultural significance of foxes in folktale from Japan and Russia by examining the woodblock New Year's Eve Foxfires at the Changing Tree, Ōji by Utagawa Hiroshige and the print Reynard the Fox by Vera Ermolaeva, from the late 19th to early 20th centuries respectively. In both artworks, foxes signify deception but also have distinct cultural meanings. In Hiroshige's artwork, foxes are mystical tricksters who predict the success or failure of the harvest. In the Russian artwork, however, foxes serve to represent morally corrupt humans. The discussion of the Edo period and Hiroshige will provide the context in which he created the artwork. Next, an analysis of symbolism behind the Japanese foxes and the Changing Tree will be provided. Following, I will provide a formal analysis of the print Reynard the Fox and its cultural significance within the framework of the folktale "Reynard the Fox." This study is based on art, historical resources, and a formal analysis of artworks.

Tatyana Ivanova

Discipline: Engineering

Authors:

#1 Murtuza Lemonwala

Abstract Name: Experimental Design and Comparative Analysis of CubeSat-Based Reflector Concepts for Future Solar Energy Redirection on Mars

Previous research shows that redirecting sunlight with large orbital mirrors could support warming specific regions of Mars by targeting ice deposits and releasing greenhouse gases. Although the concept has strong theoretical support, deploying and adjusting massive rigid reflectors in orbit remains a major technical challenge. This study aims to investigate the impact of using a swarm of small, adjustable Cube Sats equipped with different reflector types on the effectiveness of solar energy redirection for Martian surface heating. Through comparison of multiple designs in controlled conditions, this work addresses whether smaller, flexible systems could offer a practical alternative to traditional large mirrors. This project follows an experimental approach. A detailed trade study evaluated six components: Fresnel concentrators, Scheffler concentrators, parabolic dish concentrators, aluminized PET film, Mylar aluminum membranes, and Kapton-aluminum membranes. Designs were ranked by absorption and reflectivity, focal precision, ease of assembly, cost, material availability, and fabrication feasibility. A custom metal test frame holds two trays with eight CubeSat simulators. Each unit mounts a reflector on a three-axis gimbal, adjusted by motors and Arduino boards. Data will be collected using thermocouples for heat measurement, with manual alignment. Software simulations will be run together with lab tests to check system behavior and reflector alignment. Initial research shows that all reflectors can focus sunlight effectively, with the Fresnel lens producing the sharpest focal point and highest heat output. The swarm setup keeps the beam stable with manual adjustments, supporting the idea that small adjustable reflectors can match the function of a single large mirror. This project demonstrates a flexible approach to adaptive solar energy redirection using CubeSat swarms. The findings will help identify the most effective solar reflector design, guide improvements to the control system, and support future work on scaling this concept for orbital use.

Samyukta Iyer

Discipline: Psychology

Authors:

Abstract Name: Fangirl Culture, and Romantic Expectations and Acceptance of the Emotionally Neglectful and Unavailable Men in Young Women aged 15 to 25

Growing interest among young women in emotionally distant or brooding male characters reflects evolving cultural expectations around intimacy, identity formation, and media engagement. Fan communities offer social validation, a sense of belonging, and opportunities to reinterpret experiences of emotional neglect through shared storytelling and idealized engagement with fictional, media characters. As social media and online fan communities play central roles in adolescent and young adult life, fictional, parasocial relationships provide spaces for self-exploration. Despite this, fangirl culture, defined as a community of fans who express strong enthusiasm and emotional investment in a celebrity or media figure, often faces stigma, with practices dismissed as trivial or irrational, creating a tension between individual experience and cultural perception. This behavior is evident in fandoms centered around characters like Damon Salvatore from *The Vampire Diaries* and Conrad Fisher from *The Summer I Turned Pretty*, where emotionally distant male figures are idealized and defended by young female audiences. This paper examines how parasocial attachments, personal attachment history, peer influence, and repeated exposure to media shape young

women's attraction to emotionally neglectful romantic figures in media. Analysis of cognitive and emotional mechanisms revealed important factors, such as character identification, imagined interaction, and learned relational patterns, that sustain these one-sided bonds. Engagement with these fictional figures evokes emotional responses similar to those experienced in real interpersonal relationships, allowing young women to practice vulnerability and experiment with romantic expectations in a controlled environment. Individuals with insecure or anxious attachment patterns are drawn to distant fictional partners, while enthusiasm and reinforcement from peers within online fandoms increase the perceived desirability of these characters and normalize potentially dysfunctional relational expectations.

Koussay Jaballah

Discipline: Interdisciplinary

Authors:

#1 Koussay Jaballah

Abstract Name: Bias in research: Factors and mitigations

This study delves into the multifaceted issue of bias in research, aiming to understand perceptions, awareness, and attitudes toward this topic using a quantitative approach. Although bias can be a vast topic, bias in research encompasses errors that may occur in research which hinder getting transparent and correct findings. This bias can happen at any stage of the research from data collection and misinterpretation to using false arguments and imprecise deduction reasoning. The study tried to quantify how much the general public has awareness about research bias and how researchers deal with bias. Numerous factors were investigated and multiple solutions were proposed to determine both commonalities and disparities that exist inside the research community. The study also investigated how experience in research affects the responses and whether bias is dependent only on the researcher itself or whether there are other actors. Through these inquiries, the study aimed to contribute to a better understanding of bias in research and inform strategies for its mitigation.

Zhone Jack

Discipline: Biochemistry

Authors:

#1 Kehinde Cole

Abstract Name: Metabolic Flexibility in Adipocytes

Metabolic flexibility is the capacity of cells to shift between lipid storage and lipid utilization in response to changing energetic demands, all while maintaining metabolic health. Adipocytes regulate this process by storing fatty acids as triglycerides and releasing them through catecholamine-stimulated lipolysis. Impaired metabolic flexibility, a hallmark of obesity, reflects the inability of adipocytes to appropriately modulate these transitions. This study focused on understanding whether adipocytes can return to a pre-lipolytic, basal metabolic state after lipolysis is halted. To do this, we monitored primary adipocytes before, during, and after inducing lipolysis (CL activation) using a Seahorse metabolic flux assay to assess oxygen consumption rate (OCR) and live-cell imaging to evaluate mitochondrial membrane potential. Our results showed that CL activation increased OCR and decreased membrane potential, confirming elevated mitochondrial activity during lipolysis. Furthermore, inhibition of ATGL (ATGLi) significantly reduced OCR, indicating recovery toward basal metabolism, while insulin showed no effect on OCR under these conditions. However, imaging

analyses demonstrated that insulin partially restored mitochondrial membrane potential following lipolytic activation. Together, these findings suggest that adipocytes possess measurable metabolic flexibility, to specific interventions. Particularly, ATGLi and insulin mitochondrial protection can help reestablish basal metabolic and mitochondrial states after lipolysis.

Allison Jackson

Discipline: Biology

Authors:
#1 Xin Bi

Abstract Name: The C-terminal Domain of Hmo1 Is Not Required for its Function in DNA Damage Tolerance in Yeast Deleted for Rad5

High mobility group box (HMGB) proteins are sequence-nonspecific DNA-binding proteins that can bind altered DNA structures, such as four-way junctions. They also bind linker DNA and destabilize nucleosome structure. The *S. cerevisiae* Hmo1 is an HMGB protein that contains two HMGB motifs referred to as domains A and B. Interestingly, Hmo1 differs from canonical HMGB proteins because it has a basic C-terminal domain (CTD) instead of an acidic CTD. This basic CTD resembles that of linker histone H1, indicating that Hmo1 exhibits linker histone-like functions. Thus, Hmo1 exhibits characteristics of both HMGB proteins and linker histone H1. One unresolved function of Hmo1 is its role in facilitating the "error-free" template switching (TS) pathway of DNA damage tolerance (DDT) when promoting sister chromatid junction formation. Rad5 is a key protein in the TS pathway that allows cells to tolerate DNA damage induced by methyl methanesulfonate (MMS) during DNA replication. Previous studies have shown that deleting Hmo1 suppresses the hypersensitivity of *rad5Δ* mutants to MMS. In this work, we examined if the CTD of Hmo1 is required for its function in DDT in *rad5Δ* cells. We introduced a plasmid carrying the *hmo1-AB* allele, coding for the Hmo1 protein lacking its CTD (*hmo1-AB*) into *rad5Δ hmo1Δ* mutants. We found that the presence of the plasmid reduced MMS-tolerance of *rad5Δ hmo1Δ* mutants to a level similar to *rad5Δ* mutants. Because *hmo1-AB* fails to suppress the hypersensitivity of *rad5Δ* mutants to MMS, this demonstrates that the CTD of Hmo1 is not required for its function in *rad5Δ* mutants. Given that the CTD of Hmo1 is required for its linker histone-like function, it is likely that Hmo1 acts in DDT through its HMGB-like activity.

Emma Jackson

Discipline: Biology

Authors:
#1 David Luther

Abstract Name: Factors influencing positive interactions between mammals and birds with camera traps in the Brazilian Amazon.

Camera traps are a globally and widely used tool for studying terrestrial mammal and bird ecology and conservation. However, some species are more likely than others to approach or shy away from cameras which could bias observations and scientific results. These biases would affect species diversity, community composition, and population estimates gathered from this method of field research. To investigate this issue, my research asks are certain species more likely to interact with cameras than other species and what aspects of the animals' behavior and life history might influence these interactions? My research uses data from

medium to large sized birds and mammals and a wide variety of behaviors both in social and dietary guilds. Cameras were placed in the central Amazon rainforest roughly 40 miles north of Manaus, Brazil. They were deployed for 3 weeks per location for a total of 60 locations during the dry seasons of 2022-24. After verifying species in photos, through Wildlife Insights AI and expert verification, observations of animal interactions with cameras were classified as no interest, possible interest, and definite interest based on a set group of behaviors for each. Only species with greater than 5 independent detections were used for analysis. This research is expected to show that foraging animals will have higher rates of interaction with the camera than hunting animals. Additionally, social species are anticipated to have higher interaction rates than solitary species. Results of this study will aid in the improvement of ecological and conservation field techniques with camera traps to improve monitoring schemes and statistical approaches that remove detection bias.

Devin Jackson

Discipline: Biology

Authors:

#1 Wenheng Zhang

#2 Joonseog Kim

Abstract Name: A Novel 3D Imaging Approach to Study Evolutionary Innovations in Solanaceae Inflorescences

Understanding the relatedness of angiosperms and the evolution of their inflorescence remains challenging, as these structures are highly modified and prone to convergent evolution. The current research describing inflorescence architecture, whether genetically or morphologically focused, typically relies on text based explanations, 2D images, or 3D based models created with CAD modeling software. This creates a disparity in the reader's understanding of these models since descriptions rely heavily on the author's interpretation of the inflorescence. The goal of our study is to bridge this disconnection by producing anatomically and color-correct 3D inflorescence models using Solanaceae flowers that readers can explore directly, which will allow readers to view and rotate the inflorescence structure in real time. The Solanaceae clade serves as an excellent platform to demonstrate this concept, as it is an active area of floral research and exhibits high inflorescence diversity within the clade. Its ancestral scorpioid cyme-like morphology is presently thought to have been the result of convergent evolution from a currently unknown driving force. Developing 3D models of extant Solanaceae species could provide valuable insights into these evolutionary patterns and help clarify the mechanisms underlying inflorescence diversification. Here, we use a novel photogrammetry approach to create 3D renderings of the inflorescences of *Burgmansia* sp., *Juanulloa* sp., and *Nicotiana obtusifolia*, in the Solanaceae clade. This process will involve taking high-resolution 360° photos at various angles using a camera. Photos will be processed with SlicerMorph Photogrammetry software, donated by the developers, Thomas OO, Zhang C, and Maga AM, which generates 3D models using photographs. It is expected that the rendered 3D images will accurately reflect specimen dimensions with precise color. This will serve as a way to study and provide a larger 3D inflorescence library that can bridge the gap between authors and readers within the literature.

Aiswarya Jacob

Discipline: Nursing and Public Health

Authors:

#1 Amber Paulus

Abstract Name: KARE: A Community Partnership to Improve Kidney Health Through Awareness, Risk Screening, and Education

Chronic kidney disease (CKD) affects more than one in seven adults in the United States, yet most people do not know they are at risk. The KARE project, which stands for Kidney Awareness, Risk Screening, and Education, was created to improve early detection of kidney disease by bringing free, nurse-led screenings directly into the community. The study focuses on identifying both medical and social factors that contribute to kidney health in populations that experience high rates of hypertension, diabetes, and limited access to care. The research team conducts mobile health events where participants complete short surveys and clinical screenings. Each participant receives blood pressure, blood sugar (A1C), kidney function (eGFR), and urine albumin tests, as well as questions about housing, food, transportation, and stress. The study also offers optional genetic testing for the APOL1 gene to better understand hereditary risk in African American populations. The research question guiding this project asks: Can community-based kidney screenings increase awareness and improve early connection to care among individuals with medical or social risk factors for CKD? To date, more than 30 community members have completed screening events, with follow-up visits in progress. Preliminary findings show strong participation and positive feedback on personalized health education. Students involved in the project are learning how to apply public health and nursing research methods in real-world settings, including data collection, patient education, and interdisciplinary teamwork. Ultimately, this project seeks to develop a scalable, equitable model for community-based kidney health promotion that bridges the gap between awareness, early detection, and access to preventive care.

Sydney Jacobsen

Discipline: Political Science

Authors:

Abstract Name: Exploring the Role of Eugenics in United States Immigration Policy from 1924 to 2025

In the US, eugenic beliefs that white bloodlines should be protected from miscegenation quickly gained traction after the end of the Civil War, instilling fear and fueling support for White Replacement Theory rhetoric. The climax of this need to preserve America's ethnic composition occurred when the 1924 Johnson-Reed Act was signed into law, capping immigration quotas and restricting immigration from each nation to 2% of that nationality's population as recorded in the 1890 Census. This policy inflated European quotas by excluding descendants of enslaved Africans from the census count and people of Asian lineage entirely. Meanwhile, immigrants from the Western Hemisphere were exempted from the national origins quotas system to ensure American agricultural success. In stark contrast, 2025 immigration policies reflect different priorities, with limited accommodation for Latino refugees and a strong preference for white South Africans, reserving a majority of the 7,500 immigration quotas for Afrikaners. Amidst this, conversations of White Replacement Theory and religious superiority have returned to the discussions of political ideology. The explicit inclination to accept white, Christian South Africans amongst the travel ban of nineteen ethnically diverse countries raises questions of why it appears that the United States is adopting policies similar to another era of demographic engineering. Using the multiple streams framework, this research project will examine how modern immigration policies constructed to address public safety echo the objectives of the Johnson-Reed Act. The analysis will utilize primary sources from the Victor Howard Collection on Civil Rights and Church-State, 1907-1989, at the University of Kentucky Special Collections Research Center, contemporary news articles, and publications from academic databases and government agencies to explore how eugenic language of the 1920s compares to today's emphasis on national security. This research seeks to understand if demographic engineering has not disappeared, but merely evolved in its rhetoric.

Anish Pravin Jadhav

Discipline: Engineering

Authors:

Abstract Name: Integrating Experimental and Computational Techniques to Investigate Plant Immunity

Strengthening plant immunity depends on our ability to counteract the molecular mechanisms by which a wide spectrum of pathogens degrade the cell wall and initiate infection. Bacterial pathogens infect plants by emitting enzymes like xylanases and polygalacturonases that destroy cell walls. Plants can defend themselves in response with highly evolved inhibitors such as rice xylanase inhibitors (RIXI) which bind to xylanases and block their activity. Xylanase binding on RIXI also triggers a defense signaling cascade with immune gene activation (e.g. OsPR1a, OsPR1b, PR4), hormone-mediated signaling, and the buildup of reactive oxygen species. To predict the structure of the resulting protein complex, the protein pairs were docked using AlphaFold3 on MSU ICER's High Performance Computing Cluster. Using PyMol, several parameters such as close contact regions, buried surface area (BSA), Hydrogen Bonds, and Salt Bridges were visualized and analyzed to predict which factors were important for strong binding of the target proteins to their respective receptors. This structural information provides a foundation for future experimental work that will elucidate inhibitor-enzyme binding kinetics. To experimentally characterize these interactions, the proteins were expressed on the surface of yeast and analyzed using flow cytometry to assess target binding. This work contributes to ongoing efforts in our group to engineer plant immune receptors through machine learning and wet-lab screening. Together, these approaches aim to enhance plant defenses against cell wall-degrading pathogens.

Saee Jadhav

Discipline: Biology

Authors:

#1 Carlos Morado

Abstract Name: Understanding Widespread Pain in Rheumatoid Arthritis: The Role of the Trigeminal Ganglion

Rheumatoid arthritis (RA) is a chronic autoimmune disease characterized by inflammation of the synovial joints, leading to pain, swelling, stiffness, and progressive joint damage. While pain in patients is primarily localized to the affected joints, emerging evidence indicates the development of widespread pain that persists beyond joint pathology, suggesting mechanisms independent of local inflammation. Recent studies emphasize the role of neuroimmune interactions in driving persistent pain sensitization, particularly through IgG immune complexes, Fc gamma receptors (FcγRs), and macrophage activation. While the dorsal root ganglia (DRG) have been extensively studied in RA-related pain, the trigeminal ganglion (TG)—which processes orofacial sensory input—remains largely unexplored despite reports of facial pain and hypersensitivity in RA patients. This study aims to investigate the role of TG in RA-related widespread pain. We hypothesize that circulating IgG immune complexes bind to FcγRs on TG-resident immune cells, inducing neuronal hyperexcitability and immune cell infiltration. To test this hypothesis, we are using the K/BxN serum transfer mouse model of RA to assess the development of facial hyperalgesia in experimental and control groups. Facial mechanical sensitivity is assessed using the Von Frey test, a calibrated monofilament-based assay for measuring withdrawal thresholds. Using immunohistochemistry, we will also examine the activation of satellite glial cells, macrophage phenotypes, and the infiltration of immune cells such as neutrophils, T cells, and B cells as potential contributors to persistent orofacial pain. Identifying TG-mediated pain mechanisms provides novel insights into RA pain pathology beyond joint inflammation. This research offers a paradigm shift in pain management by highlighting FcγR-targeted and neuroimmune interactions as potential targets for RA-related widespread pain therapies. Understanding the TG's role in RA may lead to more effective pain interventions, improving patient outcomes where traditional anti-inflammatory treatments fall short.

Samuel Jaeger

Discipline: Computer Science

Authors:

#1 Samuel Jaeger

#2 Aya Vera-Jimenez

#3 Calvin Ibenye

#4 Dhrubajyoti Ghosh

Abstract Name: Human vs Machine Deception: Distinguishing AI-Generated and Human-Written Fake News Using Ensemble Learning

The rapid adoption of large language models has introduced a new class of AI-generated fake news that now coexists with traditional human-written misinformation, raising important questions about how these two forms of deceptive content differ and how reliably they can be distinguished. This study investigates the linguistic, structural, and emotional differences between human-written fake news and AI-generated fake news and evaluates machine learning and ensemble-based methods for separating these two content types. A comprehensive feature representation is constructed using document length measures, sentence structure, lexical diversity, punctuation and capitalization patterns, standard readability indices, and fine-grained

sentiment and emotion scores capturing affective dimensions such as fear, anger, joy, sadness, trust, and anticipation. Multiple classification models, including logistic regression, random forest, support vector machines, extreme gradient boosting, and a deep neural network, are trained to distinguish between human-written and AI-generated fake news. An ensemble framework combining these classifiers is further developed to improve classification stability and overall detection performance. Model performance is evaluated using accuracy, area under the receiver operating characteristic curve, and precision-recall analysis. The results indicate that human-written and AI-generated fake news exhibit systematic differences in readability structure, lexical regularity, and emotional expression, with AI-generated content showing more uniform stylistic patterns and compressed emotional variability. Across models, ensemble learning consistently improves discrimination between the two classes relative to individual classifiers. These findings provide insight into how machine-generated deception differs from human-authored misinformation and demonstrate the value of ensemble-based learning for distinguishing between these increasingly intertwined forms of fake news.

Amirhossein Jafari

Discipline: Chemistry

Authors:

#1 Omolola Mary Adedeji

#2 Justice Josiah Mallen

Abstract Name: Design and Computational Assessment of Novel JRM-28 Analogs Targeting HDAC2

Histone deacetylase 2 (HDAC2) remains an attractive therapeutic target in Alzheimer's disease due to its strong association with impaired memory formation and synaptic dysfunction. JRM-28, a thiadiazole-based inhibitor previously developed in our lab, demonstrated improved binding within the HDAC2 catalytic pocket. In this project, we aimed to design next-generation JRM-28 analogs with enhanced stability, binding affinity, and drug-like properties. A full library of analogs was first evaluated computationally using molecular docking and molecular dynamics (MD) simulations. RMSD analysis of the protein–ligand complex, ligand-only conformations, and protein backbone revealed stable trajectories for several analogs (<3 Å), indicating strong retention within the binding pocket. Among the designed structures, some of the analog produced the most favorable docking score and maintained a well-defined pose during MD, including strong coordination with the Zn²⁺ catalytic center. These results suggest improved binding performance relative to the parent scaffold. Experimentally, we synthesised and characterized several modified intermediates required for the synthesis of JRM-28 analogs based on the computational studies. Other intermediate analogs with the best computational results (Docking score) will be synthesized as well.

Arjun Jagdeesh

VA - Virginia Commonwealth University

Discipline: Biology

Authors:

#1 Austin Witt

#2 Larisa Litovchick

Abstract Name: Novel GEMMs to Investigate the Role of DREAM Complex in HPV-Driven Oral Tumorigenesis

Background: High-risk human papillomavirus 16 (HR-HPV16) is responsible for ~90% of HPV-induced oropharyngeal cancers. HPV16 induces tumor growth via HPV16 E7 oncoprotein, which promotes degradation of pRB, p107, and p130. While pRB is a known tumor suppressor, the roles of p107 and p130 are less well understood. In mammalian cells, p107 and p130 interact with LIN52 protein to form the DREAM complex that controls cell cycle progression by repressing E2F transcription. In HPV-infected cells, E7 binds to p130 and p107 and displaces LIN52, which disrupts the DREAM complex and promotes transcription of cell cycle genes and cell proliferation. LIN52-S20C mutation increases the DREAM formation in HPV-positive cancer cell lines, but the role of DREAM complex in HPV-driven tumorigenesis is not well known. **Aims:** The purpose of this study is to determine if stabilizing the DREAM complex leads to a decrease in tumor growth in HPV16-E7 oral carcinogenesis model. **Methods:** Mice with a knock-in Lin52-S20C mutation were generated and crossed with K14-E7 transgenic mice to establish K14-E7/Lin52-S20C or K14-E7/WT (wild type) animals. These mice were given 4-Nitroquinoline 1-oxide (4NQO) water for 16 weeks to induce oral tumor growth, and monitored for an additional 10 weeks by weighing and examining tumor formation in the oral cavity. **Results:** The results showed that K14-E7/WT mice had an increased tumor burden compared with the K14-E7/Lin52-S20C mutant mice. Lin52-S20C mutant mice had significantly longer survival. The majority of the WT mice also became moribund and were euthanized earlier than the mutant mice. WT mice had more aggressive tumor growth in the esophagus per H&E and KI67 staining. **Conclusion:** Reactivation of the E7-disrupted DREAM complex appears to reduce tumor growth and extend lifespan of the LIN52-S20C mutant mice. Restoring the DREAM complex could represent a therapeutic approach for preventing or treating HPV-induced cancers.

Akash Jagdeesh

VA - Virginia Commonwealth University

Discipline: Biology

Authors:

#1 Joseph Landry

Abstract Name: Determining Genes Involved in Recovery From Chemotherapy in 4T1 and EO771 TNBC Cell Lines

Breast cancer is one of the most common types of cancer. Traditional treatments for breast cancer include . However, these treatments are not 100% effective, and patients might experience recurrence in their cancer months or years after achieving remission. Cancer cells can evade chemotherapy through five mechanisms: senescence, quiescence, cytoprotective autophagy, and apoptosis/necroptosis suppression. One of the ways these mechanisms can be targeted to make growth arrest permanent and make cancer treatment more definitive is through epigenetics, using gene silencing. In this study, a CRISPR screen was conducted to identify how silencing of different chromatin regulator genes would affect the growth of 4T1 and EO771 triple-negative breast cancer cells in mice. 4T1 and EO771 triple-negative breast cancer cells were transfected with a plasmid that would allow the cells to express Cas9 in a tetracycline-dependent manner. For in vivo experiments, the cells were implanted bilaterally in the mammary fat pad. A CRISPR screen will be conducted to determine the effects of silencing certain chromatin regulator genes, to determine the effects on the growth of these 4T1 and EO771 cells in mice. Finally an RNA-Seq analysis will be conducted to determine how the transcriptome of these cells were changed with administration of chemotherapy and subsequently after gene silencing, to determine genes involved in chemotherapy resistance. Genes that will be identified can present targets for epigenetic treatments and other gene-editing interventions, to help make chemotherapy a more effective treatment for breast cancer. These interventions administered in sequence or in conjunction with traditional chemotherapy can provide more targeted treatment for these cancers, that will reduce the recurrence of tumors in patients with cancer, and increase the likelihood of remission.

Anya Jain

Discipline: Computer Science

Authors:

#1 Babak Shahbaba

Ethan Louie

Abstract Name: Parsimonious Multinomial Model for Neural Decoding: Identifying Critical Neurons for Encoding Non-Spatial Memory

The hippocampus is crucial for encoding sequential memory in humans and animals, but the specific neurons that differentiate elements of those sequences remain relatively poorly understood. To investigate this, we analyzed neural activity data from rats in the UC Irvine Fortin Lab performing a sequential memory task where they were trained to recognize sequences of odors. We trained logistic regression models to distinguish a particular odor from others and predict if given odor sequences were in or out of order. To study more complex decision-making, we coded multinomial regression models and neural networks, using activity from all 46 neurons at precise millisecond times to identify specific odors. Our method identified neurons significantly associated with sequential memory processes. We then used a LASSO regression (dimensionality reduction technique) and a Random Forest model (ensemble method for prediction) to corroborate our findings based on our logistic and multinomial regression models to identify the neurons most critical for encoding each odor. We found that when the task was binary, i.e., using our logistic regression models, training with only the most critical subset of neurons preserved the predictive accuracy of using all neurons. Although baseline accuracy varied across the five odors, the accuracy gap between full and subset models was consistent for all the odors. This could permit the use of less resource-intensive methods for neural activity data collection. However, for more complex neural networks and multinomial models, using the same subset of neurons reduced accuracy significantly, suggesting that only in binary tasks, neurons encoding for non-target odors can be redundant. When distinguishing between all odors, the contribution of each neuron's unique information becomes more critical. These results have the potential to improve neural prosthetics and brain-computer interfaces by simplifying neural decoding applications in development or use.

Anushka Jain

Discipline: Biology

Authors:

#1 Igor Sharakhov

Abstract Name: Investigating the Impact of 628 GFP + and 7aX DsRed + Transgene Combinations on Female Mosquito Mating and Egg Production with Wild-type Males

Anopheles gambiae is the most efficient malaria vector due to its abundance, preference for feeding on humans, long lifespan, and susceptibility to infection. In 2023, malaria caused 263 million cases and 597,000 deaths, highlighting the need for new vector-control strategies. Gene editing is a promising approach, but it's essential to understand how transgene insertions affect reproductive success. This study examined the effects of two insertions— 628 GFP+ and 7aX DsRed+ –individually and combined, on female mating with wild-type males, blood feeding, and egg laying. The 7aX line carries a piggyBac insertion on the X chromosome with a 3xP3-DsRed marker and a non-expressed hsp70-TEP1 construct. The 628 line is a CRISPR insertion disrupting TEP3 on chromosome 3 with a 3xP3-GFP marker. Earlier work suggested reduced blood feeding and egg laying in double-positive females, but it was unclear whether this phenotype came from the combined genotype or one insertion alone. This study tested whether 628 GFP+ females could produce eggs when crossed with wild-type males. Three trials were conducted using five groups: 628 GFP+, 7aX DsRed+, double positives, double negatives, and wild-type males. Crosses were set at the pupal stage, and mating

success was assessed via spermatheca dissection. Only double-negative females laid eggs. Neither 628 GFP+ nor 628 GFP+/7aX DsRed+ females produced eggs across trials. Both groups also showed lower blood-feeding rates. Spermatheca dissections revealed empty spermathecae, indicating failure to mate rather than defective oviposition. Thus, the 628 insertion is the main factor driving infertility. Possible explanations include altered mating behavior, disrupted timing of mating or feeding, or physiological effects of TEP3 disruption. Blood freshness or feeding conditions may also disproportionately affect 628+ females. Overall, the 628 GFP+ insertion severely impairs female reproductive success, highlighting the need to evaluate unintended fitness costs before advancing transgenic vector-control strategies.

Garv Jain

Discipline: Interdisciplinary

Authors:

Abstract Name: *Replaying the Past: How have films continued to perpetuate the memory of old conflicts? A Comparative Analysis of India-Pakistan & Japan-South Korea Relations.*

This paper examines how films have continued to perpetuate the memory of historical conflicts, focusing on two case studies: India-Pakistan relations and Japan-South Korea relations. While previous research has examined the political and social consequences of these conflicts, less attention has been given to the role of popular media, particularly cinema, in shaping collective memory and reinforcing narratives of historical animosity. By analyzing films from both regions, this study explores how films highlight and reinforce past conflicts in contemporary societies, influencing how societies remember and interpret these conflicts. This research employs a qualitative visual and media analysis methodology, examining narrative structures, visual symbols, characterizations, and themes within selected films. This approach enables a nuanced examination of how films represent conflict, grievances, national identities, and intergroup relations, as well as how they may influence audience interpretations of historical memory. A comparative historical analysis between the two case studies will assist in identifying shared historical patterns of conflict memory. Preliminary findings suggest that films often emphasize identity, nationalism, and cultural commonalities or divisions, thereby contributing to public perceptions of historical conflicts. In some cases, films reinforce existing grievances, while in others, they foster empathy or highlight opportunities for dialogue. This demonstrates the potential of cinema as both a medium for division and reconciliation. These results will be discussed in relation to interdisciplinary theories of collective memory, media influence, and post-conflict reconciliation, highlighting the complex role of film in societal understandings of historical conflict.

Rishabh Jain

IA - Iowa State University

Discipline: Computer Science

Authors:

Abstract Name: *Interactive Analytics for Speed Compliance and Road Safety in Iowa*

Speeding is a leading contributor to traffic crashes and fatalities, yet current monitoring methods often rely on manual reporting or static summaries, limiting timely insights. This project develops an interactive dashboard to visualize speed non-compliance across Iowa, integrating daily traffic data, roadway segment maps, and county-to-law-enforcement district mappings. The dashboard allows users to filter by route type, county, district, and date, and provides visualizations including maps colored by non-compliance percentages and

trend charts over time. By bridging raw traffic data with actionable visual insights, this tool supports Iowa DOT and law enforcement agencies in identifying high-risk segments, targeting interventions, and making data-driven decisions to improve road safety. Beyond immediate applications, the dashboard establishes a framework for statewide monitoring, enabling planners and safety teams to track trends, compare districts, and allocate resources efficiently. Future enhancements include incorporating real-time speed data for live monitoring, predictive analytics to forecast high-risk areas, and integration with crash data for a combined safety analysis. By transforming complex traffic data into an accessible and interactive platform, this project contributes to safer and smarter transportation systems, demonstrating the potential of data-driven approaches in public safety and infrastructure planning.

Sanjana Jain

Discipline: Political Science

Authors:

Abstract Name: Silencing Ogoniland: Oil, Power, and the Politics of Neglect

Nigeria is Africa's largest crude oil producer. This resource is concentrated across nine states that constitute the Niger Delta. Despite the fact that oil is distributed across the Delta, since 1957, Ogoniland, Rivers state has been subjected to an unwarranted degree of exploitation and environmental degradation, and the Ogoni people have been subjected to uninhabitable conditions, inexistent economic opportunities, and what appears to be the intentional omission of basic human rights. To determine the primary causes for these discrepancies, I intend to compare another ethnic group which resides in an oil-rich territory in the Niger Delta against the Ogoni people. I will hold factors such as population size, geographic terrain, political power, and prevalence of a multinational oil company constant. Based on my current research, I hypothesize that the Ogoni people's history as a minority ethnic group-which was able to successfully organize a nonviolent resistance movement that gained international attention-has rendered the Nigerian government severely indifferent to their condition. There is currently no scholarship that focuses on understanding the differences between various communities before and after an extractive company enters them.

Parshv Jain

Discipline: Computer Science

Authors:

#1 Parshv Jain

#2 Anay Parikh

Anay Parikh

Abstract Name: AI's Impact on the Job Market: A Study Using Google Colab and IBM Watson

Artificial intelligence is rapidly reshaping the global workforce, changing which skills are in demand and how careers develop over time. With automation accelerating, understanding which jobs will survive or grow is critical for students and job-seekers. This project explores AI's impact on the labor market using two complementary datasets. The first dataset, Global AI Job Market & Salary Trends 2025 (15,000 listings), includes information such as salaries, job titles, experience levels, and skill requirements. The second dataset, AI Job Trends 2024-2030 (30,000 records), provides projections on job openings, automation-risk percentages, education requirements, gender diversity, and remote-work trends. This second dataset is especially useful for studying broader workforce changes, as it includes titles from non-AI roles. Study 1

focused on developing salary-prediction models and analyzing skill premiums using the first dataset. After extensive preprocessing, multiple regression models were built using IBM Watson and Google Colab. Among all ML algorithms (eg. Random Forest, Extra Trees, XGBoost), XGBoost performed the best, with MAE = \$13,586, RMSE = \$18,449, and $R^2 = 0.885$. The most influential factors on salary were experience level, job specialization, and geographic location. Study 1 concluded with a need for fresh datasets and a deeper understanding of global trends. Study 2 addresses these goals by utilizing the second dataset to shift the focus from salary prediction to measuring job vulnerability. Early results show that repetitive jobs face the highest automation risk, while technology and engineering roles are expected to grow significantly. By comparing outcomes from these two analyses, the study will evaluate whether changes in salary trends align with projected job growth or decline, offering insight into broader labor-market disruptions. The final presentation will explain new indices and a multi-model analytical framework used in this research, providing a scalable method for understanding future labor-market transitions in the AI era.

Sriya Samhitha Jakka

Discipline: Biology

Authors:

#1 Amanda Furman

#2 Hannah Stadtler

#3 Peter Hamilton

#4 Kaitlin Bountress

#5 Matthew Banks

#6 Gretchen Neigh

Abstract Name: Effects of Early-Life Stress on Ultrasonic Vocalization in Rats

Early-life stress (ELS) has been associated with long-term changes in emotional development, stress responsivity, and vulnerability to behavioral alterations, including those related to later drug exposure. The impact of early-life exposures on adult behaviors can be difficult to study in humans, and rat models provide opportunity to test early influences on adult outcomes in controlled settings. The overarching study examines the potential for early behavioral changes following ELS, in this study modeled through limited-bedding and nesting, to predict increased markers of drug-seeking behavior in adulthood. The work presented here will examine the hypothesis that ultrasonic vocalizations (USVs), a non-invasive indicator of affective-like communication, are altered by ELS both during exposure to ELS and at the end of stressor exposure later in adolescence. Rats produce ultrasonic vocalizations above 20 kHz that reflect emotional-like states. Infant distress calls occur around 40 kHz, 22 kHz calls in older rats are linked to aversive states, and 50 kHz calls are associated with positive, reward-related states. Because these calls emerge naturally in response to environmental and emotional conditions, changes in their patterns may help identify early alterations related to ELS. USVs in this study will be recorded using the Wildlife Acoustics system with acoustic foam used to reduce background noise. The calls will be analyzed using Kaleidoscope's Cluster Analysis to extract timing, duration, and frequency. USVs are measured twice during exposure to ELS and then during adolescent development at postnatal days 26, 36, 46, and 51. We will test the hypothesis that ELS disrupts call rate and acoustic features across adolescent development. Findings from the USV analysis will support the broader study's goal of determining how early-life environments may contribute to later behavioral outcomes. Given the importance of communication for social interactions, disruptions in communication patterns may lead to adverse social behaviors and increased risk.

Douglas Jamal

Discipline: Interdisciplinary

Authors:

Abstract Name: AN OPEN SUGGESTION TO THE UNITED STATES: TWIN TOLERATION IN MOROCCO

After the 2011 Arab Spring revolts within the MENA region, Morocco led in the inclusion of strengthened individual rights and governmental power, whilst retaining central authority within the monarch of the state. With the rise of religious nationalism in the United States, the research question considers whether Morocco, a constitutional monarchy, exhibits “Twin Toleration” through active legislation from 2011-2025 and within the state’s constitution. The proposed research question seeks to add to previous studies considering potential tolerance between state and religious institutions in democratic states. However, as opposed to the previous studies’ analysis of Western democracy, the current proposal considers tolerance between the religious state and secular institutions of a Muslim democracy, such as Morocco. The paper utilizes Alfred Stepan’s definition of Twin Toleration, defined as a state’s recognition and respect for a person or group’s beliefs, and a religious institution’s ability to respect the results of the democratic process. Through an analysis of the 2011 Moroccan constitution and active legislation, I thematically code legislation laws and titles from the constitution based on requirements for Twin Toleration to be visible in democratic states, and conduct interviews to gauge public opinion in Morocco about legislation performance. The data is collected from Titles One and Two of the Moroccan Constitution, which refer to the fundamental freedoms and rights of the people, as well as the rights of secularist groups in the nation. Additionally, it includes legislation passed through the House of Representatives after 2011, along with data presented in the interviews. The collected data aims to provide a concrete understanding of the tolerance between the state and secularist institutions within Morocco. The tolerance between state and secularist institutions will allow for recognition of potential tolerance between religion and secularism in other countries leaning towards religio-nationalistic political systems, such as the United States.

Dexter James

Discipline: Political Science

Authors:

#1 Dexter James

Abstract Name: Forward Deployed, Functionally (Ir)relevant? Assessing the Impact of Forward Deployed “Tactical” Nuclear Weapons on Nuclear Crisis Outcomes

This paper asks whether the presence of forward-deployed tactical nuclear weapons materially affects the outcomes of nuclear crises. The question sits at the intersection of long-standing scholarly debates over deterrence, nuclear superiority, and the credibility of escalation options. Proponents of “hard” deterrence argue that tactical nuclear capabilities enhance resolve by providing leaders with credible counterforce options within the brinkmanship processes described by Schelling and expanded upon by Kroenig. In contrast, scholars emphasizing the “nuclear revolution,” the nuclear taboo, or psychological uncertainty suggest that such deployments may have little practical influence on real crisis behavior. Against this contested backdrop, especially amid renewed policy interest in reintroducing U.S. nuclear weapons to the Indo-Pacific, this study evaluates whether forward-deployed tactical nuclear weapons have a tendency to improve a state’s likelihood of achieving its crisis objectives. To test this proposition, the paper combines the International Crisis Behavior (ICB) dataset of nuclear crises with a comprehensive dataset of foreign nuclear deployments compiled by Sechser and Fuhrmann. Using two alternative coding schemes for identifying forward deployments, it conducts chi-square and Fisher’s exact tests to assess statistical association between forward-deployed tactical weapons and crisis victory. A case study of the Cuban Missile Crisis supplements the quantitative analysis by probing whether tactical capabilities influenced decision-makers’ perceptions, options, and constraining factors. Across all tests, including those restricted solely to U.S. crisis dyads, this

study finds no statistically significant relationship between forward-deployed tactical nuclear weapons and crisis success. The Cuban case likewise reveals ambiguous effects. These findings suggest that tactical nuclear weapons do not function as meaningful levers of crisis bargaining. For contemporary policymakers, the results imply that redeploying U.S. tactical nuclear weapons to East Asia would provide limited crisis-level advantage and should not be assumed to enhance coercive leverage or crisis outcomes.

Maris James

Discipline: Health and Human Development

Authors:

#1 Maris James

Abstract Name: Examining the Trajectory of Black Women's Health Through Policy Gaps and Clinical Training Frameworks

This study examines how the persistent and deeply-rooted health disparities experienced by Black women in the United States reflect long-standing gaps in health policy, clinical training, and structural discrimination. Studies from the past five years report that Black women face disproportionate burdens across a wide trajectory of health outcomes, including a 40% higher breast cancer mortality rate compared to White women, alongside increased risks for stroke, heart disease, type 2 diabetes, and uterine fibroids. While these studies may be recent, the patterns that create these health outcomes are nowhere near new. The health outcomes of Black women are shaped by discriminatory housing practices and historical laws that targeted both Black communities and women, contributing to pivotal differences in socioeconomic status and access to care. The maternal mortality crisis, for instance, is an urgent cause for intervention, with non-Hispanic Black women being three to four times more likely to die during pregnancy or within a year postpartum. Qualitative studies reveal that many Black women giving birth in low-performing hospitals continue to experience poor communication from providers, and barriers to receiving appropriate prenatal and postpartum care due to antiquated, racist protocols in fields like obstetrics and gynecology. Black women are also more likely to receive fewer or untimely interventions, contributing to preventable complications and poorer overall health outcomes. This history still influences present-day interactions, creating mistrust of healthcare providers, inconsistent adherence to treatment, and ineffective communication. This study relies on published data and autoethnographic research methods to analyze how policy structures and clinical training shape Black women's health experiences. This research is crucial to better understanding the need for policies and training frameworks that intentionally center and uplift the trajectory of Black women's health to create pathways toward equitable care for all.

Myla James

Discipline: Education

Authors:

Abstract Name: Engaging Minds, Empowering Students: Are You Ready for a Career in STEM?

A decade ago, the National Institutes of Health (2016) identified key "interventions to 'lift' [underrepresented] students' interests, commitment and ability to persist in STEM fields," including fostering organizational responsibility, developing impactful collaborations, optimizing curricula, addressing access gaps, and promoting creativity. Massey et al. (2022) highlighted the STEM hidden curriculum, advocating for the empowerment of students "to embrace their own distinct identities and scientific voices and explain how

students can overcome challenges unique to underrepresented students throughout their undergraduate career." The National Science Foundation (2024) reinforced that "a diverse workforce is vital for enhancing the nation's capacity for innovation" (Bell et al., 2019; Hsieh et al., 2019). This autoethnographic study explores educational dynamics in the transition from high school to college, emphasizing how the principles of discovery, innovation, collaboration, and excellence (DICE) promote student empowerment. Through personal experiences, self-reflection, and observation, I uncover overlooked perspectives within STEM and analyze the relationship between self-identity and pedagogical challenges. Using an autobiographical timeline and narrative analysis of essays, I investigate how DICE practices supported my transition and prepared me for a STEM career. The central question guiding this research is: Are You Ready for a Career in STEM? Findings suggest that when students actively shape their educational journeys, they strengthen critical thinking, cultivate a sense of belonging, and take ownership of their learning. This empowerment enables them to advocate for their needs and commit to academic excellence. This poster presentation invites educators and scholars to reflect on how underrepresented students develop STEM identities and challenges us to adopt innovative practices that prioritize engagement and learning for all. By sharing actionable strategies from my research, I aim to inspire educators to create environments where every student can thrive. Together, let's engage minds and empower all students to succeed in STEM careers.

Kai Jandial

Discipline: Biology

Authors:

#1 Kai Jandial

#2 Larisa Litovchick

#3 Austin Witt

#4 Erica Peterson

#5 Anton Chestukhin

Abstract Name: A Tool to Assess an Off-Target DYRK1A Inhibition by Clinically Used Anti-Cancer Drugs

Dual-specificity tyrosine-regulated kinase 1A (DYRK1A) has a significant role in cell cycle control via its regulation of the DREAM complex, and therefore could influence cancer progression. DYRK1A phosphorylation of LIN52 is critical for assembly of the DREAM repressor complex, which restrains cell proliferation. Thus, inhibition of DYRK1A may disrupt the LIN52/DREAM interaction and influence drug responses. Several approved anticancer agents, such as abemaciclib, silmitasertib, and olaparib, have been shown to inhibit DYRK1A in vitro, but the clinical significance of this off-target activity is unknown. DYRK1A's role in cancer is controversial since its inhibition has been associated with both tumor suppression and promotion. Here, we aim to develop a reporter system to quantify DYRK1A activity and assess drug effects at clinically relevant concentrations. The system uses a LIN52-turboGFP fusion (tGFP-rLIN52) and phospho-LIN52-specific antibodies to measure intracellular DYRK1A activity. Interaction of tGFP-rLIN52 with DREAM and related complexes is evaluated by immunoprecipitation and western blot. Drug effects are tested in SKOV3 and Kuramochi ovarian carcinoma cells and T98G glioblastoma cells, using cells with DYRK1A depletion by lentiviral shRNA or knockout via CRISPR-Cas9 to confirm the reporter specificity. Our data show that tGFP-rLIN52 phosphorylation is highly specific to DYRK1A and reproducible across the cancer cell lines. The reporter does not interact with DREAM and is unlikely to affect proliferation. This tool will enable quantification of in-cell DYRK1A inhibition by anticancer drugs and correlation with cytotoxic and cytostatic effects, providing insight into the therapeutic and biological significance of DYRK1A modulation.

James Jang

Discipline: Education

Authors:
jungin hyun

Abstract Name: The Impact of Financial Distress on Airline Safety: A Regression Analysis of Economic Indicators

Financial stability plays a critical role in the airline industry, influencing both operational decisions and long-term safety outcomes. After deregulation in 1978, U.S. airlines experienced a sharp increase in competition, leading to significant overcapacity and frequent fare wars. As a result, profits declined for many carriers, which in turn raised the concern that short-term financial survival may come at the cost of investments in safety. Although scholars have debated the link between financial health and accident risk, prior studies have produced mixed results. Some suggest that profitability encourages risk-taking, while others argue that stronger finances enable greater investment in safety. Because findings remain inconsistent, there is a need for a clearer, data-driven approach to understanding how financial distress affects safety performance. This study examines 14 major U.S. airlines to evaluate whether financial indicators such as profitability, liquidity, debt ratio, etc., correlate with accident and incident rates recorded by the Federal Aviation Administration and National Transportation Safety Board. A fixed-effects regression model will be applied to control for airline-specific characteristics, with particular attention to the COVID-19 pandemic period, which created a natural experiment of financial decline and heightened safety concerns. The findings will provide practical insights for regulators, managers, and consumers. By clarifying the relationship between financial health and safety outcomes, this research aims to support proactive monitoring systems, inform regulatory policy, and encourage airlines to prioritize safety investments even under financial stress.

Faith Jango

Discipline: Biology

Authors:
#1 Patricia Estes

Abstract Name: The Effect of the Microbiome on Food Preference in *Drosophila Melanogaster*

Energy intake and feeding regulation are heavily impacted by interactions between the nervous system and microbiome. SINGLE-MINDED1 is a transcription factor needed for the development and function of neurons in the paraventricular nucleus, controlling such autonomic processes as metabolism and feeding. Loss or silencing of single-minded disrupts these processes and can lead to obesity-related issues. In *Drosophila melanogaster*, our previous experiments indicated that flies with silenced single-minded neurons extend their proboscis more than wild type flies when offered a sucrose solution. To further understand the mechanism of these responses, we considered the impact of the gut microbiome. The gut microbiome plays a critical role in influencing host development, physiology, behavior, and neural function. In flies, the microbiome decreases developmental time, increases adult weight, and increases hormone signaling, including insulin. To examine feeding regulation in flies, we compared food preference in wild type flies and flies with silenced single-minded neurons in both the presence and absence of the microbiome. To remove the microbiomes, we dechorionated the eggs and then grew the embryos on an autoclaved diet containing 50 µg/ml chlortetracycline. Proboscis extension reactions of the wild type flies and flies with silenced single-minded neurons was tested with two food sources: a 2 M sucrose and 50% live yeast solution. Both genotypes decreased their response to sucrose after microbiome removal, suggesting that the microbiome enhances sucrose preference. When tested with yeast, wild type flies lacking a microbiome extended their proboscis more often than flies with silenced single-minded neurons. The number of wild type flies that extended their proboscis for yeast increased after the microbiome was removed, whereas the number of flies

with silenced single-minded neurons decreased. These results suggest that both the microbiome and single-minded neurons shape feeding preference and may promote macronutrient preferences for sugar over protein.

Susana Jankovic

Discipline: Social Work and Human Services

Authors:

#1 Susana Jankovic

#2 Jeevan Braggs

#3 Shelby Smith

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#6 Spit for Science Working Group

Camerin Banks

Abstract Name: The Effects of Marijuana on Anxiety Levels.

Marijuana is a psychoactive drug that is considered the most commonly used federally illegal drug. In recent years, marijuana use has increased significantly, reaching historically high levels. In 2023, approximately 42% of adults 19-30 reported marijuana use in the past year. Current research on the subject has not drawn conclusive findings. Some studies report a significant relationship between anxiety and marijuana while others show no effects of marijuana on anxiety. The present study examines marijuana use in the past 12-months for non-medical purposes and compares the anxiety levels of individuals who have used marijuana to those who have not used marijuana. Data was gathered from college students who participated in cohorts 6 and 7 of the Spit for Science study (N=1022). Spit for Science is a longitudinal study that examines how genes and the environment work together to contribute to emotional health difficulties such as anxiety, depression, and substance use. Anxiety levels based on the SCL-90, as well as indication of marijuana use in the past 12 months, were examined among college sophomores. An independent sample t-test was conducted to explore the differences in anxiety levels between those who have used marijuana and those who have not. The findings indicate that individuals who used marijuana in the past 12 months reported significantly higher levels of anxiety ($M=4.63$, $SD=3.43$) than individuals who have not used marijuana in the past 12 months ($M=3.45$, $SD=3.32$) ($t=-3.746$, $p<0.001$). These findings add to previous research suggesting that there is a relationship between anxiety and marijuana. This may help increase education and awareness of marijuana and its effects on emotional health. However, more research is needed to determine whether anxiety is caused by marijuana use.

Allie Jansen

Discipline: History

Authors:

Abstract Name: Behind the Bars: The Injustices of Staff-Perpetrated Sexual Violence in US Women's Prisons

Behind the Bars is an analysis of the injustices that lie within staff-perpetrated sexual violence against U.S. women prisoners. Combining information from the few statistical reports on the matter with first-hand accounts from victims, this paper attempts to capture the true depth of the issue, despite the difficulties in measuring. In 2020, a Bureau of Justice Statistics report found that, though women only make up 7% of the incarcerated population, they are responsible for over 28% of reports of staff-perpetrated sexual violence. The

disproportion proves that this is an issue of gender, which has been recognized by scholars like Michelle VanNatta, Gina Fedock, and Barbara Owens. *Behind the Bars* builds on existing research by arguing that the problem exists at the intersection of gender and justice. First, staff-perpetrated sexual violence has an additive effect on prisoners' punishments. The loss of liberty inherent in incarceration is compounded by the loss of physical autonomy through sexual violence. When the attack is committed by a member of prison staff, the additional punishment (torture) is sanctioned directly by a representative of the state. Then, the various barriers that discourage victims from reporting and prevent effective investigations multiply these punishments by guaranteeing impunity to the staff perpetrators. This multiplicative nature is what makes staff-perpetrated sexual violence an issue of justice, while the disproportionate victimization of women makes it an issue of gender. This paper's dual perspective reveals that staff-perpetrated sexual violence is not merely a symptom of rape culture nor of the American prison system, but that it is an independent injustice that requires specific attention.

Nainil Jariwala

Discipline: Economics

Authors:

#1 Nainil Jariwala

#2 Adam Stivers

Abstract Name: Do Ethnic Groups Think Fast Differently? Nudging Diverse Consumers.

In consumer decision-making, nudges often guide choices by triggering well-established cognitive biases such as loss aversion, framing, affective heuristics, and processing fluency (Kahneman & Tversky, 1981; Slovic et al., 2007). Although these “fast thinking” mechanisms are typically assumed to be universal, surprisingly little empirical work has examined whether the magnitude, or even the direction, of these biases varies across cultural or ethnic groups (Henrich et al., 2010). This absence of comparative evidence represents a meaningful gap in both behavioral economics and consumer psychology. To address this gap, we conducted a mixed experimental survey ($N \approx 400$), using a between-subjects factor of self-identified ethnicity and a within-subjects factor that captured multiple behavioral nudges. Participants completed a fully randomized set of consumer scenarios probing established biases (e.g., framing, anchoring, social proof, affect heuristic, endowment valuation), enabling parallel effect-size estimation across four ethnic groups. Across all nudges, participants displayed classic bias patterns, yet the intensity of several effects, particularly affect-driven choices, fluency preferences, endowment gaps, and framing sensitivity under risk, varied systematically by ethnicity. These cross-group differences emerged reliably across both binary-choice and continuous-rating measures. At the same time, several biases typically treated as universal, including diminishing sensitivity and urgency-based scarcity cues, showed striking cross-cultural stability. Notably, we also observed unexpected pattern reversals, such as anchoring scenarios in which the absence of a reference price produced higher willingness-to-pay than either low or high anchors. Together, these results provide the first broad empirical comparison of multiple consumer-relevant biases across ethnic groups. The findings refine assumptions about the universality of behavioral biases and offer actionable guidance for cross-cultural marketing, communication strategy, and policy design in increasingly diverse consumer contexts.

Sarah Jasser

Discipline: Biology

Authors:

#1 Sarah Jasser

#2 Javeed Farooqi

Abstract Name: Sp7 is Required for Apoptosis of Hypertrophic Chondrocyte and Cartilage Turnover

Objective: Sp7 transcription factor is essential for skeletogenesis, as global deletion causes failure of bone formation. Sp7 gene mutations in humans cause osteogenesis imperfecta. Deletion of the Sp7 gene in developing chondrocyte blocks endochondral ossification. Sp7 role after chondrocyte hypertrophy and during postnatal chondrogenesis remains unknown. **Methods:** Sp7 gene was deleted in hypertrophic chondrocytes (HCs) by Col10a1-Cre. Endochondral ossification was analyzed in littermates from birth to 3 months, using molecular, biochemical, histological, and spatial transcriptomics. **Results:** We first confirmed Col10-Cre activity is restricted to HCs by using Td-reporter mice. Homozygous (Sp7^{HC/HC}) mice survive and exhibit comparable endochondral ossification to their WT littermates at birth. The length of the growth plate and hypertrophic zone is increased in the femurs of P3, 1- and 3-month-old Sp7^{HC/HC} mice. A decrease in caspase-3 and an increased Bcl2/Bax ratio revealed that Sp7 promotes apoptosis of HCs. Alcian blue/Saf-O staining showed a retention of cartilage in Sp7^{HC/HC} mice during postnatal development. Consistent with these observations, qPCR showed a significant decrease in the expression of collagenases (Mmp9, 13) and aggrecanases (Admts4, Admts5). Xenium in situ analysis established spatially decreased expression of these enzymes in Sp7-deficient HCs. Surprisingly, μ CT analyses revealed a 2-fold increase in trabecular bone mass at 1-month and 3-fold increase in adult Sp7^{HC/HC} mice. The increased bone mass is not linked to osteoblast activity, as histomorphometry, dynamic labeling, and qPCR showed that osteoblast numbers, bone formation/mineral apposition rates, and gene expression are comparable among littermates. Surprisingly, the number and surface area of Trap⁺ osteoclasts decreased in Sp7^{HC/HC} mice. The qPCR and Xenium analyses revealed a reduction in the expression of Rankl, Trap, Ctsk, and Car2, indicating impaired osteoclast differentiation. **Conclusion:** Sp7 regulates trabecular bone mass by controlling the expression of signaling factors and enzymes in hypertrophic chondrocytes.

Sanika Javeri

Discipline: Health and Human Development

Authors:

Abstract Name: Investigating TP53 Codon 238 Mutations Through CRISPR Genome Editing and Computational Protein Analysis

Cancer remains one of the leading causes of mortality worldwide, and mutations in Tumor Protein 53 (TP53), the most frequently altered tumor suppressor gene, play a central role in its onset and progression. While hotspot mutations such as codon 248 are well characterized, codon 238 represents an understudied site with potential to reveal new insights into TP53 dysfunction. This project investigates the structural and functional consequences of missense substitutions at codon 238, determining how they disrupt protein stability and tumor suppressor activity. Using CRISPR-Cas9 genome editing, the codon ACA at position 238 is targeted in HEK293 cells to introduce pathogenic variants. The experimental workflow includes guide RNA design, single-stranded donor template construction, transfection, PCR amplification, and Sanger sequencing to confirm edits. Protein-level validation is optionally performed via western blot to assess expression and stability, providing empirical insight into the consequences of the mutation. Complementing wet-lab experimentation, this study employs web-based structural biology platforms such as AlphaFold, Ensembl Variant Effect Predictor, and SwissSidechain to model and compare wild-type versus mutant TP53 conformations. These tools visualize how single nucleotide substitutions alter protein folding and offer insights into disrupted tumor suppressor activity. By integrating CRISPR-based genome editing with computational modeling, this project provides a dual lens: empirical validation of cancer-associated variant and theoretical exploration of its structural impact. This project shows how combining lab experiments with computer-based modeling can give a fuller picture of how genetic changes drive cancer. By editing TP53 in cells and then predicting how the mutations reshape the protein, we connect genotype to function in a way

that is both practical and insightful. By connecting lab-based genome editing with structural modeling, the project deepens the understanding of genotype–phenotype relationships in cancer and highlights the value of integrative strategies.

Ibraheem Jawadi

Discipline: Business

Authors:

#1 Cheryl Rathert, PhD

#2 Timothy J. Vogus

Abstract Name: Healthcare Workplace Compassion Practices and their Associations with Patient – Care Provider Therapeutic Connections

Background: Patient-centered care is a defining element of healthcare delivery. Both healthcare organizations and providers are interested in ways they can improve patient experiences. Previous research has demonstrated that better patient health outcomes and satisfaction are associated with patients experiencing a therapeutic connection (TC) with their provider; yet there is little knowledge about factors that may strengthen TCs. However, related research has found positive associations between workplace compassion practices and outcomes for both patients and providers. Workplace compassion means that an individual notices someone in distress and acts to reduce their suffering. Compassion practices are ways of organizationally encouraging and normalizing expressions of compassion between coworkers. Purpose: We investigate the association between workplace compassion practices and healthcare clinicians' perceptions of TCs and two mechanisms through which workplace compassion practices may operate: psychological safety (PS) and perspective taking (PT). Workplace compassion practices are expected to be associated with PS because they likely elicit feelings that workers will not be penalized for expressing distress or supporting others who are suffering. In turn, feeling safe is likely positively associated with PT because other's perspectives are more likely to be heard and understood (i.e., empathy), which is an important component of TC. Method/Results: We conducted a cross-sectional survey of healthcare providers (n=341). Serial multiple mediation regression models were employed to test the association between compassion practices and TC directly and indirectly through the sequential mediators of PS and PT. Associations between compassion practices and TC were significantly mediated by PS and PT. Conclusion: Although we cannot infer causation from this study, it suggests that organizational compassion practices are associated with better patient-provider TCs through PS and PT. It provides preliminary evidence to incentivize organizations to adopt workplace compassion practices.

Dharshine Priya Jayakrishnan

Discipline: English and Literature

Authors:

#1 Elizabeth Wright

Abstract Name: Slain as an Italian, Revived as a "Turco": How One Diaspora Inspired a Global Literary Movement

I researched an unexamined mystery in Colombian author and Nobel Prize winner Gabriel Garcia Marquez's "Chronicle of a Death Foretold" (1981). This novel, reconstructing an honor killing that haunted the author for decades, catalyzed a global literary movement combining journalistic documentation with fictional

dramatization. When writing for the Sunday Times on October 24, 1982, Salman Rushdie praised Garcia Marquez's spectacular imagery. The biography of record by Gerald Martin from 2008 indicates the real-life victim was the son of Italian immigrants, but doesn't contemplate why the protagonist shifted from being Cayetano Gentile, to the son of an Arab immigrant, Santiago Nasar. To answer this question, I engaged in archival and secondary source research to cast light on the Middle Eastern immigrant community of early twentieth-century Colombia. I studied the author's papers held at the Harry Ransom Center at the University of Texas, examined census and immigration records from the Colombian government's official statistical collection agency (DANE), and read secondary sources on the Middle Eastern Diaspora. In the end, my analysis of Garcia Marquez's exploration of Arab identity in Colombia sheds light on broader questions of assimilation and cultural interactions around the world. Can immigrants ever fully be part of the societies they have sacrificed to call home?

Pinchadevage Kanishka Jayathilake

Discipline: Computer Science

Authors:

#1 Pinchadevage Kanishka Jayathilake

Abstract Name: A Hybrid Classical and Quantum Side Channel Attack on Kyber 512

Kyber is a Module-Lattice based Encryption (Module-LWE) scheme recently standardized as MLKEM-512 for post-quantum security. In deployed systems it is wrapped in the Fujisaki Okamoto (FO) transform where decapsulation re-encrypts the recovered message to check ciphertext validity. In real hardware this FO decapsulation step leaks power or electromagnetic information which can be processed into a noisy "plaintext-checking" oracle, for a chosen ciphertext, it tells the attacker with some error probability whether the decrypted message equals a target value. This work asks how much such FO leakage can weaken Kyber512 and constructs a concrete hybrid classical-quantum key recovery pipeline. I first model each oracle response as a bit sent over a binary symmetric channel, design special ciphertexts such that each query reveals a sparse linear constraint on the secret key bits, and then collect many queries to get an LDPC system. I apply belief-propagation decoding, a standard iterative algorithm from coding theory, to recover most of the roughly 1,500 secret bits using only a few thousand oracle queries. The remaining uncertain bits are encoded as a QUBO problem, equivalent to an Ising spin model. We solve this residual problem using a quantum annealing style optimizer and a constraint aware multi-qubit correction step that explicitly enforces LDPC parity checks and encoding consistency. Finally, a blockwise phase uses a small number of additional oracle queries to detect and locally repair any remaining errors in blocks of the key. By comparing the total work of this leakage-assisted attack to standard primal lattice attacks on Module-LWE, We show that realistic FO leakage effectively reduces the underlying lattice dimension and lowers Kyber512's practical security level. This provides an end-to-end, quantitatively case study of how side-channel leakage and quantum inspired optimization can interact against post quantum cryptography.

David Jefferson

Discipline: Biology

Authors:

#1 Shahla Hassan

#2 Adithi Thumuluru

#3 Meera Velga

#4 Laura Mathies

#5 Andrew Davies
#6 Jill Bettinger
Faheem Ahmed

Abstract Name: Low Concentration Locomotor Activation by Ethanol in *unc-13* Mutant *C. elegans*.

Alcohol Use Disorder (AUD) is a serious disease that affects millions worldwide and is the result of a combination of genetic and neuroadaptive causes. Our research aims to gain a deeper understanding of the molecular mechanisms underlying changes in synaptic transmission induced by ethanol. We are particularly interested in the effect of low concentration ethanol, because the low dose disinhibiting effects are thought to contribute to problematic drinking. The nematode *Caenorhabditis elegans* was used as our model because their nervous system is highly conserved with mammals, making them particularly useful for studying fundamental neuronal mechanisms. To explore the mechanisms involved in ethanol-induced changes in synaptic transmission, we analyzed behavioral responses to low concentration ethanol in wild-type and synaptic transmission-defective *C. elegans*. UNC-13 is required for the priming of synaptic vesicles, and *unc-13(e1091)* mutant animals are paralyzed. To better understand how locomotion in *unc-13* mutant animals changes with ethanol compared to basal conditions, we assessed locomotor activation using two approaches: a grid assay, to count the number of grid squares the animals entered based on their tracks, comparing ethanol-treated movement to baseline, and video-recording analysis (WormLab) to measure worm speed and distance travelled under basal and ethanol-treated conditions. We found that *unc-13* mutants display significantly increased locomotor activity in response to ethanol. This increase in locomotor activation was observed in both the grid assay analysis and in track maps generated from video recordings. Overall, these findings suggest that low doses of ethanol can bypass the UNC-13-dependent process in synaptic vesicle priming. We are now working to understand how ethanol is bypassing the function of UNC-13, and we will describe these results.

Paige Jencik

Discipline: Economics

Authors:
Lauren Level

Abstract Name: 2025 SNAP Lapse, Stability or Collapse? An Analysis of Impacts on Tribal Communities and Grocery Decision-Making in Oklahoma

Recently, the lapse of funds for the Supplemental Nutrition Assistance Program (SNAP) during the most recent government shutdown caused unexpected turmoil for consumers. This was especially seen in states that have the highest levels of food insecurity, Oklahoma being one. In this research, we assess this unique policy occurrence to study how the change in food access affected food choices at grocery stores. We analyze items purchased across Oklahoma to determine the influence of the SNAP lapse on consumers using product-level data from NielsenIQ. Our purpose is to deduce how consumers' decisions change in response to the lapse, with some substituting to less expensive products while others substitute to no products at all. In our regression analysis, we measure how varying demographics change purchasing behaviors, for instance the difference between areas with large tribal presence, and differences in urban and rural areas, which may have many food pantries or other nonprofit organizations compared to areas facing food deserts. This work has important ramifications as it measures how the sudden and unexpected change in SNAP affects adequate food intake.

Tyler Jenkins

Discipline: Biology

Authors:

#1 Tyler Jenkins

#2 Hugo Castillo

Abstract Name: Investigation of Biofilm Formation and Osmotic Stress Tolerance of Nonmotile *Escherichia coli* in Simulated Microgravity

Simulated microgravity presents multiple physiological stressors for astronauts, including bone demineralization, muscle loss, and weakening of the immune system. Bacteria serve as viable model organisms to study physiological changes because of their abundance in the human digestive system and skin. Motility in bacteria plays a significant role in cell survival, but few studies have been conducted on microgravity's effect on motility phenotypes. While motile strains like *Escherichia coli* K12 have been studied extensively under microgravity conditions, the effects of simulated microgravity on non-motile strains are largely unknown. To better understand this relationship, the nonmotile *E. coli* MG1655 strain was inoculated and exposed to simulated microgravity via a 2D clinostat to study growth, biofilm development, and behavior under osmotic stress conditions. Results from this experiment suggest significant changes in phenotypical expression occur in a microgravity environment, which presents potential implications for adverse effects to the human gut and skin microbiota like increased cell inhibition and virulence.

Riley Jenkins

Discipline: Biology

Authors:

#1 Emily Notari

#2 Ananda Amstadter

Abstract Name: Sex differences in the heritability of posttraumatic stress disorder, substance use disorders, and their comorbidity: a systematic review.

Background: Posttraumatic stress disorder (PTSD) and substance use disorders (SUD) frequently co-occur, are both moderately heritable, and have correlated genetic risk. Despite established sex differences in both PTSD and SUD prevalence, it remains unclear whether these sex differences are in part due to differences in genetic risk (i.e., if heritability estimates or genetic correlations differ between males and females). Clarifying these sex-specific patterns has important implications for understanding risk of PTSD and SUD co-occurrence, as well as informing prevention and treatment strategies. Objectives: This systematic review of the human literature examines whether existing behavioral genetic (twin/family-based) and molecular genetic (SNP-based) studies provide evidence for sex differences in the heritability of PTSD, SUD, or their genetic correlation. Methods: Searches were conducted through PubMed and PsycINFO, yielding 132 studies prior to screening. Studies were uploaded into Covidence for blinded review by the research team. Title and abstract screening applied hierarchical exclusion criteria, removing studies that were non-empirical, animal-based, did not assess our phenotypes of interest, concerned unrelated comorbid conditions, used single-sex samples, treated sex only as a covariate, did not report sex-specific heritability estimates, or did not estimate genetic variation. Full-text screening is currently in progress, and data will be extracted from eligible studies (expected $n = \sim 40$). Results: Although this study is still in progress, the review aims to synthesize existing evidence on sex-specific heritability to clarify the role of sex in the genetic influences on PTSD, SUD, and their co-occurrence. Conclusions: The completed work will identify current gaps in the literature, highlight areas where sex-specific data are limited, and provide direction for future research on the genetic and environmental pathways that shape risk across sexes.

Noah Jensen

Discipline: Interdisciplinary

Authors:

#1 Derek Larson

#2 Troy Knight

Abstract Name: Restoring Balance in Lake Sagatagan: An Adaptive Management Plan for Improving Panfish Size, Predator Structure, and Angling Quality

This project investigates the central question of what ecological and management factors are driving long-term panfish stunting and predator imbalance in Lake Sagatagan, a 227-acre mesotrophic lake in central Minnesota, and how an adaptive management framework can restore a healthier, more sustainable fish community. Situated on the Saint John's Abbey and University property, the lake offers a unique case in which private governance, limited access, and shifting ecological conditions intersect. Existing research on bluegill stunting, predator-prey dynamics, and selective angler harvest provides essential context, yet few studies examine how these processes operate within privately managed lakes where institutional values, such as preservation and low intervention, shape management outcomes. This study aims to contribute to that gap by integrating ecological assessment with a historical and institutional analysis of local decision-making. Field methods included angling-based bluegill sampling, otolith crack-and-burn aging to evaluate growth rates, and comparison with regional benchmarks. Predator size structure and abundance were examined using catch-per-unit-effort data from previous surveys. Historical records and management narratives were analyzed to understand how past practices influenced present-day conditions. Results indicate slow early-life bluegill growth, high recruitment into intermediate size classes, limited representation of preferred-size fish, and an abundance of small northern pike, together reflecting a system characterized by density-dependent stunting and inefficient predation. These findings will be discussed in relation to institutional stewardship philosophies and the ecological mechanisms that reinforce imbalance. The project concludes by proposing an adaptive, multi-phase management strategy involving predator restructuring, modified harvest approaches, and long-term monitoring. This framework not only targets Sagatagan's specific challenges but also offers insights applicable to other small, low-access Minnesota lakes seeking data-driven, ecologically grounded management solutions.

Carly Jensen

Discipline: Health and Human Development

Authors:

#1 Megan Ogle

#2 Timothy Sonnenberg

#3 Chelsea Lockyear

#4 Rachel Greenberg

#5 Danny Benjamin

Abstract Name: Therapeutic Use of Hydrocortisone in Neonates: Outcomes and Trends

Hydrocortisone (HC) is increasingly used off-label in neonatal intensive care units (NICUs) to prevent or treat bronchopulmonary dysplasia (BPD), a major cause of morbidity and mortality in extremely preterm infants. However, clinical practices surrounding HC administration remain variable, particularly regarding the

timing of treatment. This study aimed to characterize national trends in HC use from 2010–2022 and evaluate differences in infant characteristics and outcomes associated with early versus late HC administration. We conducted a retrospective cohort study of extremely preterm infants discharged from 323 NICUs across the United States. Deidentified data were extracted from the Pediatrix BabySteps Clinical Data Warehouse. Infants were categorized into three groups: no HC treatment, early HC (first dose ≤ 7 days of life), and late HC (first dose ≥ 8 days). Demographic variables, comorbidities, interventions, and clinical outcomes were compared using chi-square testing, and annual trends were assessed using a nonparametric trend analysis. Among 76,617 infants, 68,171 received no HC, 4,438 received early HC, and 4,008 received late HC. Infants treated with HC had substantially lower gestational age and birthweight than untreated infants. BPD occurred in 20% of the no-HC group, 34% of the early HC group, and 62% of the late HC group. Compared with untreated infants, those receiving HC exhibited higher rates of complications such as necrotizing enterocolitis, intraventricular hemorrhage, and spontaneous intestinal perforation. Early HC use rose significantly over the study period, while late HC use remained stable. Treatment duration was generally shorter in the early HC group. These findings suggest that increasing early HC use may reflect growing confidence in its role in reducing BPD among high-risk infants. However, substantial differences in baseline risk between groups highlight the need for prospective studies that control for gestational age and birthweight to more clearly evaluate the independent effects of HC treatment.

Hannah Jensen

Discipline: Psychology

Authors:

#1 Hannah Jensen

#2 Sophia Baumann

#3 Eva Jones

Sophia Baumann

Eva Jones

Abstract Name: The Loneliness Epidemic: Exploring the Relationship Between Social Connectedness and Misogynistic Attitudes

Limited research has explored how loneliness may contribute to more subtle or everyday forms of misogynistic attitudes within general, non-radicalized populations. Understanding how traditional gender ideologies structure experiences of loneliness and shape misogynistic beliefs is necessary to inform effective prevention efforts. This study addresses this critical research gap by investigating the early psychosocial mechanisms that may precede extremist radicalization. We further explore how gender identity might influence or moderate this relationship. To guide our research, we pose two central research questions: Does a correlation exist between self-reported levels of social connectedness, loneliness, and misogynistic attitudes? Are there demographic variables, such as gender and age, that moderate this relationship? Informed by the existing literature, we hypothesize that there will be a relatively strong, positive correlation between self-reported levels of social disconnection, loneliness, and misogynistic attitudes. We also predict this correlation will be stronger among men, due to gendered socialization and masculinity norms. This study will assess three main constructs using validated measures: loneliness, social connectedness, and misogyny, in addition to collecting demographic information. All participants will answer the same items in the same order. Descriptive statistics will be used to characterize the sample, and bivariate correlations will assess the relationship between social connectedness and misogynistic attitudes. Multiple and hierarchical linear regression analyses will be conducted to evaluate the potential predictive and moderating roles of demographic variables. Full analytic procedures, including planned regression and moderation analyses, will be conducted upon completion of the target sample and presented at NCUR if this submission is accepted.

Daniel Jeon

Discipline: Biochemistry

Authors:

#1 Daniel Jeon

Abstract Name: Development of a Doxorubicin derivative to Minimize Heart Failure Risk While Retaining Anticancer Efficacy

Doxorubicin is a widely used chemotherapy drug, but its use is limited due to its cardiotoxicity. This toxicity results from doxorubicin's strong affinity for the Ryanodine Receptor 2 (RYR2) calcium release channel. When doxorubicin binds to RYR2, it alters the channel's conformation, causing it to adopt a quasi-open, or leaky, state. This leads to calcium leakage, disrupting the heart's ability to maintain sinus rhythm and ultimately causing heart failure. Because of this, and because of its red color, doxorubicin is sometimes called "red death." The goal of this project is to develop a doxorubicin derivative that retains its anti-cancer properties while reducing its interaction with RYR2. To achieve this, I plan to use a ³H Ryanodine binding assay. The assay will help determine the activity of RYR2 while also being bound to Doxorubicin, to assess the effects the drug has on the protein. Once we have determined how the drug alters the protein's activity, I plan to use a combination of cryo-electron microscopy complemented with 3D modeling. Cryo-EM will help determine where the drug specifically binds to the protein. Then, I will use 3D modeling software such as Chimera and Pymol to analyze the structural features of the site of interaction between Doxorubicin and RYR2 and analyze any conformational changes derived from Doxorubicin binding. If time permits I hope to use the Surface Plasmon Resonance (SPR) to determine the binding affinity of a new drug derivative provided by a collaborator. This comprehensive approach will provide valuable insights into the drug's binding characteristics and the potential of its derivatives to reduce cardiotoxicity while preserving its anti-cancer efficacy.

Katoya Jepson

Discipline: Psychology

Authors:

Abstract Name: Charles Manson as a Prototype Psychopathic Offender: A Forensic Imperative to Identify Serial Homicide by Proxy

This project examines Charles Manson through a forensic-psychological lens to challenge the persistent cultural framing of him as merely a manipulative cult leader. The central research question asks: Can Charles Manson be understood as a prototype psychopathic offender whose behavior meets the forensic criteria for serial homicide even without direct physical participation? Grounded in forensic and criminological theory, the study situates Manson within contemporary research on psychopathy, coercive control, and organized serial violence. Methodologically, the project employs a qualitative forensic case analysis synthesizing archival evidence, psychological evaluations, court records, and secondary criminological sources. Manson's psychological assessments reveal traits of dominance, sadism, and manipulative charisma consistent with the Psychopathy Checklist-Revised (PCL-R). Comparative analysis with Ted Bundy highlights shared features of organized psychopathy—planning, control, and exploitation of systemic blind spots—demonstrating how Manson's orchestration of murder through subordinates constitutes as "serial homicide by proxy." Findings indicate that forensic and historical evidence—disappearances of associates, reports of desert graves, and patterns of symbolic violence—suggest additional uncharged homicides aligned with the dark-figure-of-crime framework. The research identifies systemic investigative failures, including fragmented jurisdiction, neglect of marginalized victims, and underestimation of psychopathy as a predictor of lethal violence. This study concludes that Charles Manson represents a critical forensic prototype: a charismatic psychopathic

orchestrator whose violence was psychological, organized, and premeditated. Recognizing such offenders requires expanding the definition of serial homicide to include those who kill through manipulation rather than direct action. By reframing Manson as a forensic warning rather than a cultural relic, this research contributes to improving early risk assessment, strengthening investigative collaboration, and preventing future manifestations of organized psychopathic violence.

Shudan Jew

Discipline: Biology

Authors:

#1 Anne Baldino

#2 Tsvetan Bachvaroff

#3 J. Sook Chung

Abstract Name: Discovering Multiple Anti-Lipopolysaccharide Factor Variants in the Atlantic Blue Crab

The Atlantic Blue Crab, *Callinectes sapidus*, is an ecological and economic marvel in the Chesapeake Bay, and their harvest here provides 50% of the commercial crabs sold across the United States. Despite this, recent reports show a steady decline in the natural population due to environmental causes that are further exacerbated by poor water quality and increased bacterial levels. This study focuses on anti-lipopolysaccharide factor (ALF) genes found in the blue crab genome responsible for innate immune defense. Anti-lipopolysaccharide factors are antimicrobial proteins that play a crucial role in identifying and neutralizing foreign bacteria. Initial phylogenetic analysis demonstrated that these genes in *C. sapidus* are closely associated with previously verified ALF genes in the related crab, *Portunus trituberculatus*. The 102 available sequences were analyzed to determine six novel gene loci in *C. sapidus*. Multiple sequence alignment further revealed conserved regions within the identified ALFs, including the conserved cysteine–cysteine disulfide bridge. This structural motif is widely recognized for its contribution to protein stability. Additionally, a protein structure prediction server representation shows conservation across all six sequences, highlighting its importance in maintaining ALF form and function. Overall, this study aims to establish a foundation for future research to improve the understanding of immune defense strategies in marine invertebrates for the development of disease management techniques in the aquaculture and fishing industry.

Kiersten Jewell

Discipline: Environmental Science and Sustainability

Authors:

#1 Amy Fowler

Abstract Name: Understanding the parasite Didymozoida within Atlantic Mackerel (*Scomber scombrus*)

Parasites play essential ecological roles in marine food webs and can serve as indicators of ecosystem health, yet their impacts on some commercially important fish species remain understudied. Atlantic mackerel (*Scomber scombrus*) in the western North Atlantic host trematode parasites resembling members of the Didymozoida, a group with complex multi-host life cycles. Published records of Didymozoida in western Atlantic mackerel are lacking despite high levels of infection proportions in local collections. This study aimed to characterize parasite communities in mackerel from two sites, Cape Cod and the Isles of Shoals, to identify factors influencing infection patterns and parasite development. Between June and August 2025, mackerel were collected from Massachusetts and Maine waters. Fish were measured, weighed, sexed, and

examined for didymozoid cysts in the mouth, operculum, and associated structures. Individual worms were extracted, measured, and scored for egg maturity, and subsets were massed to generate a length–mass index. High infection intensity (average 6.26 cysts per fish) was observed across all samples. Apparent differences between sites were attributed to fish size structure rather than location. A significant positive relationship was found between fork length, weight, and infection, while a negative relationship was found between condition factor and infection. Infection was more likely to be found on the opercula and pharyngeal teeth, though the pharyngeal teeth contained larger and more mature worms, suggesting this structure might be the primary infection site. No secondary or tertiary infections occurred without concurrent infection at these locations, indicating infection is likely occurring through digestive means. We are currently performing genetic analysis of the parasitic worms to determine species identification. This study is one of the first to provide data on the host-parasite interactions of a didymozoid in the western stock of Atlantic mackerel.

Olivia Jeziorczak

Discipline: Psychology

Authors:

#1 Olivia Jeziorczak

Abstract Name: The Choices Athletes Make, and the Regret They Face

Regret is a cognitive-based emotion arising when individuals compare real outcomes with better alternatives that could have occurred (Roese & Summerville, 2005; Zeelenberg, 2007). Regret research demonstrates a temporal pattern: actions tend to elicit greater short-term regret, whereas inactions often produce stronger prolonged regret—particularly when correction is no longer available (Gilovich & Medvec, 1995; Gilovich & Chen, 1995). Shaping this pattern is the perceived future opportunity principle. Beike and colleagues (2009) argue that lost opportunity predicts the strongest regret, whereas Roese and Summerville (2005) report that regret is often greatest in high future opportunity. The current study seeks to address conflicting results by examining both perceived future opportunity and the nature of the triggering decision (actions vs. inactions). The present study focuses on athletes, a unique contribution. Although regret has plenty of thorough studies, little research examines athletic decision-making. Athletes make rapid, high-stakes decisions under pressure and are continually evaluated for both their actions (e.g., taking a risky shot) and inactions (e.g., hesitating and missing an open opportunity). Yet little is known about when athletes experience more regret: during competition, when future opportunities remain, or after the game, when outcomes are fixed. Studying athletic decision-making, the current study can offer a potential resolution to the conflicting findings in the regret literature. We will use a vignette-based paradigm in which athletes rate the regret they would experience by imagining scenarios either at halftime or after the final whistle. The design adopts a 2 (Decision Type: Action vs. Inaction) $\times$ 2 (Perceived Future Opportunity: High vs. Low) between-subjects framework to assess regret intensity. Consistent with research, we predict (1) overall stronger regret after the game, given the loss of future opportunity (stronger inaction-based regret after the game); (2) action-based regret will be more intense during halftime (actions elicit greater immediate regret).

Olivia Jeziorczak

Discipline: Psychology

Authors:

#1 Elena Popovic

#2 Samantha Desantis

#3 Christina Zahorik

Abstract Name: Mindfulness: Learning to Accept the Past

Regret is a counterfactual emotion that arises when individuals compare an actual outcome to a more desirable alternative that “could have” occurred (Kahneman & Miller, 1986). Prior research demonstrates that regret is associated with anxiety, depression, and persistent rumination (Markman et al., 2009). Individuals high in evaluative-concerns perfectionism—characterized by heightened fear of mistakes and self-critical tendencies—may be particularly vulnerable to regret-related distress (Bergman et al., 2007; Stoeber et al., 2007). Mindfulness, defined as nonjudgmental present-moment awareness (Kabat-Zinn, 2003), has been shown to reduce rumination and promote emotional acceptance. This proposed project will examine whether brief mindfulness practices reduce regret and whether perfectionistic tendencies moderate this effect. All participants will first be asked to recall a regretful personal event. They will then complete pre-intervention measures, including emotional ratings (regret, sadness, responsibility) as well as the short 5-Facet Mindfulness Scale (Baer et al., 2006) and the Self-Compassion Scale (Neff, 2019). Participants will then be randomly assigned to either a mindfulness condition or a control condition. Those in the mindfulness condition will listen to a guided audio recording promoting present-moment awareness and nonjudgmental reflection; those in the control condition will complete a matched-duration neutral activity. Afterward, all participants will complete post-intervention measures, including the same mindfulness and emotional ratings to assess changes in regret. We expect that participants in the mindfulness condition will report reduced regret compared to those in the control condition. Additionally, we anticipate a moderation effect such that the benefits of mindfulness will be strongest among individuals high in evaluative-concerns perfectionism, who may struggle most with self-critical rumination. By integrating self-report measures with an experimental design, this study aims to clarify whether brief mindfulness practices can help individuals regulate emotional responses to regret—particularly those with perfectionistic tendencies.

Aditi Jha

Other/Institution Not Found

Discipline: Computer Science

Authors:

#1 Daniel Palmer

Selorm Essey

Abstract Name: Counting Visually Distinct Placements of Possibly Overlapping Axis-Aligned Rectangles on Finite Grids

Much of the work on tiling with shapes requires that their placement avoid gaps or overlaps. This work investigates visually distinct ways axis-aligned shapes can be arranged on a finite grid that allows both. Although specific counting techniques exist for special cases, general methods for systematically characterizing all such arrangements remain limited. This study develops a structured hybrid approach that combines closed-form counting formulas with a geometric region-decomposition algorithm to enumerate all visually distinct placements of two shapes on a grid. Our approach begins with closed-form formulaic expressions for counting placements of each individual shape, including all distinct orientations. It then incorporates configurations in which the shapes overlap, including situations in which one shape becomes obscured by the other when viewed from above. Next, it considers arrangements where the shapes remain separate but produce identical visible patterns regardless of placement order. The core algorithm analyzes the free space surrounding a placed shape by partitioning the grid into a collection of sub-regions that capture all possible placements of the second shape. By combining these closed-form components with this geometric region decomposition, the method accounts for all cases that must be included or excluded to obtain the total number of top-down distinct arrangements. Our complete algorithmic approach operates in linear time with respect to the grid area, a substantial improvement over brute-force enumeration, which requires quadratic time by evaluating all ordered placement pairs. Complete brute-force generation of all arrangements was

implemented to verify correctness. This work provides a rigorous, efficient, hybrid formulaic–algorithmic technique for enumerating all top-down visually distinct shape placements on discrete grids.

Aditi Jha

Discipline: Computer Science

Authors:

Abstract Name: Detecting AI-Generated Text: An Interpretable Multi-Pipeline Analysis Across Stylometric, TF-IDF, and Transformer Representations

This study investigates differentiating human-written text from AI-generated text. The rise of AI-generated writing raises concerns for academic integrity, authorship attribution, and plagiarism detection. Our work addresses the growing need for detection methods that are accurate, interpretable, and grounded in measurable linguistic evidence by asking a central question: what linguistic and representational patterns most reliably distinguish AI-generated writing from human writing across different modeling approaches? We evaluate four supervised modeling pipelines: stylometric features with machine learning models (logistic regression, support vector machines, random forests, and gradient-boosted trees); word- and BPE-level TF-IDF representations with linear, kernel, and neural classifiers; fine-tuned transformer models; and a tokenizer-controlled TF-IDF pipeline using logistic regression and support vector machines to isolate vocabulary effects. A balanced dataset of 10,000 English texts was compiled from public sources, covering essays, creative writing, QA, paraphrasing, and summarization. The fine-tuned RoBERTa model performed best, achieving 0.925 accuracy. Stylometric models reached 0.77 to 0.85, while TF-IDF pipelines achieved 0.76 to 0.80. The tokenizer-controlled TF-IDF experiment improved model performance to 0.81, demonstrating the influence of representation. These pipelines allow us to ask whether detection accuracy is driven by model choice or the underlying feature representation used to encode text. Interpretability analyses, including SHAP, LIME, PDPs, TF-IDF contribution maps, and transformer attributions like attention and integrated gradients, showed that stylometric and TF-IDF features capture only broad linguistic tendencies without clearly separating human and AI texts, a pattern confirmed by unsupervised clustering. In contrast, t-SNE visualizations of RoBERTa embeddings revealed distinct separation driven by deeper semantic and structural signals. Moving beyond recent work that treats AI-text detection primarily as a classification problem, our study emphasizes the importance of understanding the representational signals behind predictions, underscoring the value of interpretability and evidence-based reasoning for developing more transparent and reliable detection systems.

Nan Jiang

Discipline: Economics

Authors:

#1 Nan Jiang

Abstract Name: Intraday Capital Reallocation from Climate Disclosure: Evidence around CDP Score Releases

This article investigates how publicly released climate-related disclosure influences intraday capital allocation. It exploits the institutional design of a centralized, embargoed release of climate scores, ensuring simultaneous disclosure across firms and creating quasi-experimental variation in information arrival. The study constructs a high-frequency panel of U.S. large-cap equities, aligning intraday abnormal net order flow

and liquidity metrics to the release day, and partitions the trading session into fine-grained intervals (1-minute and 20-minute blocks) to identify when and where information is impounded. To isolate genuine disclosure effects from firm characteristics or recurring liquidity cycles, two placebo tests are employed. The “random-score” design permutes firms’ scores while preserving timing (breaking the firm–score link), and the “random-date” design preserves scores but randomizes disclosure dates (breaking timing synchronization). Together, these test whether any intraday pattern stems from synchronized, credible disclosure rather than background noise. Results show rapid capital reallocation within minutes: abnormal buying pressure is minimal or slightly negative at the open, flat through midday, then becomes economically and statistically significant in the final trading blocks before the close: consistent with investors delaying execution to the closing auction to exploit imbalance signals. The effect remains robust, controlling for liquidity and volatility, and disappears under both placebo designs; over multi-day horizons, little to no systematic drift emerges, aligning with semi-strong efficiency in which public signals are digested primarily through within-day order flow and depth rather than through prolonged post-event drift. By moving from day-level to trading-clock resolution, it isolates where within the session climate information is actually impounded and separates opening noise from pre-close rebalancing dynamics. By aligning minute-level flows with CDP’s strict embargo window and exploiting the closing-auction microstructure, the article closes a key empirical gap in understanding how, when, and through which microstructure channels climate transparency influences capital allocation within the day.

Vincent Jiang

Discipline: Engineering

Authors:

Abstract Name: Predictive Scour Analysis for Seasonal Flooding in the Sahel: Mitigating Climate and Humanitarian Risk

In response to the global rise in extreme weather driven by climate change, this study develops a predictive hydrological simulation framework for the Sudanese Nile Basin of the Sahel region. The region faces escalating threats from increasingly destructive seasonal flooding of the White and Blue Nile rivers, such as scouring endangering vital infrastructure. The primary objective is to obtain bridge scour results for the White Nile Bridge, Halfaya Bridge, and critically, the Al-Manshiya Bridge. The Al-Manshiya bridge had collapsed due to excessive scouring from the Blue Nile river and thus became a popular interest of study for scour analysis. With previous research from other studies to cross-referenced the scour analysis from HEC-RAS, the author develops a predictive simulation framework using HEC-HMS and HEC-RAS to model scouring for key local bridges such as Al-Manshiya’s neighboring White Nile Bridge, and the Halfaya Bridge downstream that takes both the White Nile river’s gradual flow and Blue Nile river’s rapid flow. The critical depths are also predicted by the software and confirmed with calculations to be considered for future hydraulic structure designs. The findings offer actionable data designed to enhance regional early warning systems for extreme hydrological events. This data will directly guide the necessary climate-resilient design for hydraulic structures within the vulnerable Nile Basin, thereby minimizing future infrastructure loss and improving regional resilience.

Valeria Jimenez-Garcia

Discipline: Biology

Authors:

Ally Schwennesen

Abstract Name: Apical-Out Lung Organoids: A Platform for Spaceflight and CF Research

A genetic condition known as cystic fibrosis (CF) is brought on by mutations in the CFTR gene, which results in chronic lung inflammation and impaired chloride ion transport. CF bronchial epithelial cells enable direct comparison of disease pathology, while normal human bronchial epithelial (NHBE) cells offer an essential model for researching airway physiology. Realistic modeling of respiratory tissue and its reaction to environmental stressors like microgravity is made possible by the creation of 3D lung organoids from these cells. In this project, we developed apical-out organoids, which expose the apical surface of epithelial cells to the external environment. These organoids offer a powerful platform for studying host–pathogen interactions, mucociliary clearance, and drug response in a physiologically relevant orientation. This configuration closely mimics the in vivo airway environment and enables dynamic modeling of how external stimuli affect airway surfaces. The objective of this project is to identify the differences in structure, development, and function between NHBE and CF lung organoids, as well as how microgravity changes their shape, differentiation, and gene expression. NHBE and CF cells were cultured to primary human bronchial epithelial cells. Brightfield microscopy at 4X and 10X magnification was used to observe morphological changes at several time points during differentiation. To assess cellular organization, organoid types will be tested under altered gravitational conditions. Early organoid formation is successful by Day 4, and epithelial structures are more defined by Day 6, according to preliminary observations. We anticipate that CF lung organoids will exhibit more structural and functional abnormalities when exposed to microgravity. In addition to advancing our understanding of CF pathophysiology, understanding how bronchial epithelial cells react to microgravity is crucial to maintain astronauts' respiratory health during prolonged space travel.

Timothy Jo

Discipline: Business

Authors:

#1 Timothy Jo

#2 Tarique Hossain

Abstract Name: Consumers and the Machine: Effects of Human Input in AI-Personalized Recommendations

AI-powered recommenders now shape discovery and choice in streaming and e-commerce, yet consumers differ sharply in how they perceive and use them. Prior literature explores how AI-powered recommendations can be optimized for consumers, with some of the main factors being trust, transparency, and accuracy. Research also indicates that the product type heavily influences how consumers perceive and interact with AI-powered recommendations, with material goods AI recommendations perceived as more trustworthy compared to experiential product AI recommendations. We examine (1) how to improve AI recommendations with experiential products, (2) whether the addition of human input increases trust, perceived usefulness, purchase intention, and (3) the impact of individual preferences on consumer perceptions of AI-powered recommendations. We use a one-way factorial design in an A/B test with two AI-powered recommendation concept design variations. Participants will be randomly assigned to two levels: (1) a basic AI-powered recommendation for an experiential product or (2) a copy of the first design with the addition of human input, such as human reviews. Outcomes include trust, perceived usefulness, and purchase intention, with covariates including familiarity with AI, adoption, and product-related preferences. Findings from this experiment will explore how different types of recommendations can be further optimized for consumer decision-making and highlight the importance of adding human input to AI systems.

Jerry Johns

Discipline: Physics and Astronomy

Authors:

#1 Kaelyn Leake

Kelly Cyrus

Abstract Name: Developing Classroom-Ready Cloud Chambers for Observing Charged Particle Tracks

This project investigates the feasibility of constructing cloud chambers of multiple scales, ranging from compact dry-ice diffusion systems to a larger 55-gallon demonstration chamber, to create stable supersaturated environments for visualizing ionizing radiation. Both designs use alcohol vapor saturation and controlled cooling to generate conditions in which charged particles form condensation trails. In the smaller chamber, a temperature of approximately -35°C produced a relative humidity near 200% within the bottom 1in–3in, enabling consistent cloud formation after about ten minutes of setup. Ionized particle tracks and curvature in a 0.5mT magnetic field were observable. The larger chamber focuses on improved temperature regulation, sustained vapor saturation, and optimized illumination to support repeatable classroom demonstrations. Limitations include the quality of environmental sealing and sensitivity to ambient temperature. Together, these designs demonstrate scalable methods for producing reliable, quantitative particle-track visualizations useful for physics and atmospheric science education in laboratory settings.

Kristan Johnson

Discipline: Biology

Authors:

#1 Indu Sharma

#2 Shawn Dash

Brooklynn-Lear Norman

Jordyn Mitchell

Abstract Name: Genomic Analysis of Cold-Adapted *Sulfitobacter pontiacus* from Antarctica

The Antarctic region is described as a frigid, oligotrophic environment. During a November 2009 expedition, phytoplankton were observed in the bottom 5 cm of the sea ice cores collected from Ross Sea, McMurdo Sound Station, Antarctica. This study focuses on understanding which type of heterotrophic bacteria are associated with these algae/phytoplankton and whether they have the genomic capacity to utilize these carbon sources. To test this, we used an enrichment culture approach using laminarin and cellobiose as the sole carbon source. The resulting microbial growth was serially diluted and plated on seawater-complete media (SWC), from which four well-isolated colonies (01DW25, 04NG25, 01KJ25, and 01JM25) were selected for pure culture. The 16S rRNA gene was amplified and sequenced. The phylogenomic analysis identified these isolates as *Sulfitobacter pontiacus*. Growth rate estimates on SWC and defined media showed that these isolates did not utilize beta-glucan, suggesting that other microbes had broken down algal polysaccharides into oligo- and monosaccharides (public goods) before isolation. Whole-genome shotgun sequencing and comparative genomic analysis with ANVIO confirmed that the Average Nucleotide Identity (ANI) between the *S. pontiacus* isolates and their closest relative, *S. pontiacus* (GCF_022788675.1), is 97.9%. CAZyme screening showed 22 glycoside hydrolase genes and 37 glycosyltransferase genes. These findings suggest that these psychrotrophic strains have the capacity to break down complex carbohydrates and adopted an energy-conserving strategy called carbon catabolite repression in the lab, which implies that these isolates represent a cheating strain of *S. pontiacus* that likely uses cross-feeding to sustain itself within Antarctic microbial communities, given the inherent costs of resource acquisition in a cold, oligotrophic environment. Future proteomic analyses will investigate specific proteins involved in carbon utilization and environmental responsiveness.

Marissa Johnson

Discipline: Art History

Authors:

Abstract Name: The Influential Design Philosophy of Alan Fletcher

This paper offers a study of Alan Fletcher's design philosophy of using the world around him as inspiration for design, as well as his tendency to involve humor and playfulness into his work. It goes in depth on the art of observation and gives examples of various projects that he completed that embody that philosophy of his. It discusses the influence that Fletcher left that led to him being described by many as one of the most influential designers of his time, and even being called "The British Father of Graphic Design." This paper discusses his upbringing and education, both in the UK and the United States, as well as his major design partnerships such as Fletcher/Forbes/Gill and Pentagram. The paper uses his book, *The Art of Looking Sideways*, as a unique perspective for understanding Alan Fletcher's influential design philosophies. The book is wide mix of quotations, imagery, wordplay, and puzzles that all come together to portray the way that Fletcher approached projects in both his personal and his professional life. The paper gives an account of his accolades and awards in graphic design and discusses all the organizations that he participated in or founded/co-founded. The review suggests that the influence that Alan Fletcher holds over the graphic design community is not only due to his recognizable projects and logos, but also to his overall attitude towards design and the design process. It argues that his design and life philosophies of observation and humor set a standard for modern designers to follow, and to truly live a life of design.

Leah Johnson

Discipline: Psychology

Authors:

#1 Christina Zahorik

Elena Popovic

Samantha Desantis

Abstract Name: The Power of Patience: Delayed Gratification and Regret

Regret research highlights how individuals evaluate their decisions after negative outcomes occur, whether due to an action or inaction. Traditionally, the "action effect" suggested that failed actions elicit stronger regret than inactions (Kahneman & Tversky, 1982). Later findings challenged this view, showing that inaction regrets become more salient over time (Beike et al., 2009; Gilovich & Medvec, 1995). This shift suggests that the temporal dimension of regret—and the ability to manage emotions over time—plays a meaningful role in how people interpret their choices. Delayed gratification offers a useful lens for understanding this dynamic. Mischel's (1989) classic marshmallow paradigm demonstrated that individuals who can postpone immediate rewards in favor of later benefits tend to experience better long-term outcomes, including stronger emotional regulation and greater resilience. These findings point to the idea that difficulty delaying gratification may contribute to later regret: decisions made impulsively for immediate gain may lead to unfavorable outcomes that people come to regret more intensely. Decision-making involves navigating tension between short-term satisfaction and long-term consequences. Individuals who choose immediate pleasure may regret those actions when outcomes fail to meet expectations, while those who delay gratification may regret missed opportunities for enjoyment. This duality illustrates that both actions and

inactions can produce regret, depending on the perceived value of the alternative. Understanding how delayed gratification interacts with regret offers insight into everyday decision patterns. People routinely face situations that require balancing impulse and patience, and their choices shape both emotional experiences and long-term satisfaction. Examining these processes helps explain why individuals sometimes make choices that conflict with their future goals and how practicing self-regulation can reduce later rumination. Ultimately, exploring the connection between delayed gratification and regret deepens our understanding of motivation and decision-making. Recognizing these patterns may help individuals cultivate patience, emotional resilience, and make decisions aligned with long-term well-being.

Adrianna Johnson

Discipline: Art History

Authors:

#1 Teresa Pac

Abstract Name: Two-Spirit Identity in a Colonized North America

This study examines the identity of Two-Spirit Indigenous people in contemporary North American society. The aim of this study is to show how the Western idea of binaries is not a set rule and highlight the ways in which Indigenous Americans previously had a fluid perception of gender and sexuality within their communities. Contemporary Indigenous Americans have labeled themselves Two-Spirit in order to reclaim the knowledge and culture of their ancestors. The history of Two-Spirit people in pre-colonial Indigenous communities will be a focus of the introduction in order to emphasize the roles these individuals held in their respective communities. In addition, the diminishment and erasure of their importance by European colonizers in their recordings of history will also be discussed. In order to show the importance that culture has in our perceptions of gender, the works of the Indigenous Canadian artist Kent Monkman and the historical American artist George Catlin will be examined to see the history and biases that influence our understandings of gender. The study of the intersectionality of queer people within different communities is important to challenge the ideas that are used to exclude and harm people in contemporary society.

Adrianna Johnson

Discipline: Visual Arts

Authors:

Abstract Name: Madonna: A Representation of Gender Dysphoria

My painting "Madonna" is a visual culmination of the thoughts and feelings I experience about my gender when menstruating. As a nonbinary person, I often feel like my body is betraying me when going through this biological cycle. It can feel like my body is bared open to the world, my biology dictating who I am and how people view me. I wanted to explore the differences in the feelings I have about myself compared to my expectations of how other people view me. I looked at works and artists of the High Renaissance period to convey the sense of idealism present in this period of art. I used the iconographies present in historical paintings of the Madonna to show the idea of femininity that I am disconnected from. I referenced various paintings depicting angels from the Bible to express an androgynous appearance. The figure in my painting is displayed nude in a way that looks forced to contrast with the overall beauty of the image. The painting is done in oil on canvas to achieve the realism achieved in Renaissance paintings. The contrast between the beauty of the piece and the violent feeling of the figure menstruating works well together, and I hope to further the negative feelings by emphasizing the lack of autonomy through physically restraining the body. Gender is a central aspect of my life, and my art is a place for me to depict and talk about my experiences and who I am because of them.

Alicia Johnson

Discipline: Nursing and Public Health

Authors:
#1 Alicia Johnson

Abstract Name: Systematic Review of Intervention Strategies Implemented for Developing Academic and Professional Writing Skills of Healthcare Students

Academic writing is a critical skill needed by all healthcare students. Healthcare professionals will share their research with their supervisors, other residents, and chair members of the department they're undertaking. Healthcare professionals will frequently uphold leadership roles, with a critical focus on contributing to the science of their professions. Being able to write advanced articles will help not only for their publications, but their professional career. This review was written to provide a summary of articles aimed to strengthen the overall skills of healthcare students, and identify knowledge gaps limiting student's access to academic guidance. The PubMed database was used to find three of the studies included. The VCU Cabel Library Web of Science database was used to find six of the studies. Google Scholar was used to identify one study. The last searched article was found on Nov. 6, 2025. The methods used to synthesize results included meta-analysis, descriptive statistics, thematic analysis, and conceptual models. The data was presented using tables, narrative summaries, interviews, and surveys. There are 10 studies included in this review and a total of 1,036 Participants. Participants were scouted by interviewing and identifying students at medical and nursing colleges who were deemed at-risk, by looking into their background, GPA, MCAT scores, NCLEX scores, publication rates of the university for specific groups (i.e., graduate, and nursing students), and undergraduate transcripts. The study with the most effective intervention was conducted with 159 participants who participated in a Publication Mentorship Program Curriculum. Of the 159 total participants, 84% reported being likely to write to publish in the future, and 96% reported improvements in their writing skills due to the program. The main limitations seen in most studies were delivering meaningful feedback in an adequate timeframe to all participants, given the substantial amount of writing to review.

Kelly Johnson

Discipline: Psychology

Authors:
#1 Nathan George

Abstract Name: Exploring Cognition Through NYT Games

Prior research has shown that participating in cognitive games has the ability to improve cognition and delay one's cognitive decline. Solo games such as crosswords have long been played analogically, and can be played digitally. Murphy et al. (2016) suggest that short focused puzzle activities can improve specific types of verbal fluency. While there are articles released on New York Time's crosswords in the media, there is little academic research examining the actual impact on cognition. This correlational study aims to explore the relationship of someone who plays New York Time's games and their lexical fluency scores. Participants, between the ages of 30 to 60, will be asked to self-report their game playing habits in a series of questions and complete three short timed lexical fluency tasks. It is expected that results will be positively correlated with participants who report frequent game play having higher lexical fluency scores. The findings are anticipated to contribute to growing discussions of New York Time's games and cognition. Furthermore, while causal conclusions may not be drawn, the study highlights that word game play may have links to cognitive functioning worth exploring with larger longitudinal studies.

Lyric Johnson

Discipline: Criminology/Criminal Justice

Authors:

Abstract Name: The Price of Freedom: America's Privatization of Bodies and Mass Incarceration, a Historical Analysis

The climbing rates of incarceration of Black and low-income individuals are an issue in America. Labor is the backbone of any functioning society, and America has been through many forms of labor to sustain its economy. From using slaves to complete quotas to leasing convicts to develop an area, labor has been a tool used for capitalism to thrive. Labor and incarceration rates may seem like a hard line to connect; however, what if they are one in the same? Race and class find their way into many discussions, especially in politics and the social justice sphere; however, the main issue may stem from the need to supply cheap labor to keep the economy thriving. This project aims to explore the connection between the privatization of labor and how it has aided in the mass incarceration of minority communities. These communities may be disproportionately represented in prisons because of the 'War on Drugs' and minimum sentencing. Black Codes and the Anti-Drug Act may have more in common than originally thought. America demonized blackness and tried its best to wipe it from society; similarly, this can be seen now with drug users and traffickers. Demonizing a certain population can make it easier for people to justify the high rates of incarceration, allowing for private entities to continue to make money without scrutiny or pushback. Privatization in this project will refer to the capitalistic structure and how exploitative labor is the backbone of a capitalistic society. This project will dissect how this capitalistic structure is sustaining the modern Prison Industrial Complex. By finding the line between the privatization of labor/ bodies and the mass incarceration issue, we may be able to find a deeper systemic issue harming minority communities.

Alexis Johnson

Discipline: Environmental Science and Sustainability

Authors:

#1 Paul Block

#2 Emma Balckford

Abstract Name: Integrating Machine Learning for Improved Seasonal Forecasting of Coldwater Fish Habitat Stress

Freshwater lakes across the Upper Midwest are experiencing increasing summer warming, which creates stressful low-oxygen and high-temperature conditions for coldwater fish species such as cisco. Managers require reliable seasonal forecasts of this habitat stress, but existing models often rely on linear assumptions that fail to capture the complexity of climate-lake interactions. This study evaluates whether advanced machine learning techniques can significantly improve predictions of Cumulative Viable Habitat Thickness (CVHT), a key metric of coldwater habitat availability. Using a 42-year dataset (1981–2022) of climate teleconnections and in-lake spring conditions, I benchmarked two machine learning models, including Random Forest and Extreme Gradient Boosting (XGBoost), against the established Principal Component Regression (PCR) baseline. Models were trained using leave-one-year-out cross-validation and evaluated with deterministic metrics (R^2 , RMSE) and the probabilistic Ranked Probability Skill Score (RPSS), which measures model skill across the full distribution of Below-Normal, Normal, or Above-Normal habitat years. Across all five study lakes in Northern Wisconsin, XGBoost consistently produced the strongest predictions. In Big Muskee Lake, XGBoost nearly tripled the PCR baseline accuracy (R^2 increasing from ~ 0.28 to ~ 0.68) and achieved substantially higher probabilistic skill (RPSS ≈ 0.77). Similar predictive gains appeared across the other four lakes, demonstrating that the model generalizes well across different lake types. These findings show that climate-driven habitat stress contains non-linear patterns that modern

machine learning methods can capture more effectively than traditional approaches. This project demonstrates a clear path for advancing ecological forecasting by integrating machine learning with seasonal climate information. The results provide a foundation for developing a future decision-support tool that helps fisheries managers anticipate habitat stress, communicate uncertainty, and plan adaptive, climate-resilient management strategies.

Brianna Johnson

Discipline: Political Science

Authors:

#1 Brianna Johnson

Abstract Name: A Nuclear Crossroads: South Korea's Nuclear Stance and the Factors that Shape it

South Korea represents a standard case of latent nuclear power, where nuclear development is constrained by choice rather than capability. In the past, Seoul's rhetoric surrounding nuclear capabilities has ranged from endorsement of a domestic nuclear program to a staunch commitment to nonproliferation. These shifts are shaped by both foreign and domestic factors that reflect Seoul's broader strategic calculations. Through comparative case studies of three key periods in South Korea's nuclear rhetoric, this paper analyzes the main factors that influence the official stance on nuclear development. The first case covers early attempts at nuclear development in the 1970s with Project 890 after the Korean War. The second analyzes the transparency approach of the Roh administration (2003-2007), and its commitment to nonproliferation and the denuclearization of the Korean Peninsula. Finally, case three focuses on the transition from the Moon to the Yoon administrations (2016-2023), identifying the factors that contributed to the reemergence of nuclear discourse. This paper argues that no single factor consistently drives South Korea's nuclear stance. Instead, the nuclear rhetoric is shaped by the combination of global cooperation initiatives, regional tensions with North Korea, international conflicts, domestic politics, and the priorities of the ruling administration. This analysis moves beyond the predominantly US-centric narrative to highlight the broader range of influences affecting Seoul's nuclear discourse. The paper finds that nuclear rhetoric is used as a multi-faceted tool, reflecting both domestic political objectives and strategic responses to a shifting international order. By refining the factors that shape nuclear rhetoric into a trend, future shifts in this policy can be better understood.

Jake Johnson

Discipline: English and Literature

Authors:

#1 Jake Johnson

Abstract Name: Knives and Normativity: The Self Repression of Peter Walsh in Virginia Woolf's Mrs. Dalloway

In Virginia Woolf's novel, *Mrs. Dalloway*, Peter Walsh can be read as a symbol of patriarchal norms. Feminist researcher and analyst Emel Zorluoglu, argued that, "it is obvious that [Peter] is proud to be a member of and acclaims patriarchy" (78). She, among other academics, suggests that Peter acts as a masculine, imperialist foil to the subversive opposition of Clarissa Dalloway. In this paper, I suggest that this analysis removes him from Woolf's broader conception of the novel and mischaracterizes the relationship between gender, empire, and identity in *Mrs. Dalloway*. I argue that Peter Walsh's insistence on a normative understanding of his own

gendered perspective is detrimental to himself and those around him, and that Peter's view of this perspective is far more ambivalent than Zorluoglu and others acknowledge. For Peter, this understanding can be understood as a set of rules which insist on adherence to the socially normative understanding of masculinity, sexuality, and adherence to values of the British Empire. Peter's insistence on fitting himself into this model is detrimental to his emotions and relationships, preventing him from questioning himself or making platonic friendships. Every time he confronts the incongruence between his internal self and the self he feels pressure to be by this insistence, he fidgets with his pocket knife. This knife is representative of his masculinity and his habit of fidgeting with it is representative of the moments in which he insists on clinging to it, whether this is helpful or harmful, despite his ambivalence. This research project concludes by examining the eventual genuine confrontation with his internal self provoked through his conversation with Sally Seton at Clarissa Dalloway's dinner party. There, through dialogical exchange, Peter's emotions are able to emerge free of the normative model and he is finally able to perceive Clarissa without social impediment.

Kyra Johnson

Discipline: Psychology

Authors:

#1 Heather Kissel

Audrey Thompson

Abstract Name: Psychophysiological and Self-Reported Reactions to Sensory Stimuli in Neurotypical vs. ASD Young Adults

Sensory processing difficulties affect up to 95% of individuals with autism and can significantly impact daily life. These challenges include hyper-reactivity—such as extreme sensitivity to noise, touch, or movement—and hyporeactivity, where individuals may be less aware of sensory input. Such issues can worsen social communication deficits, increase repetitive behaviors, and impair motor control. While the exact mechanisms are unclear, addressing sensory issues may lead to broad improvements in social, behavioral, and educational domains. The current study examines the question: "How do psychophysiological responses and self-reported reactions to sensory stimuli differ between individuals with autism spectrum disorder (ASD) and neurotypical controls?" This project uses a quasiexperimental design to examine these differences. Participants first completed a Sensory Hypersensitivity Survey and the Autism Spectrum Quotient (AQ, a scale of level of ASD traits) and those with scores in the neurotypical range and high levels of ASD traits on the AQ were invited to a laboratory session. During the session, physiological measures, including heart rate and skin conductance responses (SCR), were recorded using an electrocardiogram (ECG) and skin conductance sensors. Following a five-minute baseline, participants were exposed to visual (flashing strobe lights), tactile (makeup brush on the palm), and auditory (vacuum sound) stimuli, each presented for two minutes, with one-minute rest intervals. After each stimulus, participants self-reported their discomfort with each sensory experience on a 1-5 Likert scale. Data collection is ongoing and results of our MANOVA comparing the physiological responses and subjective discomfort ratings between groups will be presented. We hypothesize that participants with high ASD traits will demonstrate hyper-reactivity in physiological responses across sensory modalities relative to neurotypical controls. This research can be implemented into classrooms to aid the learning environment of both ASD and neurotypical individuals by providing them with a space that is low stress on the sensory processing system.

Demetrice Johnson

Discipline: Psychology

Authors:

Abstract Name: Lost in the Letters: How Students with Dyslexia and ADD/ADHD Navigate College Challenges

Across higher education, many neurodivergent students continue to experience barriers related to academic engagement, retention, and performance, even when disability services are available. These challenges reflect broader national patterns in how colleges support students with learning differences such as dyslexia and ADD/ADHD. This study examines these issues within the context of a midsize public university, the University of Central Oklahoma (UCO), to better understand how neurodivergent students navigate academic demands and utilize available institutional resources. Using mixed-methods design, including surveys, interviews, and observational data, the study explores differences in academic challenges, executive-function demands, resource use, and perceived support across key neurodivergent groups. Rather than evaluating UCO as an institution, the research uses it as a case study to illuminate trends widely reported at colleges and universities nationwide. Preliminary findings indicate that students benefit from structured learning tools, peer support, and early academic intervention, yet many still report unmet needs related to sustained attention, processing demands, and communication about accommodations. These insights highlight areas where universities, broadly, may strengthen existing practices. The study's goal is not to criticize a single institution but to contribute evidence-based recommendations relevant across higher education. Ultimately, this work aims to inform campus policies, guide resource allocation, and promote inclusive learning environments that support persistence and equitable academic success for neurodivergent students. By identifying both strengths and gaps in current approaches, this research contributes to a growing national conversation on how to better meet the needs of students with diverse cognitive and learning profiles.

Ellis Johnson

Discipline: Engineering

Authors:

#1 Cody Scarborough

Abstract Name: Design Procedure for RF Spot-Focused Lenses with Low-Cost Materials

In this presentation, a design procedure for a low-cost spot-focusing lens at RF frequencies (K-band) is reported. The lens is fabricated from standard acrylic stock as opposed to more expensive RF materials such as Rexolite. The design is compatible with a measurement system to characterize anisotropic engineered materials (metamaterials). Such materials can be characterized by their response to electromagnetic (EM) beams at several angles. The measurement system requires a Gaussian beam profile with a spot size on the order of 10 wavelengths. Since most commercial Gaussian beam launchers are designed to create a small spot size (around one wavelength), a custom lens must be designed and fabricated. To maintain a low cost and short lead-time, this work explores a procedure for designing lenses with readily available acrylic. The reported procedure includes: (i) the electromagnetic characterization of readily available acrylic samples; (ii) an analytical initial lens design based on the material measurements and simple optical expressions; (iii) an optimization of the lens in a full-wave physical-optics solver; (iv) a g-code synthesis method compatible with a low-cost (\$600) hobbyist CNC machine; (v) a near-field measurement to validate the lens response. Key measured electromagnetic features such as the realized focal length and the spot radius will be reported. This work supports the hypothesis that an EM beam with a highly Gaussian profile can be produced with low-cost materials and fabrication technology. Starting with an optical design for a lens, further full-wave simulations can be done to account for the beam-spreading inherent to Gaussian beams. The reported procedure is straightforward, with all steps of the design and prototyping carried out in-house.

Taylor Johnson

Discipline: Health and Human Development

Authors:

Abstract Name: Examining Nutrition and Physical Activity Behaviors Among Students at a Southern Urban HBCU

Overweight and obesity among college students represent a significant global health concern, with research indicating that students attending Historically Black Colleges and Universities (HBCUs) are disproportionately affected. Elevated rates of overweight and obesity in this population are often associated with insufficient fruit and vegetable consumption, high intake of energy-dense foods and sugar-sweetened beverages, and low levels of physical activity. This study examines findings from the American College Health Association (ACHA) survey administered in Spring 2025 at a southern, urban HBCU in North Carolina. Data were collected from over 400 undergraduate students, representing a 10% response rate, who completed an online questionnaire distributed via email. The survey included items related to eating habits, physical activity, lifestyle factors, dietary beliefs, nutritional behaviors, and other health-related practices. Responses were analyzed to identify patterns and trends in student nutrition and physical activity behaviors. The results offer valuable insight into health practices among HBCU students and highlight the need for targeted, culturally relevant interventions. Such strategies are essential to support student well-being, promote academic success, and reduce long-standing health disparities that disproportionately affect this population.

Maggie Johnson

Discipline: Biology

Authors:

#1 Isabella Muratore

Abstract Name: Environmental Influence on the Spatial Distribution of Resources in Pavement Ant Colonies

The spatial placement of the queen and brood within an ant nest is critical to colony survival and reproductive success as typical social organization in ants involves one fertile queen and many sterile workers who care for the brood. Our experiment examines how sudden changes in humidity and lighting influence brood-placement decisions within the nest of *Tetramorium immigrans*. 3D printed modular hexagonal chambers were arranged into an interconnected artificial nest. Each chamber contains a lower reservoir separated from an upper living area via wire mesh. This reservoir held either a damp cotton ball or desiccant beads. Study colonies were provided access to two dry chambers and two wet chambers, which were assigned initial identities, and then were switched after a week to test whether the ants' preference for humidity levels would override scent-based environmental history. A camera and ring light were set up to take photographs of the colony every thirty minutes for one week. Interpretation of the photographic data from initial experiments aligned with our hypothesis that the pavement ants would actively exert a preference for a humid environment to store their brood. We further investigated the influence of light on brood-placement decisions by covering the clear acrylic lid of two of the chambers with red acetate sheets to simulate a dark environment, hypothesizing that the ants will prefer the dark chambers for queen and brood placement. Understanding the preferences that factor into collective decision-making for spatial usage within the ant colonies has the potential to inform policymakers and computer models that manage human disaster responses where vital resources must be rapidly and reliably protected.

Alana Johnson

Discipline: Biology

Authors:

#1 Allyson E. Sgro

#2 John F. Durel

Abstract Name: Coordinated Particle Transport During Development of a Soil-Dwelling Microbe

In response to food scarcity, the soil-dwelling social amoeba *Dictyostelium discoideum* undergoes a developmental transition from a unicellular organism to a multicellular organism, aggregating to form fruiting body structures that are crucial for survival. These cells possess a non-specific adhesive capacity that not only allows them to adhere to each other during aggregation, but also to particles in their environment, allowing for the manipulation of their physical environment. The ability of cells to selectively adhere to neighbors while potentially also remodeling surrounding materials represents a critical but understudied aspect of multicellular development. To investigate whether cells systematically remodel their microenvironment during the unicellular-to-multicellular transition, we designed experiments that allowed us to visualize coordinated motility and aggregation behavior in the presence of fluorescent microbeads simulating soil particles. Specifically, we performed time-lapse imaging using spinning disk confocal microscopy and transmitted light microscopy of starved cells undergoing the full developmental process. The key new result we observed is that beads become attached to cells transiently during early aggregation and are carried with groups of cells as they aggregate, but the beads are not included in the multicellular structure as it continues to develop. Our work has revealed a previously unknown way soil-dwelling organisms tune their interactions with the environment over time. We anticipate further experimental work and computational analysis will uncover differences in adhesion and coordination specific to each stage of development that control this phenomenon. Understanding how cells potentially tune adhesion to carry particles sheds light on the many ways organisms have evolved to interact with and survive in diverse environments.

Haley Johnson

Discipline: Psychology

Authors:

#1 Anne-Marie Iselin

Abstract Name: Exploring Depressive Rumination and Depressive Symptoms Among Adolescents from Three Countries

This study examined the association between depressive rumination (i.e., the repetition of negative thinking about oneself or one's circumstance) and depressive symptoms among adolescents from three culturally distinct countries: Colombia, Italy, and the United States. We also examined the relation of depressive symptoms and rumination with societal beliefs (i.e., individualism, uncertainty avoidance, and indulgence from Hofstede's Cultural Dimensions). Participants included 540 mother-child dyads (Youth Mage = 12.50 years; 50% females) representing six subgroups: Colombian, Napoletano, Roman, White, Black, and Latinx. Depressive rumination and depressive symptoms were significantly and positively correlated across all six subgroups ($r_s = 0.52$ to 0.69 , $p_s \leq 0.001$) and gender ($r_{boys} = 0.52$, $r_{girls} = 0.63$, $p_s \leq 0.001$). Depressive rumination was not significantly related to any of the three societal beliefs. Depressive symptoms were significantly and positively correlated with uncertainty avoidance ($r = 0.12$, $p \leq 0.01$) and significantly and negatively correlated with individualism ($r = -0.12$, $p \leq 0.01$). Indulgence was not significantly related to depressive symptoms. Our findings advance understanding of how depressive processes may be partially

shaped by culture and gender among adolescents from three distinct countries with different value orientation. Through this, future pathways of prevention could be considered to further benefit the development of youth.

Matthew Johnson

Discipline: Education

Authors:

#1 Matthew Johnson

Abstract Name: Shifting the Reading Experience to Engage Middle School Students

Over recent years, middle school literacy rates have declined, raising concerns about how traditional reading instruction fails to engage students who see reading as a chore. This research explores how to re-engage middle school students with reading in an authentic manner. By examining multimodal formats, including graphic novels, hybrid texts, and expressive writing, this study explores the cognitive, emotional, and behavioral benefits that different reading experiences provide. Drawing on neuroscience and Social-Emotional Learning (SEL), the research synthesizes findings from recent studies to identify which formats most engage adolescent readers. The goal is to highlight how these formats support the benefits of reading such as emotional regulation, identity development, and academic resilience, to point out the personal gains from reading. The study offers a framework for implementing innovative reading interventions in middle school settings to reshape reading environments to not only provide knowledge but also invite emotional development and cognitive growth. Ultimately, my study lays the groundwork for designing inclusive literacy interventions that help students see reading as personally meaningful, not just another assignment.

Kahlea Johnson

Discipline: Biology

Authors:

#1 Glenn Rowe

Abstract Name: Investigating Hypoxia-Induced Mitochondrial Gene Changes in Cultured Myotubes.

Mitochondria are dynamic organelles responsible for producing the energy needed by cells and are able to respond to physiological and pathological changes by fission, fusion, transport, and mitophagy. An imbalance of these processes leads to a range of diseases including diabetes and cardiovascular disease. Studying the pathways that target mitochondrial dynamics is crucial to identifying potential treatment opportunities like hypoxia. One pathway that has been identified as a negative regulator of mitochondrial function is hypoxia or low oxygen. Hypoxia induces the stability of the hypoxia-induced factor 1alpha (HIF-1a) transcription factor which controls a variety of genes. These targets when expressed, these target genes increase glucose transporters, glycolytic enzymes, and mitochondrial density via biogenesis in skeletal muscle. This increase in mitochondrial density generally causes fiber type switching in skeletal muscle from fast twitch to slow twitch fibers. Also, these hypoxia conditions cause a switch from OXPHOS to glycolysis to generate energy with a lack of oxygen. An increase in slow twitch fibers accompanied by an increase in GLUT 4 expression may improve insulin sensitivity. This increase in Glut4 expression can occur under hypoxic conditions due to the known subsequent increase of PGC1- α expression. Therefore, this project's goal is to determine if stabilizing HIF- α in skeletal muscle treats the mitochondrial dysfunction hallmarked by insulin resistance. We will utilize C2C12 myoblast differentiated them into myotubes treated with DMOG a hypoxia mimetic and test how mitochondrial function is affected by an increased accumulation of HIF1-a over a 10-hour period. We

will run a qPCR to figure out if the HIF1- α and glycolysis target genes expression has been altered. Then we will perform a Seahorse Mito stress test to measure mitochondrial function in the cells. We expect to see an increased expression of target genes and a higher rate of glycolysis in the cells.

Marina Jokanovic

Discipline: Art History

Authors:

Abstract Name: *Liberté, Antiquité, Publicité: How Jacques-Louis David's Neoclassical Approach to Painting Shaped History*

This thesis investigates how the art of Jacques-Louis David (1748–1825), the leading Neoclassical painter of Revolutionary and Napoleonic France, utilized classical ideals to document history and shape public perception. Primarily building on the scholarship of Dr. Dorothy Johnson, this study explores how David redefined history paintings - a genre of painting which depicts scenes from history, mythology, religion, or literature with a moral purpose. By incorporating Ancient Greek and Roman art conventions and beauty standards, David both elevated contemporary figures and events and made moral lessons from the past relevant to his time. His strategic use of straight lines, geometric shapes, and symmetry as well as archeologically accurate depictions of ancient settings and clothing not only cast events of his time in a heroic and monumental light but also shaped collective memory of Classical Greece and Rome. By applying a detailed visual analysis of his major works including *The Oath of the Horatii* (1784), *The Death of Socrates* (1787), *The Lictors Bring to Brutus the Bodies of His Sons* (1789), *The Death of Marat* (1793) and others, this research examines how David made use of classical topics and symbolism to connect the past with the contemporary man. Adding to Dr. Johnson's analysis of David's role in Revolutionary propaganda, his pedagogical approach, and his shifting political allegiances, this research positions Jacques-Louis David as both a recorder of history and an architect of its visual and ideological legacy. Ultimately, this thesis demonstrates how David's Neoclassical approach to painting helped define the way historical events and figures were remembered in Western art.

Coleman Jones

Discipline: History

Authors:

Abstract Name: *Never a Statue, Never a Story: The Unheard Tale of Kentucky's Black Civil War Soldiers*

In the spring of 2025, I carried out a research project for a history class that was based around creating a biographical account of the life of a single formerly enslaved member of the USCT (United States Colored Troops) during the American Civil War who was from Lexington, Kentucky. His name was Clifton Young, and based off of a few documents that had gone nearly forgotten by historians and archivists, I was able to bring his story back to the light. This research was primarily carried out by investigations done with wartime service records and soldier registration documents of Kentucky Civil War regiments acquired from the National Archives, as well as historical state and local government documents acquired from the Fayette County Clerk's Office and contemporary texts and personal narratives of the time like famous Kentucky USCT veteran and Baptist reverend Elijah T. Marrs' autobiography as well as Charles Kieker's 1866 historical account of the 116th regiment of the USCT, two documents that were actually the primary inspirations for this initial research. The intended goal of this research is to paint a fuller picture of Black military service in

Kentucky during the American Civil War, to tell a story about the Kentuckian veterans of the USCT and their families that has never been told before.

Paiton Jones

Discipline: Political Science

Authors:

#1 Paiton Jones

Abstract Name: The Threat Multiplier: How Climate Change Accelerates Radicalization in the Middle East

The MENA region, facing high climate vulnerability and chronic instability, creates a significant global security threat. This research models how climate change functions as a “threat multiplier,” not a direct cause of radicalization, by sequentially intensifying critical vulnerabilities. The proposed causal pathway is defined as: climate stress (drought) leading to livelihood collapse/forced migration, and ultimately the erosion of state legitimacy. Non-state actors (NSAs) strategically exploit this governance void by weaponizing resources like water infrastructure and offering economic incentives, which accelerates recruitment among climate-displaced populations. Using comparative case studies of Iraq and Yemen, this proposal will identify geographic “hotspots” where these risks converge, why the risk seems to be higher in the MENA region, and how climate change is increasing radicalization in this region. The key policy argument is that climate adaptation, resource security, and decentralized local governance are the most effective long-term counter-recruitment strategies, offering an empirical model for integrating climate resilience into global security policy.

Morgan Jones

Discipline: Biology

Authors:

#1 Nicole Cabbage

#2 Jaira Ferreira de Vasconcellos

Abstract Name: Optimizing a Novel In Vitro Model of Human Post-Traumatic TGFβ1-Induced Fibrosis

Post-traumatic tissue repair allows for the restoration of the architecture and function of the injured tissue. It involves two independent biological processes: regeneration, where the damaged tissue is partially or entirely restored to its steady state, and replacement, where tissue(s) are repaired by the layering down of connective tissue, a process known as fibrosis. However, a better understanding of the molecular mechanisms underlying post-traumatic fibrosis is still needed. The goal of this study was to optimize a novel in vitro model of human post-traumatic transforming growth factor beta 1 (TGFβ1)-induced fibrosis. Human bone marrow mesenchymal stem cells (BM-MSCs) were cultured in poly-L-lysine (PLL) treated plates, followed by TGFβ1 treatment. Several aspects of the protocol required optimization, including the TGFβ1 concentration [5 ng/mL to 20 ng/mL], PLL concentration [5 mg/mL to 20 mg/mL], and days in culture (1 or 4 days). Statistical analysis was performed using a two-tailed Student’s t-test. Higher concentrations of TGFβ1 treatment for 4 days increased the number of fibrotic nodules observed (Control: 2.4 ± 1.7 , TGFβ1 [5 ng/mL]: 11.1 ± 1.9 , $p=0.05$; TGFβ1 [10 ng/mL]: 17.7 ± 5.4 , $p=0.05$; TGFβ1 [12 ng/mL]: 17.3 ± 15.0 , $p=0.26$; TGFβ1 [15 ng/mL]: 17.6 ± 17.4 , $p=0.30$; TGFβ1 [18 ng/mL]: 25.4 ± 17.9 , $p=0.18$; TGFβ1 [20 ng/mL]: 27.2 ± 13.2 , $p=0.10$). Moreover, higher concentrations of PLL [15 mg/mL and 20 mg/mL] used to treat the cell culture plates before plating the cells, followed by BM-MSCs TGFβ1 treatment [10 ng/mL] for 1 day, showed a trend

towards an increased number of fibrotic nodules compared to the lower PLL-treatment concentrations [5 mg/mL and 10 mg/mL]. Altogether, our results support the notion that our in vitro model may be a useful system for future post-traumatic fibrosis studies. Supported by: NSF BRC-BIO (award # 2334535).

Catherine Jones

Discipline: Geography/Geology

Authors:

#1 Ryan Carter

#2 Catherine Jones

#3 Jackson Williams

Ryan Carter

Jackson Williams

Abstract Name: Modeling the Impacts of COVID-19 and Climate Change on Eastern Thailand's Agricultural Sector by 2030

This study uses modeled scenarios to explore how Thailand's agricultural landscape may evolve due to the combined impacts of the COVID-19 pandemic and climate change on tropical farming. With a direct focus on provinces in Eastern Thailand, where rapid urbanization and climate variability have a direct impact on global food production cycles, the study examines whether the agricultural landscape can return to pre-pandemic conditions by 2030. Stakeholder interview data influenced the input into TerrSet's Land Change Modeler; from this, five land-cover scenarios informed by socio-economic and environmental variables were developed. Transition models developed with machine learning project consistent expansion of urban land into forest and farmland, with no scenario indicating a return to pre-pandemic agricultural extent. Instead, results show that climate change and increased megacity growth around Bangkok and the Eastern Economic Corridor will continue to fragment farmland and challenge the basis of agricultural resilience. The framework developed provides an adaptable quantitative approach for post-crisis land-change prediction and can be generalized across tropical South and Southeast Asia.

Christopher Jones

Discipline: Engineering

Authors:

#1 Lorraine N. Vélez-Torres

#2 Pascal Yamlome

#3 Sarah Hatcher

#4 Nate O'Connell

#5 Ralph B. D'Agostino, Jr

#6 Alexandra Thomas

#7 Jennifer H. Jordan

Abstract Name: Evaluation of the Correlation between Multimodal Cardiovascular Inflammation Imaging Biomarkers in Premenopausal Breast Cancer Patients

Background: As breast cancer survival rates improve, especially among premenopausal women, attention is shifting to long-term cardiovascular health. Cancer therapies can influence cardiovascular function through hormonal disruption, inflammation, and treatment-related vascular injury. Dysregulated epicardial adipose

tissue (EAT) and pericoronary adipose tissue (PCAT) promote an inflammatory environment around the heart and coronary arteries, linking both to coronary artery disease and impaired myocardial function, and may be measured with noninvasive imaging. Aims: To determine the relationship between EAT volume and PCAT volume in premenopausal breast cancer (BC) survivors. Methods: We performed an early interim analysis of premenopausal BC patients from the multisite CROWN study (n=90 to be enrolled) who underwent Cardiovascular Magnetic Resonance (CMR) imaging scans and Coronary Computed Tomography Angiography (CCTA) scans using standardized contrasted protocols. The EAT area was manually segmented, and mass was quantified from CMR scans using CVI42 software; volume was calculated using a fat density of 0.92 g/mL. PCAT volume was quantified from CCTA scans using QAngio CT software and normalized to coronary segment length to derive global length-adjusted PCAT volume. A Pearson correlation was conducted to evaluate the relationship between EAT and PCAT volumes. Results: Our interim analysis included a total of 16 premenopausal patients who recently completed treatment for BC. A positive, moderate correlation between EAT volume and length-adjusted global PCAT volume was observed ($r = 0.40$, $p = 0.12$). Conclusion: This preliminary correlation suggests that higher EAT volume measurements tend to be associated with greater PCAT burden. This interim data highlights the need for a larger sample size to allow adjustment for covariates (e.g., BMI and age) in our full cohort analysis and to validate these multimodality imaging biomarkers with cardiovascular outcomes in cancer survivorship.

Jamira Jones

Discipline: Education

Authors:

#1 Jamira Jones

#2 Alexsandra Valentin

#3 Brianna Bentley

Alexsandra Valentin

Abstract Name: Examining the Impacts of Immersive Learning on Student's Math Anxiety

This study investigates how immersive learning activities influence students' confidence and levels of math anxiety in mathematics courses at a small, private university. The research is situated within ongoing institutional efforts to integrate immersive and active learning experiences across the curriculum, emphasizing applied understanding and reflective engagement during class time. Within the mathematics courses, immersive learning is defined as actively applying knowledge into practice and is implemented through collaborative group work, online learning platforms that offer immediate feedback, and the "Rough Draft Math" approach (Jansen, 2020), which normalizes unfinished solution attempts as part of the learning process. Research has shown that mathematics skill-oriented interventions, which aim to improve math ability through instruction and practice, increased mathematics performance and decreased participants' math anxiety (Liu et al., 2025). Math anxiety can manifest as feelings of tension, apprehension, or fear that interferes with students' mathematics performance (Ashcraft, 2002). Immersive learning can be classified as a mathematics skill-oriented intervention, and has the potential to impact student's math ability and their anxiety and confidence related to mathematics. Grounded in theories of growth mindset (Boaler, 2015) and math anxiety reduction (Liu et al., 2025), the study asks: How do immersive learning strategies, including rough draft math, affect students' confidence and math anxiety in College Algebra and Contemporary Mathematics courses? To address this question, students completed an anonymous survey measuring their math anxiety, confidence in solving mathematical problems, perceptions of immersive learning activities, and reflections on changes in these areas over the semester. Preliminary analysis suggests that immersive learning environments, particularly those emphasizing process over correctness, foster greater student confidence and reduce math anxiety by reframing errors as a natural and productive part of learning. The findings support immersive learning as a mathematics skill-oriented intervention that promotes growth mindset development and enhances students' emotional engagement with mathematics.

Savannah Jones

Discipline: Physics and Astronomy

Authors:

#1 Michael Rodruck

Abstract Name: A Comprehensive Study of Star Clusters in NGC 7320 Using the James Webb Space Telescope and Hubble Space Telescope

We present a study of star clusters in the galaxy NGC 7320, a nearby galaxy ($\sim 45 \times 10^9$ light years away), using archival images from the James Webb Space Telescope (JWST) and the Hubble Space Telescope (HST). Our goal is to find the ages and masses of star clusters within the galaxy. This study expands the knowledge of the formation of low mass clusters, possible due to this galaxy's proximity, the high quality of the archival images, and the wide span of wavelength coverage provided by these images. This was accomplished using photometry to create observational spectral-energy distributions that are compared to theoretical models of star clusters, from which we obtained their ages and masses. We also completed a search for star clusters that do not appear in the HST images by using the infrared capabilities of JWST. Such objects were previously undetected due to the extinction of optical light from gas and dust in the galaxy. We present our results on the ages and masses of these star clusters, shedding light on the low mass regime of star cluster formation.

Mosi Jones

Discipline: Biology

Authors:

#1 Lindsey Winograd

#2 Janie Alonso

#3 Zachary Armstrong

#4 Xhavit Zogaj

#5 Karl Klose

Abstract Name: The Relationship Between Redirected Phage Packaging Protein and KIRK Phage Infection in *Francisella novicida*

Francisella tularensis (Ft) is a Gram-negative coccobacillus that causes Tularemia. It is a category A select agent, and as such it has a low infectious dose and high lethality rate. Currently, there is no approved vaccine in the U.S, increasing the necessity for alternative treatments. Phage therapy is an attractive option for treating diseases such as tularemia, but no bacteriophage able to infect Ft has been identified. We have identified two Phage-inducible chromosomal islands (PICIs) in *F. novicida* (Fn), a model organism for Ft. PICIs are mobile genetic elements that hijack helper phage machinery for their own dissemination. *F. hispaniense* (Fh) is another closely related *Francisella* species that contains a prophage in its genome (KIRK). To develop phage therapy for *Francisella*, we are attempting to understand the interplay between KIRK phage and the PICIs. Fn is unable to be transformed by the recircularized form of KIRK, but Fn lacking PICI-II can be transformed with KIRK. We hypothesize that the redirected phage packaging protein (Rpp) gene within PICI-II may be preventing KIRK infection. We are creating a Fn strain with a rpp knockout to test this hypothesis, as well as a Fn strain lacking PICI-II expressing Rpp from a plasmid. These strains will be tested for KIRK transformation, along with the wildtype and DPICI-II strains, to identify the factor(s) associated with phage hijacking. These studies may lead to novel PICI-based therapeutics against tularemia.

Jenna Jones

Discipline: Biology

Authors:

#1 Olga Lipatova

Joseph Bui

Abstract Name: Sex Hormone Effects on Weight Loss During Food Restriction in Male and Female Rats

Sex hormones are known to be involved in the regulation of appetite, metabolism, and patterns of weight change in mammals. Still, the nature of their relationship is complex and their specific contributions during caloric restriction are not completely understood. To further investigate the relationship between circulating hormones and weight fluctuation, we examined how hormone treatments may influence weight changes in male and female rats on a food-restricted diet. Twenty-four gonadectomized rats were surgically implanted with slow-release hormone capsules containing either estradiol, testosterone, or cholesterol (control). Following recovery, rats received unrestricted access to food to determine a baseline body weight and were subsequently placed on a restricted feeding schedule (one hour per day). Food intake and body weights were recorded daily, and the percent of weight change was calculated to assess the impact of hormone treatments on metabolic responses to food restriction. All rats showed reduced weight on the restricted food schedule. Weight reduction was calculated as the percent decrease from each rat's baseline weight. Preliminary findings indicate that percent weight loss in both male and female estradiol-treated rats was significantly greater than in their respective control groups. In contrast, percent weight loss in testosterone-treated male rats was lower than in control males, whereas testosterone-treated female rats showed a greater percent decrease compared to control females. Gonadectomized control rats appeared to lose weight at a similar rate. These results suggest that weight change is greatly influenced by estrogenic hormones. Overall, the effects of hormone treatments may play a role in the food intake and metabolic response of male and female rats. The implications of these patterns will be discussed in the context of hormonal regulation of metabolism and adaptive responses to dietary stress.

Ashley Jones

Discipline: Interdisciplinary

Authors:

#1 Ashley Jones

#2 Clarissa Mallory

#3 Kiyannah Blake

#4 Shatavia Harris

Clarissa Mallory

Abstract Name: From Ideas to Action: Interdisciplinary Student Leadership and Community Engagement in Practice through SWAP

Our leadership cohort participated in a structured community engagement process that guided us from exploratory problem identification to the implementation of student-led initiatives on our campus. Our goal was to gain experience in designing projects that respond to real community needs while learning how to collaborate across academic fields and lived experiences. Through a combination of workshops, guided reflection, and facilitated dialogue, we examined how community issues emerge, how they affect students in

different contexts, and how leadership can be practiced through targeted action. As we developed our initiatives, we learned how to articulate a clear purpose, analyze the environment in which our projects would operate, and evaluate the feasibility of our ideas. Several initiatives have already been implemented on campus, and these early projects have allowed us to observe how student-led interventions function within real institutional settings. We also discovered that our individual initiatives were connected in meaningful ways. By examining points of intersection across our projects, we identified shared challenges, complementary goals, and opportunities for collaborative impact. This experience demonstrated the value of interdisciplinary teamwork, particularly in understanding community issues that do not fall neatly within a single academic discipline. We gained practical leadership skills that include critical thinking, communication, and the ability to link personal motivation with broader community outcomes. Our work suggests that a collaborative initiative-building process can help students develop projects that stand independently while also contributing to a cohesive set of efforts that strengthen the campus community. We plan to continue refining our initiatives and to expand our partnerships as we deepen our understanding of community-engaged leadership.

Ashley Jones

Discipline: Communications

Authors:

#1 Ashley Jones

#2 Ella Mintzer

Abstract Name: The Haven Partnered with Valdosta State University's Communications Arts Capstone Class

This project is designed to test our learning of communication theories and utilize this knowledge to real-world applications to help organizations meet their business needs. In this project we are teaming up with The Haven, a non-profit organization that provides 24-hour temporary shelter and services to victims of domestic violence, sexual assault, and human trafficking. We will design deliverables to promote The Haven's volunteering opportunities available to the local community. Volunteering participation is used toward helping to provide victims with the necessary supplies to lead a renewed, safe, and healthy life. The target audience of the "message" will be Lowndes County residents, Valdosta State University students and faculty between the ages of 20 to 55 that are available to donate their time and money/items to The Haven. The main goal of our project is to reach our targeted audience so that they are willing to volunteer with The Haven. We will not only promote the Haven, but also recruit more volunteers from Valdosta communities, more specifically to become more connected with the surrounding Latino community as this demographic was what the Haven desired to reach out to. Our secondary goal is to apply what we learned in school to solve a real-world problem for the client.

Keyonna Jones

Discipline: Biochemistry

Authors:

#1 Lauren Cowart

#2 Maryam Jamil

Abstract Name: Role of SPTLC3 in Mitochondrial ceramide composition and Cell Death During Acetaminophen-Induced Liver Injury

Sphingolipids are essential membrane components that regulate cell signaling and stress responses, initiated by the serine palmitoyltransferase (SPT) complex consisting of SPTLC1 and either SPTLC2 or SPTLC3. Dysregulation of sphingolipid metabolism has been linked to multiple diseases, including liver injury. Drug-induced liver injury (DILI) is the leading cause of acute liver failure, with acetaminophen (APAP) overdose being the most common trigger. This project aims to determine how SPTLC3 influences hepatocyte susceptibility to APAP-induced liver injury. We are focused on mitochondrial ceramide composition and cell death pathways, which may be either protective or deleterious, with early trends suggesting a protective response. To investigate this, we compare APAP-treated wild-type and SPTLC3 hepatocyte knockout (SPTLC3-hKO) mice. Mice are fasted overnight, dosed with 600 mg/kg APAP, and liver tissue is collected after 24 hours to assess injury. To evaluate regeneration, a separate cohort receives 300 mg/kg APAP and liver tissue is collected 3–4 days later. Complementary in vitro studies examine APAP exposure in normal hepatocyte cell lines versus SPTLC3-knockdown lines to assess viability and mitochondrial function. Preliminary data suggest that mitochondrial enzymes that degrade ceramides increase mitophagy. This suggests that loss of SPTLC3 triggers cell death that may help limit APAP-induced liver damage. We believe that mitochondrial effects may depend on the disease model, including high-fat diet, alcohol feeding, and drug-induced liver injury. Cells with compromised mitochondria may perform better under APAP stress because the injury environment resembles their normal state. These early findings support a model in which SPTLC3 regulates mitochondrial responses to injury, influencing hepatocyte survival after APAP exposure. Ongoing work will expand these findings through additional in vivo and in vitro analyses to clarify the role of SPTLC3 in DILI.

Trinity Jones

Discipline: Social Work and Human Services

Authors:

#1 Vicki Coffey

#2 Rebecca Drouhard

Abstract Name: Exploring Reentry and Recovery among Formerly Incarcerated African Americans with Co-occurring Mental Health and Substance Use Disorders.

The disproportionate incarceration rates of African Americans as reported by the Bureau of Justice Statistics (2024), highlight a critical area of concern within the criminal justice system. In 2021 African Americans were incarcerated at a rate six times higher than that of their White counterparts. Extensive research has explored reentry and recovery of formerly incarcerated African American populations. Yet, there remains a significant gap in the literature regarding the unique challenges faced by African Americans, particularly those with co-occurring issues of substance use and mental health disorders. The central research question for this study is “what insights does existing scholarly research provide on the intersection of mental health and substance use and reentry among formerly incarcerated African Americans in the United States?” This poster presentation aims to address this gap through a scoping literature review conducted using Covidence software, a specialized platform for synthesizing scientific research. This review seeks to illuminate the multiple barriers to successful reentry and recovery, thereby contributing to a greater understanding of the specific needs of this population. Preliminary findings from this study reveal four recurring themes: (1) the centrality of empowerment and social support in shaping recovery; (2) persistent racial discrimination that constrains access to mental health and substance use resources; (3) limited effectiveness and accessibility of prevailing substance use treatment models for this population; and (4) the influence of structural violence—including economic disadvantage, unstable housing, and community violence—on health trajectories and reintegration outcomes. Across studies, participants expressed strong motivation for recovery when engaged with culturally grounded, community-responsive behavioral health support.

Aidan Jones

Discipline: Biology

Authors:

#1 Aidan Jones

#2 Derek Barthels

Abstract Name: Developing Medical Countermeasures: Investigating the immune responses to a live attenuated vaccine for *Francisella tularensis*

Francisella tularensis (Ft), a facultative intracellular bacterium causing tularemia, poses a minimal risk of community spread in the United States but is a major bioterrorism threat due to its weaponization potential. A 1970 WHO study estimated that aerosolizing 50 kg of Ft over a city of 5 million people could kill 19,000 and incapacitate 250,000. A 1997 study also projected medical costs of \$5.5 billion (approximately \$11.1 in 2025) per 100,000 people infected. Ft is a Tier 1 Select Agent according to the CDC, and while it is treatable with antibiotics, the potential for antibiotic resistance and distribution challenges may limit their effectiveness. Various groups in the U.S. have tried to develop an Ft vaccine to remedy this deficiency, but none have achieved FDA approval. We are proposing Ft SCHU S4 Δ clpB (ATI-1701) as a live attenuated vaccine for tularemia. Animal studies to date have shown ATI-1701 to be safe and effective, with as few as six CFU protecting 100% of mice from subsequent lethal challenges. While most vaccines' effects are measured by humoral responses, Ft's intracellular nature implies that measurements of immune cell responses may be useful for development. This study explores immune responses of THP-1 macrophages and primary peripheral blood mononuclear cells (PBMCs) to ATI-1701. Specifically, these experiments investigate which immunity-related molecular pathways ATI-1701 activates in PBMCs. These results offer insights to help find potential mechanisms of immunity, which can be used to help bridge the gap between preclinical and clinical studies of ATI-1701 as a vaccine candidate. Abstract Disclaimers: The views expressed in this article, book, or presentation are those of the author and do not necessarily reflect the official policy or position of the United States Air Force Academy, the Air Force, the Department of Defense, or the U.S. Government.

Eva Jones

Discipline: Psychology

Authors:

#1 Eva Jones

#2 LuEttaMae Lawrence

Abstract Name: The Birds and the Beehive: Exploring the Influence of Sexuality Information Seeking on Sexual Health and Well-Being in Utah Young Adults

Sexual health and well-being encompass three interconnected dimensions: sexual health, sexual pleasure, and sexual rights. Understanding how these dimensions impact young adulthood is important, as this developmental stage involves increased vulnerability to sexually transmitted infections, unplanned pregnancies, and formative relationships. Young adults learn about sexuality from diverse sources, including school-based sex education, parents, peers, and social media. However, limited research has explored how the specific sources from which young adults learn about sexuality contribute to their sexual health and well-being. This study addresses this research gap by asking the following questions: Which sources of sexuality information do Utah young adults access most frequently and perceive as most influential? How do sexual health and well-being outcomes differ across the sources of sexuality information that participants report as most frequent and influential? This project uses a cross-sectional online survey of young adults ages 18-25, recruited through convenience sampling on Utah college campuses. Measures include an established framework categorizing sexuality information sources, the Natsal Sexual Well-being Measure, and additional

demographic variables. Data analysis will involve descriptive statistics, one-way ANOVA, and Pearson correlations. Given the limited literature, analyses will use two-tailed hypotheses to detect effects in either direction. Findings will contribute to the field by examining multiple information sources within a restrictive sociocultural context, applying these sources to a holistic model of sexual health and well-being, and informing improved approaches to sexuality education. This project recently received grant funding to compensate participants. Data collection will begin shortly and is expected to be complete by March, after which analyses will begin. Preliminary findings will be presented at NCUR if accepted.

Trinity Jones

Discipline: Psychology

Authors:

#1 Christina Zahorik
Samantha Desantis
Olivia Jeziorczak

Abstract Name: 1 / 2 From Feelings of Belonging to Academic Success at GovState

Governors State University (GovState) is committed to enhancing students' academic engagement and overall success by fostering an inclusive and supportive environment. The university's strategic plan emphasizes its dedication to fostering a sense of belonging and community among its students, which is essential for both academic success and personal development (Governors State University, n.d.). In alignment with this mission, this study aims to explore the relationship between student success and a sense of belonging at GovState. A sense of belonging, or the feeling of being genuinely accepted, valued, and connected within a social environment, is a fundamental human need that influences a range of psychological and social outcomes, including emotional well-being and academic success (Allen et al., 2020). Research has consistently shown that students with a stronger sense of belonging tend to have higher GPAs, further emphasizes the important role that belonging plays in improving academic achievement and long-term educational outcomes, as well as further indicating how important belonging is for academic success (Kivlighan et al., 2018). Students who feel more connected to their school, peers, and academic environment are also more likely to succeed in various aspects of their college experience, including participation in classroom discussions, engaging in campus activities and clubs, and also collaboration with fellow students and faculty (Jorgenson et al., 2018). Therefore, understanding these variables in-depth are crucial for improving student retention and academic growth, as students who feel more connected to their academic and social environments tend to perform better and remain enrolled longer, further improving retention. Therefore, we will assess students' perceptions of belonging and its influence on academic engagement and GPA. We expect that students with a stronger sense of belonging will show a greater amount of academic success, further supporting the importance of fostering an inclusive and supportive campus environment to enhance student outcomes.

Vikhyath Jonnalagadda

Discipline: Biochemistry

Authors:

#1 Katelyn O'Hare
#2 Michael Freeman

Abstract Name: Responsiveness and Mechanisms of TCR and IL-15 Stimulation by CD101+ and CD101-

CD57+ CD8 T cells

Terminally-differentiated CD8 T cells expressing the immunosenescence marker CD57 have been linked to cardiovascular disease risk. Our group has previously shown that the inflammatory cytokine interleukin-15 (IL-15) maintains CD57+ T cell viability and ability to proliferate, whereas T cell receptor (TCR) engagement drives CD57+ T cells toward activation-induced cell death. A substantial proportion of CD57+ CD8 T cells express the inhibitory glycoprotein CD101, but the function of CD101 expression remains unclear. Here, we evaluated the proliferative responses of human peripheral blood mononuclear cells (PBMCs) following antigen-specific (TCR) or antigen-nonspecific (IL-15) stimulation. Donor PBMCs were labeled with CellTraceViolet proliferation dye and cultured in vitro with either plate-bound anti-CD3 plus soluble anti-CD28 (TCR stimulation) or IL-15. The cells were harvested after 7 days, and proliferation and phenotypic markers were quantified using flow cytometry. In addition, we used the mTOR inhibitor rapamycin to assess the role of mTOR activity in these stimulations. We found that TCR engagement elicited significantly more proliferation from CD101+ CD57+ CD8 T cells than it did from CD101- CD57+ CD8 T cells. In contrast, IL-15 elicited similar levels of proliferation regardless of CD101 expression. Blocking mTOR signaling with rapamycin inhibited IL-15-induced proliferation but not TCR-induced proliferation. Interestingly, rapamycin exposure during TCR engagement resulted in a substantial reduction in the proportion of CD57+ T cells overall. This effect was driven not by TCR stimulation-induced death of CD57+ T cells, but is rather coupled with a trend that follows an increased proliferation of CD57- CD8 T cells in the presence of rapamycin. Our findings demonstrate differential responsiveness of CD101+ and CD101- T cells to TCR stimulation, and identify differential roles for mTOR signaling in antigen-specific and antigen-nonspecific responses of CD57+ and CD57- CD8 T cells. These results may have implications for the immunopathogenesis and treatment of cardiovascular disease.

Tara Joolhar

Discipline: Chemistry

Authors:

#1 Maryanne Collinson

#2 Md Abdullah Al Macktuf

Abstract Name: Enhancing Amino Acid Separation on TLC Using Silane Stationary Phase Gradients and Mobile Phase Gradients

Thin-layer chromatography (TLC) is widely used for rapid and low-cost analysis of molecules, but its ability to separate structurally similar molecules (such as amino acids) is limited by the uniformity of commercial TLC plates and fixed solvent conditions. This project aimed to improve amino-acid separations by introducing controlled gradients in both the stationary phase (the TLC plate surface) and the mobile phase (the developing solvent). Stationary-phase gradients were fabricated using a vapor-deposition method in which phenyldimethylchlorosilane and paraffin (7:3 v/v) react across the plate to create a smoothly changing surface chemistry. The plates were tested using mixtures of six DL-amino acids (histidine, arginine, proline, alanine, valine, methionine) under different solvent systems to identify conditions that maximized resolution. In parallel, I designed and built a dual-syringe-pump apparatus capable of producing dynamic mobile-phase gradients by dispensing and withdrawing solvent at controlled rates while keeping the total volume constant. Developed plates were visualized with ninhydrin to quantify separation performance. Results show that the vapor-deposited stationary-phase gradient consistently improved amino-acid separation relative to unmodified silica plates, producing clearer and more reproducible spot distinctions. The mechanical mobile-phase gradient system functioned as intended, but its early separation performance did not yet outperform the optimized isocratic (single-composition) solvent system. These findings indicate that stationary-phase gradients alone can significantly enhance TLC resolution and highlight the potential for combining both gradient strategies to develop a low-cost, higher-performance method for applications such as screening dietary supplement composition. Future work will focus on refining mobile-phase gradient control and integrating both gradient types into a unified analytical workflow.

Jasmyne Joseph

Discipline: Social Work and Human Services

Authors:

#1 Lily Peltz

#2 Audrey Dowdle

Abstract Name: Assessing Barriers to Awareness of Social Services Available in Rural Communities

In rural communities, individuals and families face barriers to find proper assistance for their needs. Awareness of social service agencies plays a collaborative role in rural communities. The goal of the research is to explore the extent of community knowledge of rural social service organizations. The research type is descriptive. The questions being asked on the survey are a part of the mixed methods approach. The targeted sample size is 75 participants. The student researchers ran a bivariate correlation test to determine the relationship between the participants' ages and their likelihood to donate. Results indicated there is statistical significance and a moderately strong relationship between age and the likelihood to donate ($r = .31$; $p = .004$; $p < .05$). The student researchers ran an independent t-test to determine if there is a difference in awareness of social services on different social media platforms in relationship to the city they reside in. The results indicated that there is a statistically significant difference in awareness of social services on social media and the cities the participants reside in ($t(79) = 1.45$; $p = .003$; $p < .05$). Although the results are statistically significant, most participants are from one city in the county (73.5%; $n = 61$). The student researchers ran an independent-samples t-test grouping by those who have and have not received social services and their awareness of social services revealing a statistically significant difference ($t(81) = -2.40$; $p < .05$; $p = .019$). The student researchers ran a test of independence to determine the relationship between participants utilizing services and their position to utilize services. Results indicate that participants utilizing services and participants in the position to utilize services are dependent. The relationship is statistically significant ($\chi^2(1) = 10.9$; $p < .05$; $p = .002$). By bringing awareness to agencies in rural communities, this research provides citizens with more opportunities to obtain necessities.

Tony Joseph

Discipline: Nursing and Public Health

Authors:

Abstract Name: Association Between Neighborhood Deprivation and Neurological Mortality: A County-Level Analysis of Traumatic Brain Injury and Parkinson's Disease in the U.S.

Neighborhood socioeconomic deprivation is an important social determinant of health, yet its relationship with neurological mortality is not well defined. This study examines whether the Area Deprivation Index (ADI), a validated measure of neighborhood disadvantage, predicts county-level age-adjusted mortality rates for Traumatic Brain Injury (TBI) and Parkinson's Disease (PD) in the United States. TBI and PD mortality in the U.S. is a growing concern, with the age-adjusted death rate increasing significantly from 5.4 per 100,000 in 1999 to 9.8 per 100,000 in 2020 for PD and 69,473 TBI-related deaths reported in 2021. Mortality data from 2015 and 2020 CDC WONDER were merged with standardized ADI scores from the Neighborhood Atlas, with higher ADI scores indicating greater deprivation. Analyses were performed in STATA 18.5 using univariate, stratified, and multivariable linear regressions with interaction terms for sex, race, urbanization, and year. For TBI, higher ADI was strongly associated with increased mortality ($\beta = 0.47$, $p < 0.001$), with

stronger effects in males ($\beta = 0.52$, $p < 0.001$) and in micropolitan counties ($\beta = 1.09$, $p = 0.013$). ADI remained significant in adjusted models ($\beta = 0.32$, $p < 0.001$). For PD, higher ADI was associated with increased mortality ($\beta = 0.075$, $p = 0.011$), especially in women ($\beta = 0.040$, $p < 0.05$) and in White majority counties ($\beta = 0.080$, $p = 0.009$). The adjusted association showed a smaller effect ($\beta = 0.033$, $p = 0.105$) but a consistent direction. Interaction analyses showed stronger effects in micropolitan ($\beta = 0.89$, $p < 0.001$) and small metro counties ($\beta = 0.205$, $p = 0.025$). These findings show that neighborhood disadvantage, as measured by ADI, is a consistent predictor of neurological mortality for both TBI and PD.

Staner Josselin

Discipline: Interdisciplinary

Authors:

Abstract Name: Tracing the Cost of Poverty: STEM Learning Pathways for Male Adolescents

This study investigates how the duration of household poverty shapes mathematics and science achievement trajectories for male high school students. Using data from the High School Longitudinal Study 2009-2016 (HSLS), the analysis reveals a clear socioeconomic gap in STEM performance. Male students living at or above the federal poverty threshold report a mean mathematics GPA of 2.10, compared with 1.81 for peers experiencing poverty, a statistically significant 0.29-point deficit indicating a moderate effect size. Although science grades are not sex disaggregated in HSLS, whole cohort patterns show even wider poverty-linked disparities across both disciplines. These findings align with prior research demonstrating that socioeconomic disadvantage restricts access to academic resources, increases exposure to stress, and limits engagement in technical subjects, collectively hindering STEM achievement for boys in low-income households. The results underscore the long-term consequences of persistent poverty, which can shift male performance from the low “B” to the mid “C” range and narrow readiness for advanced coursework. Targeted, school-based interventions, such as explicit instruction in foundational skills, strong STEM teacher support, and high-dosage small group tutoring, emerge as critical strategies for mitigating these effects and promoting equitable STEM pathways.

Bertrand Juan

Discipline: Engineering

Authors:

#1 Michelle Rosen

Oscar Chen

Abstract Name: Characterization of E-Paper for Temperature Regulation on a Cubesat

CubeSats are miniature satellites built in unit cubes with side lengths of 10cm to conduct academic research on components in space environments. The goal of this project is to build a 1U CubeSat for the purpose of conducting experiments on the thermal properties of e-paper at varying pixel densities. E-paper is a display device that contains charged pigments that can be attracted or repelled from the film to create monochrome patterns. It is of particular interest as it draws power only to change display patterns while being effectively powerless during static operating states. Identifying the thermal properties of e-paper as pixel densities vary, will confirm the potential use of e-papers as multi-use low-power passive thermal regulation tools on small sats. These properties will be determined through two experiments. First the e-paper will have half its surface covered in electric tape and then heated on a hotplate where it will be measured by an IR camera. The e-paper

and electric tape will be at the same temperature but have different measured temperatures due to differing emissivity. Then a solar simulator is used with an insulated brass tube placed underneath the e-paper to compare the temperature of the e-paper at steady to the tube which can be used to determine the absorptivity of e-paper. This project then targets several critical components for a functional satellite. Including structural manufacturing and the core computing aboard. This project selected a mounted side rail and end plate design for a relatively accessible CNC machining job, and to avoid significant stock waste born of a monocoque design. Additionally, building off an open, source, but outdated PCB design in the PyCubed framework, this project worked to replace obsolete and out of production components with commercially available parts, and manufacture the board to be fully integrable to external subsystems.

Mikayla Judd

Discipline: History

Authors:

#1 K. Stephen Prince

Abstract Name: Recovering Betsy Cole: Black Womanhood and Entrepreneurial Spirit of Jazz during the Age of Jim Crow

New Orleans in the late 19th and early 20th century is widely considered the birthplace of jazz culture. The life and legacy of Betsy Cole, a Black woman who emerged as a central figure in the early history of jazz, uncovers a gap in common understandings of the birth of this form of popular music. Though she is largely unknown today, famous jazz musicians like Kid Ory and Charles “Buddy” Bolden made frequent appearances at Cole’s residence, a well-known venue to the jazz community of New Orleans. Popular history and mythology of jazz centers on male musicians. However, as a case study, Betsy Cole will showcase a Black woman as a significant pillar of the social and cultural landscape of early jazz. Primary source research revealed not only Cole’s central role as a hostess within the burgeoning jazz community of New Orleans, but suggests the outlines of an entirely new class of Black women during Jim Crow. Neither working class, nor well-to-do, Betsy Cole made her way as a Black female property owner in a time and place where they were quite rare. As an impresario of lawn parties and litigant landlord, Betsy Cole embodied an underrepresented group of Black women entrepreneurs who were given an opportunity to gain economic independence through the unique development of jazz culture.

Eunice Jung

Discipline: Biochemistry

Authors:

Abstract Name: Influence of Media Composition and Temperature on Microgel Paste Dissolution

Microgels are hydrogel microparticles that can respond to environmental stimuli such as temperature and pH. Due to their biocompatibility and sensitive responsiveness, they are widely used in regenerative medicine and drug delivery applications. We have developed a new class of biomaterials based upon microgels made from poly(N-isopropylacrylamide-co-acrylic acid), called microgel pastes, which have the potential to serve as foundational materials in tissue scaffold and drug delivery technologies. However, their swelling and dissolution behavior in different environments remains relatively unknown and poorly understood. Thus, this study investigated how microgel pastes behave when immersed in different solvents at physiological temperatures (37 °C). By observing the interface between the solid paste and liquids, we aimed to understand

the nature of the interface between these biomaterials and the solution environment. To conduct this, microgel pastes with different concentrations, prepared either in water or phosphate buffered saline (PBS) were used as samples. The sample was immersed in water or PBS. Then, the movement of microgel particles at the paste-solution interface during dissolution was captured via differential interference microscopy (DIC), which was analyzed with a particle tracking feature in FIJI. The microgel pastes displayed distinct temperature-dependent responses: In water, the microgel particles diffuse rapidly, forming a thick, swollen interface. In contrast, pastes in PBS maintained a thinner interface with slower particle movement and greater stability, even at high temperatures. These findings are significant as they provide insight into how biomaterials interact in physiological media, which can be applied in further technologies in the regenerative medicine and tissue engineering fields.

Sydney Junot

Discipline: Biology

Authors:

#1 David McDougal

#2 Arline Narez

#3 Layla Deprimo

#4 Camille Meaux

Abstract Name: Effects of Leptin Replacement on Metabolic Adaptations to Starvation

Historically, insulinopenia (low insulin levels) was the signaling event considered responsible for metabolic adaptations to starvation, including mild hypoglycemia, general sympathetic outflow, and increases in serum ketones, glucagon, and free fatty acid levels. Leptin, a hormone produced by adipose tissue, is known to decrease in response to caloric restriction. Recent work in the field suggested that leptin infusion following a 48-hour fast reversed all metabolic adaptations to starvation, thus raising questions about an unacknowledged role of leptin in the starvation response. We tested whether physiological leptin replacement during a 72-hour fast in rats is sufficient to reverse the physiological adaptations to starvation. Sprague-Dawley rats were subjected to a 72-hour fast with or without physiological leptin replacement (n=6 and n=6), or ad libitum feeding (control, n=7). Leptin replacement was achieved via iPrecio programmable mini-pumps. Metabolite and hormone levels (e.g. glucose, leptin, insulin, glucagon, corticosterone, catecholamines, and ketones) were measured at baseline and every 24 hours during the 72-hour fasting period. Data will be assessed for significant differences between the 72-hour fast and 72-hour fast+leptin or control groups at each time point during the fast, using 2-way ANOVA with Dunnett post-hoc test. Expected trends were observed in blood glucose and body weight in 72-h fasted group relative to fed controls ($p < 0.001$). Additionally, while leptin levels fell in 72-h fasted group relative to controls, there was no significant difference in leptin levels between ad libitum controls and the 72-h fast+leptin group (all $p > 0.17$), confirming the efficacy of our leptin treatment in replicating physiological leptin levels. Despite this, our data generally show that key changes in hormones and metabolites are unchanged by physiological leptin treatment during fasting. Leptin treatment had no effect on sympathetic tone, weight loss, or glucose homeostasis during the fast.

Nyomi Jurado

Discipline: Anthropology and Archaeology

Authors:

Abstract Name: Sexual dimorphism of the *Macaca mulatta* hamate: A trabecular bone analysis

The relationship between sexual dimorphism (when males and females have different shapes or masses) and trabecular bone structure (the sponge-like inner part of bone that houses bone marrow) is not well understood. This limits our ability to interpret the skeletal remains of fossil human ancestors. Though we know that macaque monkeys (*Macaca mulatta*), our close primate relatives, exhibit sexual dimorphism, there is a gap in the literature assessing their trabecular bone distribution in the wrist. We hypothesize that the trabecular structure of the hamate bone, located in the wrist, will show significantly different architecture between males and females. To test this hypothesis, we will examine the hamate bone of 15 adult male and 15 adult female macaque monkeys. The hamate will be manually segmented from existing microCT data using Volume Graphics StudioMax. A volume of interest will be isolated within the bone and analyzed. We will specifically test if males and females have statistically significant differences in BV/TV (bone volume fraction, a ratio of bone to empty space in the volume of interest that reflects loading forces). We predict males to have greater BV/TV than females because of their greater body mass and heavier loading. This study explores how sexual dimorphism may impact trabecular bone structure in our close primate relatives. Results will help fill a gap in the literature, with applications to the relationship between sexual dimorphism and trabecular bone, as well as human and hominin bone structure interpretation.

Raghav Kaashyap

Discipline: Computer Science

Authors:

#1 Wei Qian

#2 Mengdi Huai

#3 Wallapak Tavanapong

Varsha Ravivenkatesh

Neal Sharma

Abstract Name: An Empirical Study of Predictive Uncertainty Under the Right to Be Forgotten

Deep learning models have achieved remarkable success over the past decade, but still often fall short in providing accurate uncertainty estimates for their predictions. Quantifying uncertainty is particularly crucial in real-world applications, such as healthcare and autonomous driving. Motivated by this, numerous uncertainty quantification methods have been proposed to assess the reliability and confidence of model predictions. Meanwhile, machine unlearning has gained increasing importance due to growing demands for the right to be forgotten. Machine unlearning aims to remove sensitive data and its influence from a pre-trained model without requiring retraining from scratch. However, the impact of machine unlearning on predictive uncertainty remains largely unexplored. To bridge this gap, this research project conducts an empirical study of predictive uncertainty under the right to be forgotten. We investigate how different machine unlearning mechanisms, including the choice of unlearning method, the modality of unlearning data, and the fraction of data removed, affect a model's predictive uncertainty, providing a fundamental understanding of the impact of machine unlearning. Our evaluation uses a convolutional neural network as the backbone model and utilizes both the benchmark CIFAR-10 dataset and the real-world, medical-domain DERMAMNIST dataset. Results are evaluated using statistical tests across three independent runs to reduce analysis bias, and we report the mean and standard deviation. We use metrics such as the Brier Score (BS) and Expected Calibration Error (ECE) to quantify uncertainty errors before and after unlearning. Additionally, we report test accuracy and runtime to assess the efficiency of unlearning. By systematically examining the impact of unlearning on predictive uncertainty, this research contributes to the development of artificial intelligence systems that are both privacy-conscious and reliable in real-world scenarios.

Maryam Kabir

Discipline: Sociology

Authors:

#1 Maryam Kabir

#2 I-Chun (Nicky) Wu

Abstract Name: Social Media, Muscles, and Baggy Clothes

Social media content targeted towards men oftentimes revolves around fitness/athleticism, forming a rise in muscle dysmorphia among adolescent men. As a result, young males resort to baggy clothes to hide perceived flaws while participating in a rapidly increasing fashion trend. This research will showcase how social media fuels the correlation between muscle dysmorphia and trending baggy clothes among adolescent men. Previous scholars have identified how social media constructs the “ideal” male body, with influencers promoting unrealistic standards. Some studies have shown a connection between dysmorphic tendencies and harmful content, but debate remains on whether damaging media causes dysmorphia or dysmorphic individuals are drawn to unhealthy content. Research on masculine identity uncovered how men's low self-esteem and muscular dissatisfaction impact clothing choices, symbolizing how men's choice of loose-fitting apparel serves as concealment and emotional protection. Moreover, the researched psychological implications of men's clothing choices remains narrow, as well as leaving the female population unexplored. This research calls for a netnographic approach, an analysis on the online community surrounding the fitness/gym culture of the male population, as well as a study on individual men. Surveys will be distributed to young men of various body types and fitness habits/journeys, scaling qualitative data on how they feel about certain posts, their body image concerns, and their clothing choices. Quantitative data will calculate frequency of social media usage, percentage of muscle-related content, and clothing fit scales. The collected data is anticipated to illustrate a positive correlation between muscle-focused social media content to muscle dysmorphia among adolescent men, resulting in the popular choice of baggy clothes to hide flaws. The data collected and the conclusions formed from this research can stimulate psychologists, parents, and others to pinpoint early signs of dysmorphic individuals through their clothing habits and prevent harmful tendencies in the future.

Nathaniel Kaboly

Discipline: Engineering

Authors:

#1 Azeemuddin Syed

Abstract Name: Hybrid Supervisory Control Architecture for Safe Student Driver Instruction: A Digital Co-Pilot

In 2021 drivers aged 15-20 made up only 5.1% of licensed drivers in the United States, yet they made up 8.5% of drivers in fatal crashes and 12.6% of drivers in all crashes. This highlights the need for a safety override system during student-driver instruction. A critical focus of autonomous driving systems is establishing a mechanism to assume control when a student driver makes a critical error. This research proposes and validates a novel Hybrid Supervisory Control Architecture (HSCA), implemented in a combined Simulink and Stateflow environment and designed to function as a digital driving instructor. The HSCA assists driving instructors by serving as a safety co-pilot, instantly overriding unsafe student commands such as excessive speed or unintended lane departure, while maintaining predictable vehicle actions. The system's intelligence is split in two: an Adaptive Model Predictive Controller that continuously generates optimal steering commands for trajectory tracking and a supervisory Stateflow chart that monitors unsafe behavior such as speeding or drifting out of the lane. The Stateflow chart triggers autonomous intervention when errors exceed safety thresholds and uses time-delayed criteria to ensure stability before returning control. Initial validation using a kinematic model and simulated student errors (lane drifting and

speeding) demonstrates successful intervention, reducing lateral error from 0.5 m to 0 m and velocity error from 2.0 m/s to 0 m/s within 2 seconds. This demonstrates that the HSCA can assume control and stabilize the vehicle quickly. The final stage of this project will validate the HSCA using high-fidelity human trajectory data from the highD dataset, a driving dataset recorded on German highways, as dynamic traffic. This will test the HSCA's ability to maintain safety during student deviations in realistic multi-vehicle traffic. The HSCA provides a predictable safety framework for driver education vehicles, allowing instructors to focus on teaching.

Aanya Kadakia

Discipline: Biology

Authors:

#1 Na Xie

#2 Tiff Ricketts

#3 Ravi Bhatia

Abstract Name: Macrophage Reprogramming in the CML Bone Marrow Niche Determined by Lactate Assay

The bone marrow (BM) microenvironment is a dynamic network of cells, extracellular matrix components, and signaling molecules that regulates hematopoietic stem cell differentiation and immune cell development. When this microenvironment becomes dysfunctional, normal cell production is disrupted, and disease processes can be amplified. Cellular energy production is especially important as metabolism directly influences immune cell activation and function. Macrophages polarize into two main phenotypes: M1 and M2. M1 macrophages primarily rely on glycolysis for energy and promote inflammation, whereas M2 macrophages support immunosuppression and depend on oxidative phosphorylation. Immune cells can shift their metabolism based on available metabolites to support rapid energy generation, proliferation, and cytokine production. In chronic myeloid leukemia (CML), overactive immune cells promote inflammation, leukemic proliferation, angiogenesis, and suppression of anti-leukemic responses. Although tyrosine kinase inhibitors (TKIs) treat CML by blocking proliferative signaling pathways, metabolic alterations in macrophages remain poorly understood. We hypothesize that macrophages in the CML BM niche increasingly depend on glycolysis, contributing to inflammation and an overactive immune environment. To investigate this, we quantified lactate levels in bone marrow-derived macrophages (BMDMs) isolated from CML, TKI-treated CML, and normal C57/BL mice. Bone marrow was collected from long bones, and macrophage fractions were differentiated from vertebral marrow cultures and polarized using LPS or IL-4. Supernatants and cell lysates from BMDMs were processed to measure lactate using a fluorescent assay kit. Both intracellular and extracellular lactate displayed similar trends. Compared to controls, the CML group showed a significant increase in lactate, indicating heightened glycolytic activity and inflammation within the BM niche. In the TKI-treated CML group, lactate levels were reduced and approached those of the control group. Altogether, an increase in lactate levels suggests that macrophage reprogramming plays an important role in promoting glycolysis within the CML BM microenvironment, and targeting macrophages may improve CML treatment.

Eshita Kadiri

OH - Case Western Reserve University

Discipline: Health and Human Development

Authors:

#1 Amanda Serapiglia

#2 Rafaela Oliveira

Abstract Name: GasderminD (GSDMD)-tagged Mitochondria Propagate Neuroinflammation in Parkinson's Disease

Parkinson's disease (PD) is a neurodegenerative disease characterized by progressively worsening motor deficits due to the death of dopaminergic neurons in the ventral midbrain. Neuron death, mitochondrial dysfunction, and increased brain inflammation are hallmarks of PD. In the brain, microglia exist as resident immune cells that initiate and regulate inflammation. It is known that neuron-released alpha synuclein (α -syn) aggregates contribute to the activation of the Nod-like Receptor Protein 3 (NLRP3) inflammasome, an innate immune pathway. However, the mechanisms by which it accelerates the disease course remain under-characterized. Though α -syn does not inherently cause inflammatory cell death of microglia, it provokes an inflammatory cascade that may contribute to the progressive nature of PD. Specifically, α -syn expedites mitochondrial dysfunction, serving as a damage-associated molecular pattern (DAMP) to activate the NLRP3 inflammasome. Subsequently, NLRP3 activation triggers the secretion of pro-inflammatory cytokines and the proteolytic activation of an enzyme known as caspase-1 (Casp1). Casp1 cleaves the pore-forming protein, gasdermin-D (GSDMD), which canonically induces inflammatory cell death by forming pores in the cell membranes. However, GSDMD activation does not cause inflammatory cell death in α -syn-treated microglia. Rather, our work aims to assess the method by which GSDMD translocates to other membrane-bound organelles and escalates the spread of neuroinflammation in PD models. We predict that GSDMD translocation and pore-formation at the mitochondria may result in the spillage of mitochondrial DNA into the cytosol, thus triggering the cGAS/STING pathway, another innate immune pathway that detects double-stranded DNA within the cytosol. Our hypothesis aims to elucidate the roles of GSDMD and mitochondrial dysfunction that increase neuroinflammation in PD models. Exploring the mitochondrial roles of GSDMD within the brain is an emerging field where limited research has been conducted. Overall, deducing these mitochondrial roles of GSDMD in microglia can establish therapies that target GSDMD-induced inflammation in PD patients.

Jacob Kagan

Discipline: Physical/Occupational Therapy and Speech Language Pathology

Authors:

Abstract Name: Rewiring Communication Pathways

Communication is central to human identity and participation in society. For individuals with aphasia, a language disorder affecting approximately two million Americans, expressing thoughts can be challenging, limiting engagement in families, communities, and social life. This presentation examines how creative and humanities-based approaches, including storytelling, writing, visual arts, and musical expression, as well as methods used in second-language learning, empower and innovate in supporting language recovery. This research was conducted while volunteering at the Russell Sage College Aphasia Center, where I observed and analyzed how creative communication methods are used in real therapeutic settings. In addition to my hands-on research, I compared how people learn a new language with how they relearn language after aphasia. Recovery is most effective when strategies focus on individual strengths rather than lost abilities. Creative activities offer alternative ways to communicate and express emotions, helping people regain confidence and a sense of self. These approaches support neuroplasticity, allowing the brain to form new pathways and helping individuals discover new ways to connect with their communities. Research shows that incorporating stories and arts-based activities can enhance motivation, communication skills, and social participation. Examining aphasia through a neurodiversity perspective demonstrates the importance of acknowledging and supporting diverse approaches to language use. Similar to how educators adjust methods to meet the needs of diverse students, creative interventions provide personalized support that encourages

engagement and community involvement. Based on observations from my research, individuals who participated in creative activities showed improved confidence, engagement, and willingness to communicate. This presentation demonstrates how students and educators can lead through creative and effective practices that promote inclusion and make a meaningful impact. Attendees will learn how to apply innovative and creative approaches in therapy and education, understand the role of neuroplasticity, and explore strategies to help individuals with diverse communication abilities succeed.

Kalel Kai

Discipline: Engineering

Authors:

#1 Douglas Wolfe

Abstract Name: Enhancing the Quality of Photonic Crystals using Nanoimprint Lithography

With the rise of radiation threats and nuclear energy demands, there is a growing need to have a method to detect radiation efficiently. Scintillators, materials capable of detecting ionizing radiation, are essential in order to improve our ability to detect radiation faster and more accurately. However, most scintillators being used today possess a high refractive index of 1.8 or greater. The high refractive index of a scintillator results in higher fractions of total internal reflection (TIR). Having TIR causes a major loss of photons reaching the photodetector, which reduces performance. This creates an inaccurate measurement of the ionizing radiation that the scintillator is absorbing. Inaccurate measurements can lead to less defined medical imaging pictures, inaccurate radiation exposure readings, and cause delays in mechanisms that need to detect ionizing radiation. Photonic crystals (PhCs) are an innovative way to not only reduce TIR but also be cost-effective with many different fabrication methods, such as nanoimprint lithography (NIL). PhCs are materials arranged in periodic patterns and geometries, e.g., spheres, pillars, and cones, to enhance the transport of light within the scintillator. This research aims to investigate different PhCs structures to study the correlation between the surface topography and the light yield of our scintillating crystals using the modeling software OptiFDTD to vary the PhC size parameters and observe the effects on scintillator light yield. Pairing this with a Lutetium–yttrium oxyorthosilicate (LYSO) scintillator and its refractive index of 1.82 provides a favorable ratio with Snell's law to enhance light output. Future work involving a cone-based PhC pattern based on peer-reviewed articles should result in a simulated light yield greater than 30%. In conclusion, this research aims to enhance scintillators' light yield and enhance performance by tailoring PhC geometries. This will assist warfighters in the field to more accurately detect ionizing radiation.

Fatoumata Kake

Discipline: Psychology

Authors:

Abstract Name: “Prenatal Economic Stress and Emotional Dysregulation Among Young Black Mothers”

Prenatal economic stress is a significant risk factor for emotional dysregulation and poor mental health, particularly among young Black mothers who disproportionately face structural inequities and chronic stressors during pregnancy. Understanding how economic stress relates to emotional, psychological, and physiological functioning in this population is essential to developing culturally responsive, contextually grounded prenatal interventions. This study will examine associations between economic stress and emotion dysregulation, mental health, and physiological stress, as indexed by heart rate variability (HRV), among young pregnant Black mothers. Using a cross-sectional correlational design, data will be drawn from questionnaires and physiological assessments collected from N = 106 Black pregnant women (ages 18–41) in New York State between 2021 and 2025. Measures include the Difficulties in Emotion Regulation Scale–Short Form (DERS-SF), the MOS Mental Health Index (MOS-MHI), HRV, economic stress, income, age, social support, and parity. Economic stress will serve as the primary independent variable, and emotion dysregulation, mental health, and HRV will be examined as dependent variables. Planned analyses will include correlational analyses, comparisons across income brackets, and multiple regression models testing economic stress as a predictor of emotion dysregulation, mental health, and HRV while accounting for age,

social support, and parity. Analyses are currently underway and will be completed before presentation. Findings from this study have the potential to advance understanding of how economic stress shapes psychological and physiological functioning in pregnancy for Black women, inform prenatal mental health interventions that address both structural and emotional factors, and highlight the need for more equitable, culturally attuned prenatal care practices that effectively respond to the lived experiences of young Black mothers.

Anika Kale

Discipline: Nursing and Public Health

Authors:

Abstract Name: Expanding Vision Care Access in Rural India: A Case Study of Mobile Ophthalmic Units

According to the World Health Organization (WHO), 2.2 billion people suffer from visual impairment worldwide. The prevalence of blindness is disproportionately high in developing nations. Mobile Ophthalmic Units (MOUs) have emerged as an innovative solution for delivering eye care to India's populations, where 25% of the world's blind reside, especially the most underserved population. MOUs are mobile eye clinics equipped to provide eye exams to individuals in remote areas. Patients are then taken back to the city for free surgeries on these buses. This study examines if the MOUs are a successful solution to providing eye care and reducing avoidable blindness in underserved parts of rural India through a case study of the Dr. Manohar Dole Foundation's MOU operations in Maharashtra, India. Research methodology includes seven years analysis of MOU operational data (2018-2024), in-person field observation of MOU operation in rural India, and questionnaire surveys with frontline healthcare workers. Findings show the MOU system to be an innovative and effective vehicle for providing eyecare and reducing avoidable blindness through cataract surgeries in rural Maharashtra. Various elements analyzed include design and operation of the MOU system, distances travelled from base hospital, community co-operation and symbiotic relationships with rural government health agencies, fee structures, hospital stays, etc. An interesting finding, however, was that a large percentage of people diagnosed with cataracts refuse to undergo eyesight-restoring surgeries even when free and brought to their doorstep. This highlights the need for further research and targeted interventions to address the barriers to surgery in order to reduce avoidable blindness in rural India.

Michael Kaleem

Discipline: Health and Human Development

Authors:

#1 Lawrence Cheskin

#2 Ali Weinstein

Abstract Name: Rest and Results: The Relationship Between Sleep, Stress, and Grade Point Average (GPA) in Undergraduates

Background Sleep plays an important role in college students' overall academic success, making it a crucial area of study. However, the specific relationship between parameters of sleep and academic performance has not been well studied. College students have also reported increasing levels of stress over the past few years, and stress can affect both sleep and academic success. Therefore, the current investigation examined the associations between duration of sleep, sleep quality, and stress with academic success. Methods Data were collected by surveys completed by undergraduate students at a large, public university. Sleep duration and

sleep quality were assessed by the Pittsburgh Sleep Quality Index (PSQI), and stress was measured with the Perceived Stress Scale. Academic success was operationalized as a self-reported GPA. Pearson correlations determined association between the variables of interest with $p < 0.05$ set as the level of statistical significance. Results There were 196 undergraduate students that participated (70.1% female, 36% white/non-Hispanic, 27.6% Asian/Pacific Islander, age: 18.1 ± 0.5). Both sleep duration and sleep quality were statistically significantly related to GPA ($r = 0.17$, $p = 0.02$, $r = -0.13$; $p = 0.001$, respectively). Therefore, as the number of hours of sleep increased and as sleep quality increased (lower number on PSQI is indicative of better sleep), GPA increased. Elevated stress levels were related to both sleep duration ($r = -0.14$; $p = 0.01$) and sleep quality ($r = 0.40$; $p < 0.001$) but not significantly correlated to GPA ($r = -0.01$; $p = 0.92$). Conclusion This study found that sleep duration and sleep quality were positively associated with academic success. Although stress was not directly related to academic success, it was associated with both sleep duration and quality, suggesting that stress may influence academic success indirectly through its effects on sleep. Future research should explore how demographic, socioeconomic, and environmental factors influence sleep patterns and academic success to better inform strategies that support student success.

Garrett Kalinowski

Discipline: History

Authors:

#1 Garrett Kalinowski

Abstract Name: The Rise of Napoleon: the Making of an Emperor

This project examines Napoleon Bonaparte's ascension to power by analyzing five key eras and events which transformed him from an obscure Corsican immigrant into First Consul of France. The central research question investigates how specific formative experiences and strategic decisions during critical moments enabled Napoleon's ascent during the chaos of the French Revolutionary period. This study surveys three categories of literature. Firstly, modern historiography and biography such as Andrew Roberts' critically acclaimed text, *Napoleon: A Life* and Norman Davies' expansive text, *Europe: A History*. Furthermore, Napoleon's influences through classical texts such as Plutarch's biographies of Caesar and Alexander to Enlightenment thinkers such as Jean-Jacques Rousseau and Thomas Hobbes. Lastly, writings from Napoleon's contemporaries such as Carl von Clausewitz's classic text, *On War* which provides a tactical view of Napoleon's strategies through the eyes of one of Napoleon's foes during the Battle of Borodino. These sources are interwoven within a chronological narrative giving context for Napoleon's actions during the French Revolution. This study traces five key eras, Napoleon's classical education in history and military theory, his victory at the Siege of Toulon, his pragmatism during the Sections uprising, his role in the Brumaire coup, and his reforms through the Napoleonic Code and Concordat of 1801. This methodology combines historical analysis with examination of political contexts that shaped each era, revealing how Napoleon's military genius and opportunism converged at critical moments with an emphasis on primary sources and reputable scholarship collated together to form a cohesive narrative. The analysis of these events demonstrates that Napoleon's success resulted from his ability to exploit key moments of instability to his advantage. This research contributes to the political science perspective of how individuals utilize political chaos to accumulate power, illustrating that Napoleon's rise was the product of several calculated decisions across a chaotic geopolitical climate.

Sierra Kaluzienski

Discipline: Exercise Science and Nutrition

Authors:

#1 Audrey Harrington
#2 Ethan Rodriguez
#3 Kathryn DiMillo
#4 Andrew Moxley
#5 Ashley Edds
#6 Marissa Cossa
#7 Ryan Cascone
#8 Scott Mazzetti

Abstract Name: Comparing Percent Increase Of Energy Cost From Explosive Contractions In Upper Versus Lower Body Resistance Exercise

Our laboratory has demonstrated increased energy cost from including explosive repetitions, but it is unclear if this effect is greater in upper or lower body resistance exercises. PURPOSE: We compared the percent increase of energy cost in bench press versus squat as a result of performing varying amounts of explosive contractions. METHODS: 7 men (20 ± 0.9 yrs; 82 ± 12 kg; 181 ± 5 cm) performed 4 protocols of 4x8 reps of squat and bench press. Two of the protocols were work-matched using 50% of maximal strength (1-RM), with one of them using exclusively explosive reps (EXPL) and the other 3 explosive reps immediately followed by 5 recreational (Partial 3/5-50%). We also included an additional partial session using 3 explosive with 50% of 1-RM followed by 5 recreational with 61.2% (Partial 3/5-61%). This protocol was work-matched with a session of exclusively recreational reps using 57% of 1-RM (REC). Subjects' 1-RM was determined on a squat machine and barbell bench press, and peak power was determined using an accelerometer. Repetition speed, ROM, and rest intervals were standardized among protocols. Total work (reps·sets·load) among the protocols was: (REC=3/5-61%) > (EXPL=3/5-50%). Expired air was collected 15min before, during, and 30min after using a metabolic cart. Data were analyzed using a 2-way ANOVA with Fisher's LSD post hoc. We hypothesized that percent increase of energy cost due to explosive repetitions would be greater with squats compared to bench press. RESULTS: Percent increase of energy cost during EXPL and 3/5-61% was significantly greater than 3/5-50% for both squat and bench press (16.4 ± 6.3 ; 15.1 ± 5.4 ; 4.5 ± 5.7 and 24.6 ± 7.3 ; 18.9 ± 8.5 ; 8.2 ± 8.5 ; respectively). Percent increase during EXPL was greater than 3/5-61%, but only for bench press. CONCLUSION: Explosive repetitions had a greater effect to increase energy cost with an upper body resistance exercise, but only with exclusively explosive sets.

Nidhish Kalyanakumar

Discipline: Psychology

Authors:

#1 Mark Myers

Abstract Name: Visual Evoked Potential Effects on Magnocellular and Parvocellular Pathways from Athletes After Mild Traumatic Brain Injuries

Background: The objective of this study is to examine magnocellular and parvocellular pathways differentiation based on checkerboard spatial frequency stimulation between normal and visually impaired individuals from athletes with mild traumatic brain injury. Purpose: Athletes who exhibited photophobia, and blurriness were subjected to 5 spatial frequency stimuli presented to the left and right eye, and both eyes simultaneously to determine the type of receptive field loss deprecation based on sports-related brain trauma. Methods: Checkerboard stimulation enables the measurement between 2 visual processing pathways and enables the determination of the integrity of visual processing through visual evoked potentials (VEPs). Conclusion: The principal results reflect P1 responses demonstrated distinct changes in amplitude from mTBI (>5 μ V) from normal cohorts concluding higher P1 amplitude of the VEP in mTBI cohorts had increased after injury. Latency in P1 was not as distinct as amplitude changes. Our major conclusion is that most of the mTBI cohort exhibited receptive field loss across all the patients appears to be magnocellular process

deprecation due to frequent instances of 8×8 and 16×16 spatial frequencies input as it relates to amplitude and latency output.

Lineesha Kamana

Discipline: Computer Science

Authors:

#1 Mehuli Ghosh

#2 Suman Saha

Akshita Ananda Subramanian

Abstract Name: Rule-Based Approaches to Atomic Sentence Extraction

Natural language often combines multiple ideas into complex sentences. Atomic sentence extraction, which is the task of decomposing complex sentences into simpler sentences that each express a single idea, improves performance in information retrieval, question answering, and automated reasoning systems. Previous work has formalized the "split-and-rephrase" task and established evaluation metrics. Additionally, while previous work has focused on machine learning approaches using large language models to improve extraction accuracy, these methods lack interpretability and provide limited insight into which linguistic structures cause extraction failures. There have been limited previous studies demonstrating how dependency-based methods can extract subject-verb-object triples and clauses, but no principled analysis has examined which specific clause structures and dependencies lead to extraction difficulties. This study addresses this gap by conducting an analysis of how complex sentence structures that include relative clauses, adverbial clauses, coordination patterns, and passive constructions affect rule-based atomic sentence extraction performance. Using the WikiSplit dataset, we implemented dependency-based extraction rules using spaCy's dependency parser. We manually generated 100 gold standard atomic sentence sets and evaluated performance using ROUGE and BERTScore. The system achieved ROUGE-1 F1 = 0.6714, ROUGE-2 F1 = 0.478, ROUGE-L F1 = 0.650, and BERTScore F1 = 0.5898, which indicates moderate to high lexical, structural, and semantic alignment. Challenging structures were relative clauses, appositions, coordinated predicates, adverbial clauses, and passive constructions. These forms often lead to truncated atomic sentences or missing predicates. In contrast, sentences with simple subject-verb-object structures are handled well. Overall, the findings show that rule-based extraction is reasonably accurate but sensitive to types of syntactic complexity, and that targeted improvements to clause boundary detection and coordination handling can improve rule-based systems.

Maya Kamat

Discipline: Biology

Authors:

Abstract Name: Maternal Microbial Transfer Methods for Infants Born Via C-Section: Using Vaginal Seeding and Fecal Transplants to Promote Neonatal Gut and Skin Microbiomes

In the context of an increase in C-Sections worldwide and the association between C-section births and adverse immunological outcomes, supplementing the microbial development of C-section delivered infants through maternal microbial transfer has gained traction. This comprehensive literature review aims to evaluate the effectiveness of different microbial transfer methods, such as vaginal seeding, fecal microbiota transfer, and oral vaginal microbial transfer in their ability to increase levels of beneficial bacteria and

decrease levels of pathogenic bacteria in C-Section delivered infants to more closely match the gut and skin microbiomes of vaginally delivered infants. This review explored the practicality and safety of these treatments in relation to their effectiveness. It was found that while the fecal microbiota transplantation methods greatly improved microbial development in C-section infants, they may introduce greater levels of pathobiont species. The vaginal seeding methods, while less effective, potentially introduced infants to microbes that overlap with microbiomes of the gut, mouth, and skin. If done with mothers who have been properly tested, the research suggests that vaginal seeding can partially reduce microbial diversity, and as a result reduce pathogenic bacterial exposure in infants. The vaginal seeding and fecal microbiota transplant methods of microbial transfer have inconsistent successes with the transfer of beneficial bacteria such as *Bacteroides*, *Bifidobacterium*, and *Lactobacillus* with notable differences between an external transfer and oral ingestion of vaginal microbes. Further research to directly compare these methods and investigate the compounded effects of infant exposures to vaginal and fecal microbes during labor, may highlight how microbes interact to aid in the development of infant gut and skin microbiomes. Additionally, it's important to consider the safety and practicality of microbial transfer methods to aid the microbial development of infants born via C-Section.

Gloria Kamau

Discipline: Biology

Authors:

#1 Christopher Ehrhardt

Abstract Name: Developing a method to separate contributors in Forensic touch mixtures

Touch samples in crime scenes are vital to the forensic evidence collected. Though, the presence of biological fluid from multiple individuals in the same evidence sample is a problem for forensic casework. This results in difficulty in DNA profiling interpretation, which decreases its value to the investigation. Currently, there are no methods that can separate biological material and/or DNA from multiple individuals before DNA profiling. The goal of this project is to develop a new method that can separate biological material from different individuals present in a mixture. For our experiment, we created a series of DNA mixtures samples where one person deposited blood onto a substrate and the other deposited biological material onto the same substrate through contact/handling. Each mixture sample was then fractionated into two biochemical components: one containing extracellular or cell-free DNA and the other containing intact cells. Each fraction underwent DNA extraction, quantification, and profiling. Using qPCR our preliminary findings will show whether the eDNA fraction was enriched in one individual who contributed material by touching the substrate, and the cell pellet fraction was enriched in DNA from the blood contributor. Overall, this can indicate that some types of DNA mixtures can be separated using this protocol. This method and these results can help casework by improving the accuracy of differentiating mixtures, which can lead to an increase of samples that can test and used.

Menatalla Kamel

Discipline: Psychology

Authors:

#1 Thais Benoit

Abstract Name: Empathy Avoidance Based on Perceived Cognitive Costs: A Replication of Cameron et al.'s (2019) Study

This research project aims to replicate Cameron et al.'s (2019) investigation into whether people choose not to empathize because they perceive empathy as effortful, aversive, or ineffective. This project seeks to clarify when, why, and how people experience empathy and to determine whether cognitive costs reliably inhibit empathic responding. Empathy, defined as the ability to share in and understand others' experiences vicariously (Cameron et al., 2019), has been shown across multiple studies to predict prosocial behavior, high-quality interpersonal relationships, and compassionate emotions (Beadle et al., 2012; Rabelo & Pilati, 2017; Pang, 2022). Empathy also plays a crucial role in reducing bias, systemic racism, and stigmatization toward disabled, homeless, and Black individuals, and those with AIDS (Batson et al., 1997; Okonofua & Eberhardt, 2015). Recent work suggests that empathy is a motivated phenomenon requiring meaningful effort, and that this effort may undermine people's motivation to engage empathically. Because cognitive costs—such as aversion and perceived ineffectiveness—have been identified as significant reasons why people might avoid empathy (Cameron et al., 2019), and given the broader replication crisis in psychology (Lilienfeld, 2017), a direct replication of this work is both timely and necessary. The present project attempts to contribute uniquely by examining these mechanisms in a contemporary context using child refugee images. To replicate Cameron et al. (2019), 300 participants will complete the empathy selection task, which involves choosing between an “objective” deck instructing detached observation and an “empathy” deck instructing them to infer internal feelings. After 40 trials, participants will complete post-task assessments measuring perceived effort costs. A one-sample t-test will determine whether the empathy-choice rate differs from 50%. It is expected that participants will show strong avoidance of the empathy deck. Results will be discussed in light of the current political and economic climates in which empathy has become increasingly difficult to sustain.

Deeya Kameshetty

Discipline: Physical/Occupational Therapy and Speech Language Pathology

Authors:

#1 Andrea Warner-Czyz

Abstract Name: Age-Related Changes in Infant Vowel Discrimination Under Reduced Spectral Cue Conditions

Spectral resolution, characterized by the number of frequency bands like the number of keys on a piano, affects speech perception. Researchers can reduce spectral resolution by manipulating the number of frequency bands to simulate a cochlear implant, a biomedical device to help individuals hear. Six-month-olds with typical hearing can discriminate vowels (/ti/-/ta/) with unprocessed speech and 32 spectral channels, but not 16 channels, showing infants need more detailed speech information than older children and adults to tell sounds apart. We have less information about how older infants process spectrally reduced speech. This study examined the effects of spectral resolution on vowel discrimination in 9- and 12-month-old infants with typical hearing to determine if older infants require the same amount of spectral detail to perceive differences in vowel sounds. Participants included 66 9- and 12-month-old infants plus 41 6-month-olds from a previously published study. Infants were randomly assigned to listen to speech stimuli (/ti/, /ta/) processed through a noiseband vocoder to reduce spectral information while preserving the temporal envelope cues. The noiseband vocoder simulated a cochlear implant with either 16 or 8 spectral channels. Using a visual habituation paradigm, we measured infants' looking times to familiar and novel stimuli as an index of speech discrimination. Results revealed a significant effect of age and spectral resolution on vowel discrimination. Although 6-month-olds could not discriminate vowel contrasts with 16 channels, 9- and 12-month-olds could, supporting a developmental effect. Additional testing revealed 12-month-olds also could discriminate /ti/-/ta/ with 8 channels, like patterns in older children. Findings indicate that increasing age and auditory experience enhance infant's ability to extract speech cues from spectrally degraded signals, with implications for understanding early perceptual development and optimizing cochlear implant processing for infants.

Paola Kanazeh

Discipline: Economics

Authors:

#1 Paola Kanazeh

Abstract Name: Saudi Hesitation Toward BRICS: Alignments, Tensions, and Vision 2030

Saudi Arabia's delayed decision to fully join the expanded BRICS alliance has raised important questions about how states navigate shifting global power structures. On the surface, BRICS offers clear benefits that align with Vision 2030, the Kingdom's national plan for economic diversification, innovation, and reduced dependence on oil. The bloc emphasizes Global South collaboration, new development financing, and economic growth outside traditional Western-led institutions. These goals appear consistent with Saudi Arabia's long-term strategy. Yet the Kingdom has taken more than a year to finalize its BRICS membership, signaling that the decision is far more complex than it initially appears. This project explores why Saudi Arabia remains cautious despite the apparent alignment between Vision 2030 and the economic agenda of BRICS. Drawing on policy statements, regional scholarship, and comparative analysis of Gulf Cooperation Council (GCC) dynamics, the research examines several overlapping factors. These include Saudi Arabia's deep security and military ties with the United States, its desire to preserve strategic autonomy, and regional concerns, particularly regarding Iran's membership in BRICS. The project also considers the internal narratives promoted through Vision 2030, which position Saudi Arabia as a modern, globally engaged state that can work with all major powers without fully committing to any single bloc. By analyzing these political, economic, and regional layers together, this research offers a clearer explanation for why the Kingdom is balancing enthusiasm for multipolar cooperation with caution about the geopolitical consequences of joining BRICS. Understanding this hesitation matters because it reveals how middle powers in the Global South navigate pressure from both Western institutions and emerging coalitions. Ultimately, the project contributes to broader conversations about global governance, economic diversification, and the evolving role of Gulf states in an increasingly multipolar world.

Meghana Kancharla

Discipline: Political Science

Authors:

#1 Meghana Kancharla

Abstract Name: How are Values Represented in the EU Commission and Speeches by Leaders?

What defines a value compared to a principle? What leaders are taking initiative in supporting constituents and upholding their values? How can data be implemented in this process? In this oral/poster presentation, I will present the aims/missions of our current "PL2" lab project, which illuminate the ways that different leaders spotlight values different values over time. It showcases the lab's interdisciplinary approach, combining computational text analysis and public-facing data visualizations to promote deeper understanding of the European Union's power dynamics. We take bulky amounts of documents, excel, and archived word data that showcases speeches and mission letters, and parse them into sections and categories that highlight how many times a specific commission has mentioned and contributed to keeping the European Values of Human Dignity, Freedom, Democracy, Equality, Rule of Law, and Human Rights intact, using tools like R and Quanteda. Furthermore, through our research, we identify the distinguishing characteristics between principles and these values. Our lab achieves to create data visualizations & websites through this parsed data to showcase and highlight places of work and places of defined, supported values through actions.

Erin Kane

Discipline: Economics

Authors:

#1 Erin Kane

Abstract Name: An Analysis of Misconceptions of the Economy

This research explores why Americans have pessimistic views about the economy even when economic indicators show growth, stability, and recovery. Even with the numbers of rising GDP, low unemployment, and moderating inflation, public sentiment remains shockingly negative. A large contributor to this is the widespread lack of economic literacy. Only half of Americans recall taking an economics course, leaving many without the conceptual tools to interpret data or distinguish between correlation and causation. So, because of this, people often fall into cognitive biases, such as assuming inflation is solely driven by government overspending or assuming inflation is caused mainly by corporations unfairly raising prices while overlooking factors like global supply chain disruptions, labor shortages, and post-pandemic recovery progress. Media coverage also further complicates public understanding. Economic reporting tends to track the experiences of wealthier households because aggregate indicators such as stock performance incorrectly reflect upper-income gains. In the meantime, stories about inequality or wage stagnation receive less recognition, which in total creates a skewed picture of overall conditions. Politics amplifies these misconceptions. Many voters believe the economy is improving only when their preferred party is in power, creating sharp divides in consumer confidence and expectations. These forces contribute to what economists call a “vibecession” or a recession in vibes rather than in a measure of economic data. Even when data shows stability, negative public feelings can slow consumer spending, reduce business investment, and influence decisions. This means people’s negative feelings can actually impact the economy. By analyzing education gaps, cognitive biases, media coverage, and political division, this research explains how misconceptions take place and why they continue to happen. In the end, the idea is that better economic education and clearer reporting can help shrink the gap between what the economy is actually doing and how people think it’s doing.

Emily Kangal

Discipline: History

Authors:

#1 Sid Ray

Abstract Name: The Pilkësh Woman: Indigenous Women’s Erasure in Manahatta’s Archival Record

On September 15, 1655, the former State’s Attorney of New Netherland, Hendrick van Dyck, murdered an Indigenous Lenape woman who was picking peaches from “his” Manahatta orchard, located somewhere between modern day Broadway and Morris Street. This incident would lead to the Peach War of 1655, a historically contentious day-long occupation of Manhattan, Staten Island, and local New Jersey by outraged Indigenous people. In the archival record this Indigenous woman is mostly erased and defamed with racist slurs – her name is at this point unknown, and her life and death questioned for historical relevance. In contrast, Dyck’s life and gilded legacy are well-documented beyond the archival record, despite his direct involvement in the genocide of Lenape natives. Even to Peter Stuyvesant and William Kieft, he was considered unlikable and incapable. I call this Indigenous woman the Pilkësh (Lenape for “peach”) woman,

as she has no historically supported name, and she was thought to have been picking peaches at the time of her death; her relative absence in the archival record is representative of a larger erasure of Indigenous women in academic and historical texts and tangible spaces, where they are most likely to be forgotten or intentionally excised from narratives due to political, racial, patriarchal colonial systems. In this project, I attempt to recover the Pilkēsh woman's story through archival records and maps, like the NYC Metropolitan Archives and New Netherlands digital archive. Given the paucity of material, I first identify Dyck and the location of his orchard and supplement the gaps with secondary historical sources. This research contributes to the acknowledgement of colonization and intervenes in the erasure of indigenous women in archival records, academic spaces, and historical texts, an erasure that I connect to modern day injustices against Indigenous women.

Sruthi Kannajoshiyula

Discipline: Biology

Authors:

#1 Keertana Surabhi

#2 Erzsebet Szatmari

#3 Robert Hughes

Abstract Name: Do neurodegeneration-associated actin mutations reduce neuronal survival?

Background and Hypothesis: Cofilin-actin rods and large actin inclusions are associated with neurodegenerative diseases, including Alzheimer's disease. Previous studies have shown that early cytoskeletal abnormalities, particularly involving actin inclusions, contribute to neuronal vulnerability. Understanding how different actin residues contribute to abnormal cytoskeletal structures is critical to understand neurodegeneration. In this study we investigated the effect of K18A and D154A actin mutations on neuronal survival. These mutations are located in the ATP-binding domain of actin and lead to inclusion formation in neurons. We hypothesized that these inclusion-forming mutants will increase neuronal vulnerability and reduce neuronal survival. **Methodology:** Cortical neurons were dissociated from E18 mouse embryos and plated on PDL/Laminin-coated 12-well plates (500,000 cells/well). On DIV5, neurons were transfected with GFP-labeled K18A and D154A actin constructs. Forty-eight to seventy-two hours post-transfection, neurons were fixed and immunostained for MAP2 and NucBlue™, and then imaged using confocal microscopy. Nuclear integrity and fragmentation were assessed in ≥ 50 transfected and ≥ 100 non-transfected neurons per coverslip. Cells were manually counted using FIJI/ImageJ by identifying GFP-positive neurons for the transfected population and NucBlue-labeled nuclei for the total population. Cytoskeletal inclusions and neuronal viability were quantified using FIJI/ImageJ. Basal neuronal death was low (12.7-11.3%) in the non-transfected population, indicative of healthy cultures. We found that neither of the two inclusion-forming constructs enhanced neuronal death. Basal neuronal death in the K18A-transfected neurons was 8.7%, while in the D154A-transfected neurons was slightly higher, at 17.6%. These preliminary studies from two independent experiments indicate that the K18A and D154A inclusion-forming actin mutants might not cause neuronal death. In ongoing studies, we will repeat these experiments and will also evaluate the effect of a rod-forming mutant (G158L) on neuronal survival.

Summer Kantanen

Discipline: Physics and Astronomy

Authors:

#1 Summer Kantanen

#2 Jason Czak

Abstract Name: The Impact of Spatially Localized Feed Parameter Perturbations on Reaction-Diffusion Systems

The Gray-Scott Model is a prominent reaction-diffusion system that comprises two chemical species, u and v , which interact through complex reactions and transformations. By manipulating parameter values within the model, spatiotemporal patterns emerge that mirror essential biological, chemical, and physical processes, including DNA oligomer formation, skin pigmentation development, and oscillatory chemical reactions. While extensive studies have typically focused on fixed parameter values, this research innovatively introduces specially defined functional forms that spatially vary key parameters throughout the lattice. Specifically, by employing sinusoidal and other oscillatory functions to modulate parameter values, we can seamlessly integrate the dynamics and behaviors characteristic of diverse parameter settings within a single reaction framework. This novel approach not only reveals a spectrum of unique and intricate patterns but also enhances the model's applicability, extending its relevance to a broader range of natural phenomena. Through this exploration, we aim to deepen our understanding of reaction-diffusion systems and their potential implications in both theoretical research and practical applications.

Suravi Kanugula

Discipline: Psychology

Authors:

#1 Sophia Hartenbaum

#2 Aaron Schurger

#3 Tomáš Dominik

Abstract Name: Investigating the Effect of Introspective Reports of Freedom on Volition Using Social Desirability

This project investigates the relationship between an individual's perception of their freedom and how free they actually are when making decisions. The central research question asks whether individuals recognize when subtle social factors are shaping their decisions or if they genuinely believe their choices are being made freely even when they clearly are not. Social desirability is the tendency to present oneself in a favorable light. It is commonly measured through scales such as the Marlowe-Crowne Social Desirability Scale (MCSDS) and the Balanced Inventory of Desirable Responding (BIDR). This study will test whether the presence of an onlooker influences the participants' responses in the social desirability scales, and whether they are aware of that influence. Participants completed the MCSDS and BIDR scales in two conditions: one where an onlooker was present and one where they were alone. Contrary to our expectations, we did not find an effect of the onlooker's presence on either the MCSDS and BIDR scores, nor the perceived influence reports. This finding is interesting, as it contradicts the intuition that when another person is present, our tendency to create favorable social impressions should increase. Additionally, we found that the participants reported feeling more influenced after answering questions from the BIDR scale than the MCSDS. This finding is surprising, as it indicates an important inequality between the two scales, which have otherwise been considered equivalent. The experimenter's presence didn't significantly impact the influence reports therefore future research should examine whether the lack of observable influence persists across different contexts, populations, and types of social presence.

Prithvi Kapilavai

Discipline: Computer Science

Authors:

#1 Prithvi Kapilavai

#2 Aavrut Khansaheb

Aavrut Khansaheb

Abstract Name: Predicting the Overall impact of using AI in education by employing multiple predictive Algorithms

The AI usage in education is increasing at a rapid rate but its impact on education is not fully comprehended. In this study we investigate three datasets which are directly related to students and their perception of AI usage in education. We developed AI models to predict students' involvement in AI, students intention to reuse AI, and impact of students' grades as they incorporated AI techniques in their day-to-day studies. An attempt is made to correlate three datasets which were modeled individually for the selected output parameters. The first dataset the AI Assistant Usage in Student Life was collected from Kaggle, which simulates 10,000 sessions across multiple disciplines and academic levels. The dataset captures behavioral and performance indicators, including session duration, number of prompts, task type, perceived AI helpfulness, and satisfaction ratings. Google CoLab was used to develop AI/Machine learning based predictive models by employing Random Forest algorithm to predict students' intention to resume AI techniques for their assignments and homework. The model achieved ~82% accuracy. The second dataset is Student AI Education Perception, which contains 5,000 student survey responses evaluating trust, ethical concerns, AI reusability intention. We achieved an RMSE of ≤ 2.3 for the predictive models that employed multiple algorithms. This study highlighted the AI usage in education and its impact on students' grades. The third dataset, Students' Perceptions of AI in Education, is incorporated to evaluate the model's ability to generalize across attitudinal signals and academic outcomes. In this phase, we investigate how the inclusion of students' perception-driven features enhances predictive performance. In the end three models are being integrated to predict the overall impact of AI techniques involvement in students education. Full results will be presented in the conference.

Oliver Kaplan

Discipline: Engineering

Authors:

#1 Tzu-Hsun Kao

#2 Robert Marshall

Abstract Name: Optimal Instrument Alignment Estimation and Attitude Filtering for the COSMO CubeSat Mission

The Compact Spaceborne Magnetic Observatory (COSMO) is a 6U CubeSat mission developed at the University of Colorado Boulder and designed to provide high-resolution measurements of the Earth's magnetic field from space. These measurements are made by a novel instrument called the vectorized rubidium magnetometer or VRuM. Measurements from COSMO will be used to contribute data to the World Magnetic Model (WMM), a global magnetic field model used widely for civilian and military applications including navigation, mapping, and in consumer electronics. In order for our measurements to be useful, knowledge of the precise attitude of the magnetometer is needed at the time of each measurement. For our magnetic field measurements to be highly accurate, we must know the magnetometer's attitude with very high accuracy, on the order of 10 arcseconds or better. COSMO measures its attitude using two star trackers, which capture an image of the sky to determine their own attitude. There are two components to this problem: first, we must accurately determine the geometric relationship between the star trackers and the magnetometer. For this purpose, we have developed an algorithm based on the optimal solution to Wahba's problem, which allows us to determine this geometric relationship from on-orbit data with arcsecond level

precision, without the need for expensive metrology. Next, we must apply a method for combining and refining our two star tracker measurements to provide the best estimate of the magnetometer attitude. We accomplish this task with a variation on a nonlinear Kalman filter, with some adaptation for our specific use case. This method allows us to leverage measurements of spacecraft body-fixed angular rates to achieve attitude estimates that are multiple times more accurate than that of a single star tracker. We have implemented these algorithms in numerical simulations on flight-like datasets to evaluate their performance.

Tanmay Kapse

Discipline: Environmental Science and Sustainability

Authors:

#1 Jennifer Richmond-Bryant

Joshua George

Abstract Name: Bitcoin Mining Facilities, Air Quality, and Social Vulnerability in the United States

The recent explosion of artificial intelligence, cryptocurrency, and large-scale data mining has resulted in a rapid increase in the construction of data centers and Bitcoin mining facilities throughout the United States. These operations play an influential role in the digital economy, yet their environmental and social impacts are not fully understood. Based on current practices, these operations are resource-intensive, drawing large amounts of electricity from nonrenewable or unsustainable sources and contributing to CO₂ emissions, water consumption, e-waste, and noise pollution. Although their global effects are documented, the current literature provides little insight into impacts on the communities that host them or the processes surrounding their placement. This study explores whether there are discrepancies in population attributes, specifically economic status, race, and education level, between areas near Bitcoin mining facilities and areas farther away. Additionally, we examine air quality, focusing on PM_{2.5} levels near the facilities, compared with the same areas before and after the facilities were built and with tracts farther away. Facility locations were obtained from DataAxle, and socioeconomic and air quality data were collected at the tract level from the U.S. Census Bureau, U.S. Environmental Protection Agency, PurpleAir, and the Centers for Disease Control and Prevention. Using ArcGIS, these data were mapped, spatially joined, and analyzed with apportionment to compare conditions within 5 miles of each center to a surrounding 5 to 25 mile radius. We then ran comparison testing in R (v 4.5.0), which included two-sample comparison tests and spatial regression. We have found disproportionate placement of Bitcoin mining centers in low-income areas. The evidence provides policy-relevant insight that can catalyze environmental health research, urban planning approaches, and technology policy toward more sustainable digital infrastructure development.

Ege Karadag

Discipline: Biology

Authors:

#1 Benjamin Vandigo

#2 Emilee Hinrichs

#3 Caroline Clark

#4 Sumei Liu

Abstract Name: Effects of Histamine on Intestinal Epithelial Permeability

Stress has been closely linked with changes in the intestinal barrier function, resulting in elevated intestinal

permeability (“leaky gut”). Increased intestinal permeability is known to be an important factor for various gastrointestinal diseases, including irritable bowel syndrome (IBS) and inflammatory bowel diseases (IBD). Mast cells, activated in response to stress, are responsible for alterations in intestinal permeability induced by stress. Activation of these mast cells releases several chemical mediators such as histamine, which can potentially influence the integrity of the intestinal barrier. However, the exact role of histamine on intestinal permeability remains poorly studied. In the current research, we studied the direct effects of histamine on intestinal permeability by using isolated intestinal tissues of the ground squirrel. Intestinal permeability was measured by monitoring the transepithelial electrical resistance (TER), a reliable marker for paracellular permeability. Initial findings indicated that histamine treatment resulted in a significant decrease in TER. This showed increased paracellular permeability. To differentiate paracellular from transcellular routes, we used two different sized molecules. For paracellular, this study used FITC-inulin (4 kDa). Additionally, to test for transcellular pathway, horseradish peroxidase (HRP, 44 kDa) was used. FITC-inulin and HRP were added to the luminal chamber, with sample measurements of luminal-basolateral transfer for both molecules. Histamine significantly increased FITC-inulin flux in the large intestine reflecting an increase in paracellular transport. However, histamine did not significantly change HRP flux, indicating no increase in transcellular permeability. Additional research will investigate the role of histamine in paracellular permeability mechanisms and pathways to explain its role in intestinal barrier regulation. A comprehensive understanding of histamine's impact on intestinal permeability may yield valuable insights for developing novel therapeutic interventions for stress-induced gastrointestinal disorders.

Raina Karakkattil

Discipline: Biology

Authors:

#1 Ashley Plumb

#2 Zulmary Manjarres

#3 Nya Gayluak

#4 Katelyn Sadler

Abstract Name: Examining the Role of Gut Microbiota in Chemotherapy-Associated Pain

Neuropathic pain and peripheral neuropathy are common and debilitating side effects experienced by patients receiving chemotherapy drugs, such as paclitaxel. While these drugs can directly destabilize axons and glia in peripheral nerves, thereby causing neuropathy, recent evidence suggests that the gut microbiome, microorganisms and metabolites in the gastrointestinal tract, may also contribute to chemotherapy-associated pain. However, it is not yet clear if and how alterations in the intestinal microbiota drive peripheral neuropathy following chemotherapy treatment. To test this hypothesis, we transplanted the fecal microbiota of animals treated with paclitaxel (8 mg/kg, IP every other day for 4 consecutive days) into naive C57BL/6 mice for 3 consecutive days. Compared to vehicle fecal microbiota transplant (FMT) recipients, paclitaxel FMT recipients developed persistent mechanical allodynia, cold allodynia, and ongoing pain that lasted for at least 28 days. To assess whether this behavioral phenotype was associated with anatomical and functional changes of peripheral nerves, we collected hind paw skin and dorsal root ganglia (DRG) neurons from an independent cohort of mice on day 14 post FMT. Histological analysis of nerve fibers (PGP9.5) in the hind paw skin revealed significantly reduced intraepidermal nerve fiber density ($p < 0.05$) in paclitaxel FMT mice compared to vehicle FMT skin. In addition, calcium imaging of cultured DRG neurons (T12-L2) from paclitaxel FMT mice showed a greater proportion of cells responding to application of lipopolysaccharide, a bacterial outer membrane component ($p < 0.01$). Lastly, data on sciatic nerve permeability using sodium fluorescein revealed reduced blood-sciatic nerve barrier integrity in paclitaxel FMT mice compared to vehicle controls. Understanding the gut microbiome's role in chemotherapy-associated pain and neuropathy is key to developing microbiome-targeted treatments, as chemotherapy-related microbiome changes can directly impact peripheral nerve anatomy and physiology. Future work will focus on identifying microbial and molecular drivers of these effects.

Kunal Karambelkar

Discipline: Engineering

Authors:

#1 Girgis Obaid

#2 Chanda Bhandari

Abstract Name: Synergistic combination of immune-targeted photoactivable liposome (iTPALs) and nab-paclitaxel for inhibition of pancreatic cancer

Pancreatic ductal adenocarcinoma (PDAC) is a highly aggressive cancer and the third leading cause of all cancer-related deaths in the U.S., with an average 5-year survival rate of 13%. More than 50% of the patients are diagnosed upon metastasis. For metastatic PDAC, one of the standard of care regimens is nab-paclitaxel, which, even when combined with gemcitabine, only improves survival up to 8.2 months. In our previous studies, we identified that the clinically approved photosensitizer Benzoporphyrin derivative conjugated to lysophosphatidylcholine, or BPD-PC, is an effective agent for photodynamic therapy (PDT). PDT is a light-based anti-cancer treatment modality where photosensitizers are activated by a specific wavelength of light to generate reactive molecular species (RMS), capable of disrupting and modulating the tumor stromal and immune microenvironment. Recently, we harnessed BPD-PC and encapsulated it within a liposome and functionalized the liposomal surface with anti-PD-L1 antibodies to develop immune checkpoint targeted photoactivable liposomes (iTPALs). We found that iTPALs successfully modulate the PDAC tumor stromal and immune microenvironment, resulting in improved survival in mice bearing subcutaneous PDAC tumors by 42.9%. This study highlights the potential of combining iTPAL with nab-PTX to enhance treatment outcomes in patients with metastatic PDAC. In our current study, we investigated the synergy between iTPALs and nab-paclitaxel. We conducted a series of mechanistic studies on murine PDAC cell lines (CT1BA5, 6620c1, C419C5). Dose-response studies revealed a higher synergistic inhibition of the cells with the combination. Flow cytometry showed an increased expression of an immunogenic cell death marker, HSP70, with the combination in comparison to monotherapies. Additionally, we also found a significant increase in G1/S cell cycle arrest with the combination. Thus, these findings highlight the potential of iTPALs to improve the treatment response of nab-paclitaxel in metastatic PDAC.

Buna Karanezi

Discipline: Biochemistry

Authors:

#1 Buna Karanezi

#2 Gavin Shou

#3 Ting Fu

Abstract Name: The Beneficial Effect of Ketogenic Diet to Reduce Mice Body Weight

As obesity rates continue to rise in the US, ketogenic diets (KDs), characterized as a high fat, and low carbohydrate dietary approach, have emerged as a promising strategy for managing obesity. KDs range widely in fat intake with pilot data from the Fu Lab indicating that diets exceeding 85% total caloric intake reliably induce ketogenesis, a metabolic process responsible for the production of ketone bodies. It remains unclear, however, what specific fat intake yields the best physiological and metabolic results. In this study, two ketogenic diets were investigated—80% KD and 90% KD—and its effects on mice body weight, blood

glucose, and ketone body production to mice previously made obese through a high fat-diet (HFD). Three groups of eleven mice were examined: HFD control (n=3), 80% KD (n=4), and 90% KD (n=4). Blood glucose along with β -hydroxybutyrate (BHB) levels were measured on Days 0 and 15, while body weight was measured twice a week throughout the study. The 90% KD produced the most physiological effects in obese mice, resulting in significant weight loss, in comparison to the minimal changes observed from the 80% KD mice group, while the HFD control mice group exhibited continued weight gain. Accordingly, mice in the 90% KD group also exhibited lower blood glucose, reaching 57 mg/dL, and BHB levels, suggesting strong metabolic responses, yet at potential risk of hypoglycemia. These findings confirm ketosis induction at 90% KD highlighting the effectiveness of a very high-fat KD. Due to the study's limited duration, long term sustainability and safety remain uncertain. Future work will incorporate molecular analyses techniques such as PCRs, and Western Blotting to clarify our understanding of KDs influence on metabolic pathways and its connection to the observed physiological changes.

Sumaiyah Kareem

Discipline: Social Work and Human Services

Authors:

#1 LB Klein

#2 Indigo Shideler

#3 Taylan Stulting

Abstract Name: Exploring the Impact of Policy Changes on Sexual Violence Services for Marginalized Survivors

This project examines how recent federal policy changes and broader sociopolitical shifts in the United States are reshaping sexual violence services, with particular attention to impacts on marginalized communities. We analyzed 106 websites from national organizations and state sexual and domestic violence coalitions and compared versions from 2024 and 2025 to identify changes in publicly available resources. Using a structured survey tool, we evaluated each site for meaningful inclusion, limited mention, or absence of information related to trans and nonbinary people, LGBTQIA2S+ communities, BIPOC, Indigenous peoples, immigrants, non-English language resources, disability and accessibility, and reproductive health (e.g., abortion, Plan B, and contraception). In addition to this website analysis, we conducted interviews with over two dozen professionals working in sexual violence services and training and technical assistance who provided qualitative insight into how policy shifts are affecting resource delivery and survivor support. Together, these methods allow us to capture both the online presence of services and the lived realities of those navigating institutional changes. Early findings point to patterns of omission, where marginalized groups are not mentioned at all, and erasure, where previously available information has been removed. These changes raise important questions about accountability, transparency, and the politicization of survivor support. By highlighting how policy climates directly shape access to care, this project underscores the urgency of inclusive and equitable outreach. The findings contribute to broader conversations about justice, representation, and the responsibility of institutions to ensure that survivors from all communities can find the resources they need.

Krishna Karra

Discipline: Engineering

Authors:

#1 Noel Aloysius

Abstract Name: AI-Driven Sensor Systems to Improve Yields in Smallholder Specialty Crops

We are proposing to develop an AI-sensor driven farm management system that continuously monitors several environmental variables (e.g., soil water potential, humidity, air temperature, sunlight, plant growth) at a specialty vegetable crops fields. The system will estimate four key vegetation growth and health metrics (VGHI), nutrient availability (NAI), light dose (DLI), and disease risk (DRI) then uses AI pattern recognition to automatically generate actionable alerts: critical RED alerts (sensor failure, immediate action) trigger SMS + emails within 2 minutes; ORANGE alerts (hidden stress like physiological drought or disease outbreak risk) send push notifications within 30 minutes with specific recommendations (e.g., "Increase irrigation to fix root zone salinity" or "Spray preventative fungicide now"); YELLOW alerts (preventative warnings) batch into hourly emails; and GREEN signals quietly confirm the system is optimized. The system learns from a knowledge base that we trained based on extensive records of University Agricultural Extension Service documents provide recommendations tailor-made for the local conditions, weather, types of crops and local and regional market prospects. In addition, our proposed system will also estimate plant water requirements, track available soil water, and automate an irrigation and fertigation schedule for optimal plant growth. The system will be designed such that it will be able to integrate multiple crops and variable planting schedules (lettuce, tomato, pepper, microgreens, etc.) by storing crop-specific targets (e.g., lettuce needs 12-16 mol/m²/day light, tomato needs 18-25). The system will be designed to learn from and provide improvements to the actual ground conditions as the growing season progresses. Our ultimate goal is to develop a system that can improve specialty crop productivity, minimize resource use and maximize net income for smallholder farmers.

Krishna Karra

MO - University of Missouri - Columbia

Discipline: Engineering

Authors:

#1 Noel Aloysius

Abstract Name: Smart Irrigation System for Specialty Crop Production at South Farm

Inefficient irrigation in specialty crop production leads to water waste, uneven crop hydration, and high labor demands. This project develops and field-tests a low-cost, scalable smart irrigation system for specialty crops at the University of Missouri's South Farm. The system integrates an ESP32-based controller that operates multiple solenoid valves and an electric pump with a METER ZL6 soil data logger and an ATMOS 41 weather station. Sensor and weather data are transmitted via cellular connection to ZENTRA Cloud and a Raspberry Pi running Home Assistant, which together provide a reliable control hub. An irrigation algorithm combines soil moisture thresholds with reference evapotranspiration (ET_o) from the Climate Engine API to decide when and how long to irrigate each zone. When thresholds are exceeded, the controller automatically starts the pump and opens the appropriate valves, logging each event and sending email notifications; a gas-powered pump provides a manual backup to ensure irrigation continuity. A Flask backend with a React-based web dashboard allows researchers to visualize soil moisture and weather conditions in real time, monitor pump and valve status, adjust scheduling parameters, and view zone locations on an interactive map. The system is currently deployed for field trials on specialty crops, where we are evaluating water-use efficiency, soil moisture stability, and labor savings compared to conventional manual irrigation. Preliminary observations indicate more stable soil moisture and reduced unnecessary irrigation events. At NCUR, we will present the system architecture, deployment experience, and quantitative results on water savings and management efficiency, highlighting how this approach can support climate-resilient, data-informed irrigation in specialty crop production.

Discipline: Environmental Science and Sustainability

Authors:

Abstract Name: Plant Breeding: A Genetic Crisis

Plant breeding has become invaluable in the modern world as it improves crops by increasing yield and nutrition, enhancing flavor, and fortifying resistance to environmental stressors; yet, it also decreases genetic diversity among plant species, making them more susceptible to disease, and it makes plants more reliant on human interference to grow, exacerbating the negative environmental impacts associated with current industrial agriculture techniques. This shows a clear dilemma, as plant breeding is necessary to support crop production amid growing population and climate change, but it is also dangerous as it opens the possibility for a single disease to wipe out major staple crops. In order to fully explore the repercussions and possible solutions to this dilemma, scientific research regarding genetic diversity, manipulation, and climate change must be studied while also focusing on the humanitarian impact by looking at case studies of different communities' reliance (or non-reliance) on plant breeding around the world. While methods of addressing food insecurity and genetic diversity have been implemented in the past, the cultural impacts of changing agriculture in different communities across the world is rarely a central focus. Considering the necessity of plant breeding and industrialized agriculture, yet the deterioration of plant health and environmental damage associated, there is no clear solution to this issue. Despite this, there are undoubtedly three vital steps that must be taken in order to address issues associated with plant breeding: there must be encouragement of genetic diversity in agriculture, investment into research on plant genetics, and multinational agreement regarding how to increase crop genetic diversity. If nothing is done to address the issue of the continuous decline of plant genetic diversity, many of humanity's needed agricultural products could go extinct and bring with them massive environmental damage and food insecurity.

Dunil Karunaratne

Discipline: Biology

Authors:

Abstract Name: Dose-Dependent Effects of Lead Exposure on Zebrafish: Implications for Survival, Development and Behavior

Lead (Pb) is an environmental toxin known to impair neurodevelopment. Understanding the molecular and developmental mechanisms underlying lead-induced toxicity is critical for designing risk assessment and developing protective measures for Zebrafish in their natural environment. This study aims to (1) determine the lethal and sublethal concentrations of lead exposure in zebrafish embryos and larvae, and (2) evaluate the impact of lead on zebrafish growth, morphological development, behavior, and gene expression. Embryos were exposed to increasing concentrations of lead nitrate (0, 25, 50, 100, 250 micrograms/liter) under standard conditions. Mortality and developmental abnormalities - such as delayed hatching, pericardial edema, impaired swim behavior, and spinal curvature - were assessed at multiple time points up to 7 days post fertilization. Growth metrics and behavioral changes were quantified using image analysis. Results from preliminary trials show a dose-dependent relationship between lead concentrations and growth abnormalities. The findings from this research can be used to enhance the current understanding of lead toxicity mechanisms, support environmental efforts, and contribute to the early identification of biomarkers for human health risk assessment. Zebrafish studies may also serve as a platform for screening potential therapeutic agents to mitigate lead induced damage.

Thiviya Karuppasamy

Discipline: Biology

Authors:

#1 Mitchell Gerken

#2 Sehgeet Kaur

#3 Abbi Green

#4 Haijie Liu

#5 Song Li

#6 Boris Vinatzer

Abstract Name: Hands to Plants: An Investigation Of The Effect Of Human Touch On The Lettuce Leaf Microbiome

Growing edible plants in public spaces has the potential to reduce carbon dioxide emissions from buildings and assist those frequenting the spaces who are experiencing food insecurity. However, growing plants in public settings puts them at risk of disease due to possible exposure to plant pathogens; additionally, publicly grown plants could present a health risk when consumed because of their possible contamination with food-borne pathogens by the people frequenting the space. To investigate these plant and human health risks, we used both our lab space and a Virginia Tech classroom to grow plants hydroponically with different levels of human interaction; occupants were instructed to touch some of the plants and stay away from others. For culture-independent study, plant leaf-associated bacterial communities were analyzed by 16S rRNA sequencing over multiple experimental periods of 3 months each. Nutrient solutions obtained from the tanks of the hydroponic systems were sampled simultaneously and also studied using 16S rRNA sequencing. For culture-dependent study, plant leaf-associated bacteria were cultured on Reasoner's 2A agar following the Spring 2025 semester trial and analyzed by whole genome sequencing. The plant microbiomes were expected to be minimally affected by humans in the absence of direct contact and strongly affected by touch. However, in our culture-independent study, we found no consistent differences in taxonomic composition between plants with differing exposures; alpha diversity values were similar, and no single operational taxonomic unit was enriched in any set of plants. Known opportunistic pathogens were identified across plants both touched and untouched by room occupants. In our culture-dependent study, bacterial abundance increased as much as 244% in plates cultured from plant leaves touched by room occupants as compared to those left untouched. While these preliminary results suggest minimal risk of transmission of human-associated bacteria to plants, more experiments are planned to confirm this conclusion.

Amulya Karur

Discipline: Nursing and Public Health

Authors:

Abstract Name: Access to Maternal Healthcare Devices in Rural Bihar: The Role of Ultrasound in Maternal Mortality Outcomes

Bihar accounts for one of the highest maternal mortality rates in India, nearly twice the national average, and despite national progress in antenatal care expansion, rural women continue to face preventable, life-threatening complications due to limited access to essential diagnostic devices. While maternal health inequities in rural India have been widely documented, the specific role that portable ultrasound plays in shaping survival

outcomes in low-resource settings has received far less focused attention. By integrating public health, biomedical engineering, and health-systems analysis, more operational insight becomes available regarding how diagnostic access, or the lack thereof, directly affects the timing of intervention. Existing research shows that inadequate infrastructure, uneven device availability, and high out-of-pocket costs delay the detection of complications such as malpresentation, preeclampsia, and fetal growth restriction, all of which contribute to preventable deaths. Additional determinants shaping maternal outcomes, including geographic disparities, cultural norms, and rural health-system fragmentation are also relevant, but none operated as strongly or consistently as diagnostic inequity. There were four major areas of focus in my study: (1) identifying how gaps between antenatal-care coverage and quality impact early screening, (2) analyzing the distribution barriers that limit access to portable ultrasound, (3) evaluating the financial burden imposed on low-income families seeking diagnostic services, and (4) assessing how insufficient provider training diminishes the clinical value of available devices. Collectively, the evidence shows that improving maternal survival in Bihar requires not only technological innovation, but also equitable distribution systems, sustainable financing, and comprehensive training frameworks to ensure that portable ultrasound fulfills its intended purpose.

Bharath Kashyap

Discipline: Engineering

Authors:

#1 Preeya Achari

#2 Caitlyn Collins

Abstract Name: The Effects of Osteosarcoma on Whole Bone Properties

Osteosarcoma (OS) is the most common type of primary bone cancer, affecting mostly children and adolescents. OS typically develops in the long bones and disrupts normal bone formation, causing structurally abnormal and weakened tissue. The goal of this study is to evaluate the impact of OS on the structure and mechanical integrity of the whole bone to assist in treatment planning and patient recovery using an orthotopic OS murine model. Mice were injected with OS cells in the right tibia, with the contralateral limb serving as a control. After 21 days of tumor development, mice were sacrificed and both limbs were extracted. Each tibia was scanned using micro-computed tomography (micro-CT) at an 8.44um voxel resolution. Bone morphometric parameters such as total volume, bone volume fraction (BV/TV), trabecular thickness, cortical thickness, and cortical porosity were quantified using Dragonfly. BV/TV and trabecular thickness were analyzed in the trabecular region near the proximal head of the tibia and cortical parameters were analyzed 37% (closest to OS tumor cell injection site) and 75% distally from the growth plate. After scanning, uniaxial compression testing was performed on all tibiae until failure to evaluate mechanical properties such as stiffness and ultimate load. Preliminary data shows that tumor-bearing limbs have significantly higher cortical porosity and thinner cortical thickness than controls, effects typical of OS-induced bone weakening. Total volume generally trended higher in tumor-bearing specimens, but both cortical and trabecular regions showed a slightly lower total volume than normal regions, suggesting more bone destruction in these regions. There were no significant differences in cortical parameters at the 75 percent site suggesting the effects of osteosarcoma are more localized. Understanding how OS alters bone structure and integrity will support the development of improved treatment strategies and fracture risk prediction for clinical OS patients.

Jogi Katende

Discipline: Business

Authors:

Abstract Name: Global Sustainable Stock Portfolios from an Investors Perspective

Sustainability is an increasingly important aspect of our world, yet many retail and institutional investors are unfamiliar with sustainable investments and do not consider them relevant. This research addresses the gap by empirically evaluating publicly traded sustainable stock investments and compares them to traditional investment alternatives. We propose using B Lab certification as a sustainability benchmark since B Lab certification is obtained by companies that strive to maintain stringent Environmental, Social, and Governance (ESG) scores. B Lab certification is challenging to attain and maintain, and therefore has become a significant standard for identifying sustainable investments. To demonstrate the potential outcomes of sustainable stock investments, our research constructs and compares multiple portfolio strategies composed of B Lab certified companies and relevant non-certified peers. We assess these strategies against traditional investments such as the S&P 500 to evaluate risk-adjusted returns, and long-term performance. Additionally, we conduct event analyses to measure the effects of sustainability-related social media events on the performance of sustainable portfolios. In particular, we quantify the impacts of sustainability-related social media posts from Elon Musk on the short-term performance of various sustainable investments, providing valuable insight into the effects of social media discourse and sentiment on sustainable investments. This research analysis on sustainable investments spans variations in company size, industry sector, and global region, offering a comprehensive evaluation of how sustainable investments perform in different market environments. Furthermore, by incorporating the effects of social media discourse on sustainable investments, this research contributes to a more nuanced and practical understanding of sustainable investments. We hope to equip investors with knowledge about sustainable investment alternatives and encourage informed participation in sustainable investing.

Sai Kathuroju

Discipline: Engineering

Authors:

#1 Keith Li

#2 Rebecca Heise

Abstract Name: Differential Elevation of IL-33, IL-6, and IL-4 in Bronchoalveolar Lavage Fluid following Micronanoplastic and Alternaria Exposure in a Murine Asthma Model

Asthma is a chronic inflammatory disease of the airways mediated by complex cytokine networks. Environmental exposures such as airborne micro- and nanoplastics (MNPs) may exacerbate airway inflammation when combined with common aeroallergens. In a prior study, intranasal exposure to 3D-printer-derived MNPs induced marked declines in lung mechanical function in mice. This was seen to exacerbate the asthmatic impact of allergen exposure alone and revealed a potential environmental risk factor for asthma severity. Building on those findings, the current study aims to characterize specific cytokine responses in bronchoalveolar lavage fluid (BALF) following exposure to MNPs coupled with the Alternaria allergen (MNPAAF) compared to the Alternaria allergen alone (AAF). C567BL/6 mice were assigned to three groups: saline, alternaria only, and combined alternaria + micronanoplastics. After an 8-day exposure regimen, BALF was collected, and levels of Interleukin-33 Th2 cytokine early alarmin, Interleukin-6, and Interleukin-4 Th2 cytokine were quantified by ELISA assay and analyzed using Gen5 software. These cytokines were selected due to their established roles in allergic airways inflammation and suspected elevation in both the AAF group and MNPAAF group. IL-33 acts as an epithelial “alarmin” molecule to promote type 2 immune activation while IL-4 acts in the immune cascade on downstream allergic responses. IL-6 is a pro-inflammatory cytokine which shows its effects as bronchial constriction, bronchospasms, and other asthma-induced complications. In previous research, exposures to micro/nanoparticles (MNPs) generated from 3D printing emissions led to a significant and progressive decline in lung mechanical function, characterized by reduced

dynamic compliance and elevated airway resistance, tissue damping, and elastance. These alterations in respiratory mechanics were more severe than those induced by *Alternaria*, a known biological allergen. Previous results suggested that inhaled MNPs contribute to airway hyperresponsiveness and structural remodeling of lung tissue, likely through inflammatory and biomechanical disruption of both airway and parenchymal components.

Daniela Katlabi

Discipline: Psychology

Authors:

#1 Daniela Katlabi

#2 Jessica Sim

Abstract Name: Exploring Perceptions of Autism Spectrum Disorder Accommodations

This literature review explores the role of fairness, prejudice, and norms in how people perceive ASD accommodations. Approximately 3% of people in the U.S. have autism, highlighting the importance of understanding accommodations for neurodevelopmental disorders. Neurodevelopmental disorders are “developmental deficits or differences in brain processes that produce impairments of personal, social, academic, or occupational functioning” (DSM-5-TR, 2022, p. 36). Examples of these disorders include autism spectrum disorder (ASD), attention-deficit/hyperactivity disorder, and dyslexia (Office of Minority Health, 2025). Many of these individuals identify as “neurodivergent” rather than “neurotypical” (Healy, 2024). In general, educational and workplace accommodations help individuals with physical and mental impairments to be successful. For example, educational accommodations may include longer verbal response time from the student, short breaks to leave class, and extra time for exams (Wheeler, 2014). Furthermore, workplace accommodations may include service or emotional support animals, flexible breaks, and workplace modifications for sensitivity to light and noise (JAN, 2025). This review found that although individuals with ASD are legally entitled to workplace and school accommodations, stigma persists. Common stereotypes include being viewed as incompetent, awkward, cold, unsociable, aggressive, unintelligent, frightening, and even dangerous (Patton, 2018). Additionally, studies have shown that when neurodivergent students are provided accommodations and outperform their classmates, neurotypical students may view these accommodations as unfair (Paetzold et al., 2008). Stigma can also occur when ASD individuals display behaviors that are different from typical norms within the workplace, as what is “normal” for neurotypicals may be challenging for neurodivergent individuals (e.g., neurotypical people may interpret an ASD individual's facial expression as rude; Vargas-Salas et al., 2025). This review shows that it is important to understand these perceptions to minimize the backlash associated with requesting and receiving ASD accommodations.

Leticia Kato Araujo

Discipline: Economics

Authors:

#1 Leticia Kato Araujo

Abstract Name: The Price of Democracy: Foreign Direct Investment and Democracy in Latin America

Foreign direct investment (FDI) has long been theorized as both a catalyst for democratization and a potential source of democratic erosion, particularly in regions marked by political volatility and external economic

dependence. This research examines the role of U.S. and Chinese FDI in Latin America, analyzing how external capital flows contribute to the economic foundations of democratization while also posing risks of dependency and neocolonial influence. By employing a mixed-method approach, the study integrates quantitative data on FDI inflows and democracy indices with qualitative analysis of policy documents and country-specific case studies. By situating Latin America within the broader context of U.S.-China competition and regional democratic backsliding, the project interrogates the paradox of FDI as both a driver of political liberalization and a potential threat to democratic resilience. The findings aim to contribute to ongoing debates in international political economy and international relations, while offering insights into the complex relationship between global capital and democratic development.

Alexis Katz

Discipline: Biology

Authors:

#1 Christopher Clark

#2 Souvik Banerjee

#3 April Weissmiller

Abstract Name: The Biological Evaluation of a Novel Set of Colchicine Binding Site Inhibitors Using A375 Melanoma Cancer Cells

Cancer is one of the leading causes of death throughout the world. This disease is treated using several different methods; however, chemotherapy is the most common. Chemotherapy consists of several different drugs that aim to halt cancer cell growth by targeting fundamental cell functions like DNA replication and cell division. One group of these drugs target tubulin, a fundamental protein involved in cell division. Currently, tubulin inhibitors like taxanes and vinca alkaloids face issues involving toxicity and drug resistance. Thus, new tubulin inhibitors have been synthesized that target the colchicine binding site on tubulin. These compounds known as colchicine binding site inhibitors (CBSIs) are promising future treatments as they are theorized to be less toxic and more likely to overcome drug resistance. In this study, we investigate a potential new set of CBSIs by examining the mechanism of action, functional consequence, and ability to overcome paclitaxel resistance using A375 melanoma cancer cells as a model system. As a result, we find that both CBSIs tested halt cells in mitosis, alter intracellular microtubule dynamics, and inhibit colony formation—an effect that was true in non-resistant and resistant A375 cells. In all, these compounds function in a manner consistent with tubulin inhibitors and should be considered for future studies aimed to characterize their potential as an effective anticancer therapy.

Benjamin Katz

Discipline: Political Science

Authors:

#1 Benjamin Katz

Abstract Name: An Historical Analysis of Collectiveness and Collegiality of the European Union

This paper uses data extracted from documents stored at the Historical Archives of the European Union in Florence to throw new light on the institutional development of the European Commission. The Commission is the European Union's executive/administrative engine, and interpersonal dynamics within the Commission have large effects on policy outcomes. Previous studies have examined collectiveness and collegiality in

national cabinets (Andeweg 1997; Ie 2024; Vercesi 2020) and the Commission itself (Patrin 2020; Scherpereel et al. 2025). These papers, however, focus heavily on conceptual matters and recent administrations. This paper will use a deeper historical approach. I will evaluate how the frequency, duration, and attendance rates at Commission meetings have changed over time (1958-2025), and I will defend these measures as indicators of collectiveness and collegiality. Throughout the EU's history, changes in the number of member-states and the number and organization of commissioners have dramatically affected the dynamics of Commission meetings. I statistically analyze information from thousands of pages of archived documents and attempt to understand how institutional changes have affected the power of individual commissioners, the strength of the collective Commission vs. individual commissioners, and the strength of the Commission president vs. vice-presidents and other commissioners.

Benjamin Katz

Discipline: Philosophy, Ethics, and Religious Studies

Authors:

#1 Benjamin Katz

Abstract Name: Welfare Hedonism and the Improved Experience Machine Objection

In this paper I analyze Roger Crisp and Jennifer Hawkins's reformulation of Robert Nozick's experience machine objection to welfare hedonism (Crisp 2006, Hawkins 2016, and Nozick 1974). The initial experience machine goes as follows: you have the opportunity to plug into a machine which will simulate all possible enjoyable experiences all while your body floats in a vat with nodes attached to your brain. While in the machine, you are not aware that what you are experiencing is fake, as it looks and feels real to you. If you would choose not to plug into a machine like this, then there must be more to life than only enjoyment and elimination of suffering, so welfare hedonism must be incorrect. I argue that there are problems with this reformulation that make it inadequate in its attempt to defeat welfare hedonism. First, I tackle arguments against Nozick's original thought experiment and explain why the reformulation is needed (De Brigard 2010, Kawall 1999, Sumner 1996). Then, I argue that Hawkins's reformulation does not retain the agency of the subject which is present in Nozick's original. Finally, I argue that the reformulation eliminates the spirit of the original by making the machine life indistinguishable from a real life from inside the machine. I conclude that because of these two reasons, Hawkins's reformulation of the experience machine objection fails to defeat welfare hedonism as a possible theory of well-being.

Gayatri Kavumkal

Discipline: Biology

Authors:

#1 Shajer Manzoor

#2 Angela Wahl

#3 J. Victor Garcia

Abstract Name: Analysis of Human Plasma Cytokine/Chemokine Levels During EBV Infection

Epstein Barr Virus (EBV) is a lymphoproliferative oncogenic virus infecting over 90% of the global population. Primary infection is efficiently controlled in healthy individuals by the immune system and EBV establishes life-long latency in memory B cells. Immune-compromised individuals are at-risk for developing EBV-associated tumors. However, it is largely unknown what signals play a key role in orchestrating viral

latency and EBV-induced tumorigenesis. Here we used an in vivo human/mouse chimeric model of EBV to evaluate the profile of circulating human cytokines and chemokines during EBV infection. Following exposure of mice to EBV B-95.8, EBV-DNA levels were measured longitudinally in peripheral blood and in tissues at necropsy using real-time PCR. The presence of macroscopic tumors was also documented at necropsy. We also measured the levels of 38 human cytokines and chemokines in the plasma of mice collected pre-EBV exposure and at necropsy. In this study, 4 out of 11 mice had high levels of cell-free EBV-DNA in plasma at necropsy. A comparison of plasma cytokine/chemokine levels at the time of harvest between mice with high (VH) vs low (VL) viral loads revealed higher levels of several cytokines in mice with high plasma viral load: IFNA2 (188.09 in VH vs 146.59 in VL; pg/ml), IL-1 β (31.89 in VH vs 12.96 in VL; pg/ml), IL-6 (251.40 in VH vs 50.57 in VL; pg/ml), IL-10 (281.18 in VH vs 14.93 in VL; pg/ml), CXCL9 (33436.99 in VH vs 4515.27 in VL; pg/ml), MIP-1B (54.07 in VH vs 27.20 in VL; pg/ml) and PDGF-AA (168.21 in VH vs 107.67 in VL; pg/ml). Future work is needed to determine the role of these analytes in EBV persistence and tumorigenesis.

Jacqueline Kea

Discipline: Chemistry

Authors:

#1 Sharini Rao

#2 Tamer Ezzeddine

#3 Mindy Capes

Abstract Name: Crushed or Not: The Effect of Shell Size on Adsorption

Increased population growth and a higher demand for industrial goods pose a threat to our limited supply of clean water. In an attempt to help eradicate this issue, bioadsorption exhibits promising results by removing contaminants such as dyes from water, offering a cost-effective and environmentally friendly approach. Our research question, "What is the optimal pH of crystal violet solution for pistachio shells in whole and crushed forms to achieve maximum adsorption efficiency?" investigates pistachio as a viable approach to this contamination. To optimize the adsorption of crystal violet, the pistachio shells were sonicated in isopropyl alcohol and dried for 20 hours after being rinsed in deionized water. Using a spectrophotometer, the absorption was monitored of whole and crushed shells in acidic, neutral, and basic conditions of crystal violet. The results indicate that both the whole and crushed pistachio shells exhibited the highest adsorption in basic crystal violet solution. Additionally, there was no difference in the whole shell adsorption compared to the crushed shells. Whole shells measured a percent removal of 84.34% while crushed had a percent removal of 83.57%. This further supports previous research where pistachio shells adsorb the most crystal violet in alkaline conditions and extends our understanding of pistachio shells as bioadsorbents, suggesting that surface area does not play a key role.

Yodahe Kebede

Discipline: Economics

Authors:

#1 Yodahe Kebede

Abstract Name: Microfinance to Battle Poverty: Designing and Evaluating a Low-Interest, Crop-Insurance-Backed Microcredit Model for Agricultural Production in Ethiopia

This study designs and evaluates a low-interest, crop-insurance-backed microcredit model tailored to the needs of Ethiopian smallholder farmers. While traditional microcredit has long been promoted as a poverty-reduction tool, two decades of randomized evidence show only modest impacts on agricultural investment, income, and household welfare. In Ethiopia where climate shocks, liquidity constraints, and limited risk protection suppress productivity the standard high-interest, rigid-repayment model remains poorly suited for smallholder agriculture. Using existing literature, national reports, and household survey insights, this paper develops a policy-relevant experimental framework that integrates low-interest loans (0–5%), index-based crop insurance, and food-bank-linked repayment protection. A multi-arm randomized controlled trial is proposed to isolate the effects of interest reductions, insurance, and their interaction on yields, consumption smoothing, input use, and repayment behaviour. Complementary analysis using secondary data and light simulation illustrates the theoretical channels through which insurance-backed credit can stabilize income and reduce default risk. The study argues that an integrated microfinance model could substantially enhance resilience and productive investment among Ethiopian smallholders, providing a scalable blueprint for policymakers, Microfinance Institutions, and national food security programs.

Will Keck

Discipline: Psychology

Authors:

#1 Will Keck

#2 Ashlea Walsh

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#4 Jarrod Hines

Ashlea Walsh

Jolyanis Muniz-Franco

Abstract Name: Examining Potential Differences in Aging Self-Efficacy Based on Disability Status in Adulthood

Age-related physical and mental health outcomes often differ between people in relation to factors like socioeconomic status, health care access, disability status, nutritional intake, socialization, environmental urbanization, etc. (e.g., Skoufalos et al., 2017). Additionally, as age increases, self-efficacy among people with disabilities decreases in comparison to peers of the same age (Schieman & Campbell, 2001). Our study aims to examine aging self-efficacy in a healthy manner among rural and urban populations. Our sampling relies on online self-report surveys, consisting of questions regarding how healthy the respondents will be or were at several points in their lives; the questions ask about social, physical, and mental health. A section of the demographic questions will ask if the individual has a disability, along with asking whether they have aged with a disability or whether they have aged into a disability. We expect to see that people who have aged with a disability will rate their own current abilities better than those who aged into a disability. We anticipate these results because those who aged with a disability may see the impact of their disability on aging self-efficacy as a normal part of their routine, whereas those who aged into a disability may view their aging self-efficacy worse after onset of disability due to self-comparison.

Colin Keeter

Discipline: Engineering

Authors:

#1 Joshua Tyler

#2 Donald Reising

Abstract Name: Measuring and comparing signal feature variations under degrading temperature versus radiation conditions

Radio frequency (RF) devices in aerospace and other harsh environments experience both temperature extremes and ionizing radiation, each known to disturb signal features used in identification and performance monitoring. This work tests whether temperature-induced variations resemble total ionizing dose (TID) effects sufficiently to support lower-cost screening. We analyze 802.11a waveforms from four emitters under controlled thermal sweeps [-40, 20, & 80° C] and compare against prior TID data [0 4, 8, 12 krad]. Feature extraction targets carrier frequency offset (CFO) and Energy and is then analyzed through statistical metrics including mean, skewness, and kurtosis. Our findings suggest potential similarities in the behavior of CFO under both thermal and radiation stress. By scaling across multiple devices and different dose rates, we derive improved parameters for future experimentation. This research contributes to understanding whether temperature testing can serve as a proxy for certain aspects of radiation testing, to reduce testing costs.

Robert Keirstead

Discipline: Interdisciplinary

Authors:

Abstract Name: How the Far-Right Reads and Dreams: The Metapolitics of Fictional Words

While it is possible to understand all literature as inherently political (Politisches Schreiben: Klein Klärungsversuch, 2022; Das Politische in der Literatur der Gegenwart, 2019), the political novel is a specific genre that can be defined in two ways: (1) novels that depict fictionalized political processes or (2) novels that, through ideologically-tinted ‘metapolitical’ reading practices, are decoded for their political content. As part of a broader investigation into the state of the genre, I examine the original twenty-first century political novels of the latter category, published in English by right-wing publishers. To discern authorial intention and uncover far-right reading practices, I also explore interviews with right-wing fiction authors and commentaries on literature written by far-right activists. This theoretical methodology is inspired by Kølvræ and Forchtner in their study *Imagining Alternative Worlds: Far-Right Fiction and the Power of Cultural Imaginaries*, in which the scholars categorize right-wing fictional works by the ‘cultural imaginary’ they conjure up. I have found that far-right novelists, notably Tito Perdue, Lee Scrivner, Michael “Mike Ma” Mahoney, and Jef Costello variously deploy nonlinear and picaresque plot structures, highly antisocial protagonists, and references to distant historical figures, places, and events to detail their plots which are ultimately engaged in a metapolitical conflict over historical memory. Additionally, I note how the differences between literary criticism published in the White Nationalist outlet *Counter-Currents* and that by the more traditionally conservative author and critic Andrew Klavan underscore the gap that divides the Far-Right from the mainstream Right. This research argues that the deep battle that plays out in their fiction is one for control over historical narrative; these far-right authors strive to recapture a Western civilizational canon that they see as having been stolen and corrupted by the institutions captured by ‘radical leftists’ in the aftermath of the postwar settlement crises of 1968.

Ryleigh Kelley

Discipline: English and Literature

Authors:

#1 Sarah Laiola

Abstract Name: #BookTok: Feminist or Feminized? Reimagining Online Literary Communities

This presentation explores the ways #BookTok, the online literary community based on TikTok, presents a unique opportunity to resist the Western heteronormative patterns reflected through the contemporary American publishing industry and literary culture. Through practices of taste-making such as book decoration, exclusive editions, and embodying the 'Bookish' aesthetic, #BookTok extends culture beyond the container of the novel to the self. This creates a tension that leaves the #BookTok community currently grappling with its purpose and platform: it simultaneously possesses the potential to disrupt the publishing industry, even as it reinscribes its exclusionary patterns grounded in Western heteronormative patriarchy through both the predominantly white female authors that make up its emerging canon, and their narratives' reliance on patriarchal tropes packaged and narrativized as "romance" and "fantasy." Consulting feminist digital humanities scholars, alongside traditional media and cultural studies thinkers, this presentation analyzes the influencer practices that have developed on #BookTok, considering how they contribute to critical taste-making of the novel. Through focused case studies of @thecalvinbooks and @illanaslibrary, I demonstrate how the #BookTok influencer functions similarly to a 'literary critic.' As well, I analyze a selection of #BookTok's "canonical" texts, comparing their narratives alongside the metadata across multiple reader-review platforms such as Goodreads, Amazon, and Barnes & Noble, and how they illustrate their popularity. This data reveals that #BookTok encompasses small pockets and windows for diverse stories to enter into the discourse, thereby posing a challenge for both the publishing industry and modern American literary culture to reevaluate how it may cultivate a literary community that includes a diverse array of creators, such as white women, women of color, and genderqueer individuals.

Fiona Kelley

Discipline: Psychology

Authors:

Abstract Name: The Impact of Graphic Design on Perception

Graphic design is a prominent factor of our everyday life that is often not given much thought by the average consumer. In an increasingly digital world, the application and importance of graphic design has become evident in society globally. This research will examine aspects of graphic design like color, shape, and typography to find out the psychological impacts of these elements on the human brain. This will help readers understand the effect of advertisements on people so that they might better recognize the impact of design on our visual perception of the world around us and, in turn, the effect of these elements on consumer behavior. Graphic design surrounds us daily in the form of advertisements, posters, billboards, product packaging, spatial design, web design, interior and exterior decoration and so much more. Designers and businesses use graphic design as a tool to influence the consumer in a certain way, direct a person to help them navigate through a space, or even guide a user's experience on an online interface. Through the exploration of various studies conducted by psychologists and design professionals that focus on each of the three elements stated earlier (color, shape, and typography) and an overview of the impact of each on consumer behavior, this research will highlight graphic design's profound psychological influence on the human brain and perception. Through the understanding of the importance of graphic design, it becomes evident how designs like the Obama "Hope" campaign posters can make such an impact on the public and the need to recognize the psychological effects of design.

Caroline Kelly

Authors:

#1 Furkan Bestepe
#2 George Ghanem
#3 James Weston
#4 Rachel Barber
#5 Dolly Pramoda
#6 Gordon Huggins
#7 Payam Salehi
#8 Basak Icli

Abstract Name: Sex-Specific Endothelial Actions of an Anti-Angiogenic miRNA in Diabetic Wound Healing

Diabetic wound healing exhibits sex-specific differences, but the molecular mechanisms remain poorly defined. MicroRNAs (miRNAs), small non-coding RNAs that act as key post-transcriptional regulators, are highly dysregulated in Type-2 diabetes (T2D). Increasing evidence suggests that miRNAs may also integrate sex as a biological variable in disease pathophysiology. Here, we investigated the role of endothelial cell (EC)-enriched anti-angiogenic miR-409-3p in sex-dependent regulation of wound healing. MiR-409-3p expression was significantly higher in non-healing human diabetic skin wounds and in the skin ECs of male miR-409 fl/fl mice compared with females. Using tamoxifen-inducible, EC-specific miR-409-3p knockout (miR-409 Ind-ECKO) and floxed (miR-409 fl/fl) littermates fed a high-fat-high-sucrose diet (HFHS) diet, we evaluated full-thickness cutaneous wound closure, perfusion, angiogenesis, and inflammation. Female miR-409 fl/fl mice displayed enhanced wound healing compared with males, with increased perfusion, granulation tissue, and angiogenesis. Interestingly, EC-specific deletion of miR-409-3p eliminated the wound healing advantage in females, resulting in decreased perfusion (31%), angiogenesis (47%) and proliferation reducing healing to male-equivalent levels. These outcomes correlated with increased pro-inflammatory M1 macrophage polarization and elevated expression of inflammatory and endothelial adhesion molecules; IL-1 β , MCP-1, COX-2, VCAM-1, ICAM-1, and E-selectin. Mechanistically, EC-specific neutralization of miR-409-3p increased the expression of zinc finger E-box binding homeobox 1 (ZEB1), a known target of miR-409 with a significantly stronger induction and simultaneously enhanced NF- κ B activation in female miR-409 Ind-ECKO mice (2.75- and 5-fold) compared to males. Collectively, these findings establish miR-409-3p/ZEB1 axis as a novel sex-specific regulator of endothelial angiogenesis and wound healing. Incorporating sex as a biological variable in miRNA-targeted approaches may enable more precise therapies for chronic diabetic wounds.

Elise Kelly

Discipline: Biology

Authors:

#1 Elise Kelly

#2 Matthew Gruwell

Abstract Name: Fungal Diversity on the Penn State Behrend Campus

Fungal Diversity on the Penn State Behrend Campus Elise Kelly (Presenter), Matthew Gruwell Penn State Behrend Biodiversity is an excellent marker of environmental conditions, as robust environments are able to support a diverse number of species. Fungal diversity, in particular, is indicative of multiple environmental factors such as nutrient composition, moisture levels, and air quality. Representations of biodiversity, like field guides and catalogs, simultaneously promote the beauty and importance of biodiversity, while providing information on environmental conditions. The goal of this research is to create a Fungal Diversity catalog of the Penn State Behrend campus, including Wintergreen Gorge, to describe the fungal community and its role in the environment. This will be executed by collecting fungal samples, extracting, amplifying, and sequencing the DNA, and classifying each fungal species. Upon its completion, the catalog will feature each fungus' morphology, location, possible ecological interactions, and phylogeny. This is an ongoing project that will continue until a confident representation of the fungal community has been reached. This research will provide insight into fungal diversity of the environment on the Penn State Behrend campus and encourage students to spend time outdoors identifying fungi and observing biodiversity in nature.

Elise Kelly

Discipline: Biology

Authors:

#1 Elise Kelly

#2 Michael Campbell

Abstract Name: Fungal Microbiome Analysis of Vineyard Soil Samples

Fungal Microbiome Analysis of Vineyard Soil Samples Elise Kelly (Presenter), Michael Campbell Penn State, Lake Erie Regional Grape Research and Extension Center, 662 Cemetery Rd, North East, PA 16428 Soil health is influenced by several factors including the soil microbiome. Soil microbiomes are defined by the biotic and abiotic factors that make up the soil on a microscopic level; i.e., bacteria, fungi, microorganisms, ions, and soil particles. Fungal composition is important for understanding moisture levels, nutrient composition, disease load, and potential mycorrhizal relationships. The goal of this research is to analyze the effect of cover crop and grape variety on fungal diversity/composition of the soil microbiome at Penn State's Lake Erie Regional Grape Research and Extension Center. Over the course of 11-week's, soil samples were collected every two weeks from three grape study groups: Vitis "Concord" with cover crop, Vitis "Concord" without cover crop, and Vitis "Chambourcin" without cover crop. Per grape study group, samples were taken at three different extraction sites in relation to a vine: under the rootstock, between neighboring vines, and between rows of vines. Three replicates of each extraction site were taken per variety. DNA was extracted from 162 soil samples, of which 160 samples were amplified at the Fungal ITS1 region, and sequenced using Illumina sequencing to survey the fungal composition of the soil. Bioinformatic technology will be used to classify and sort genomic data. This project will describe potential patterns and ecological interactions within the fungal community to support a greater understanding of the interactions

between both grape varieties and fungi, and cover crops and fungi. Preliminary data suggests there may be higher levels of diversity in soils with cover crop.

Evelyn Kelly

Discipline: English and Literature

Authors:

#1 Matthew Roth

#2 David Kasperek

Abstract Name: An Abundance of Birds: An Exploration of the Relationship Between Poetic Text and Image

The experimental novel VAS: An Opera in Flatland (2002) by Steve Tomasula and Stephen Farrell is a creative venture into storytelling through both text and design. Photographer and writer Teju Cole synthesises words and images in *The Blind Spot* (2017) to explore the concept of sight. More recently, designer David Crow has written on elements of design that communicate like language in *Visible Signs* (2022). Yet the academic conversation about these types of relationships rarely extends to the relationship between poetry and designed image. The construction of poetry already relies on an artistic vision for line breaks, white space, and text density. The poet's creative decisions may be pushed further when transferred across disciplines to the design processes of typography, photography, and experimental layouts. This project began with writing a poetry collection inspired by Seamus Heaney, Mary Oliver, Wendell Berry, and other poets. These new poems explore themes of faith, grief, art, and the natural world in the context of Italian landscape and architecture. The second phase of the project reimagines the collection through experimental design, resulting in a non-traditional chapbook. Bringing together the two academic disciplines of poetry and visual design, the multimodal chapbook invites readers to encounter the themes of everyday devotion and lament in a more dynamic way.

Kamrynn Kelly

Discipline: Political Science

Authors:

#1 Madison Walker

Abstract Name: The Final Bureaucratic Frontier: Coordinating U.S. Orbital Debris Governance through the Office of Space Commerce

The United States faces an escalating orbital-debris challenge driven less by technological limitations than by fragmented governance. Responsibility for debris mitigation is dispersed across the FCC, FAA, DoD, NASA, and the Office of Space Commerce (OSC), producing duplicated reviews, inconsistent standards, and limited enforcement on orbit. Because debris threatens essential services—including broadband connectivity, weather forecasting, financial-timing infrastructure, and national security missions—this fragmentation elevates systemic risk long before a major collision draws public attention. Historical patterns in aviation, environmental regulation, and industrial safety show that institutional reform often occurs only after catastrophe, an outcome the United States can no longer risk in Low Earth Orbit. The rapid expansion of commercial megaconstellations and persistent gaps in tracking small debris further intensify these vulnerabilities. This project examines whether a unified, performance-based orbital-debris mitigation framework centered on OSC could reduce fragmentation while preserving commercial innovation. The proposed model integrates the Traffic Coordination System for Space (TraCSS) with an interagency code of

conduct and introduces a U.S. Space Sustainability Rating (U.S. SSR): a lifecycle-based metric applied consistently across licensing reviews. The methodology draws on regulatory docket analysis, international benchmarks, historical case studies, and interviews with government and industry stakeholders to evaluate the framework across five criteria: enforceability, transparency, interagency coordination, commercial viability, and political feasibility. The analysis suggests that standardizing debris-mitigation metrics through TraCSS, linking operator performance to regulatory incentives, and consolidating coordination under OSC could strengthen national space-sustainability governance. Preliminary findings indicate that this approach can reduce duplicative oversight, improve data consistency, and encourage responsible operational practices without stifling technological progress. Emerging bipartisan legislative efforts further support the feasibility of designating OSC as the lead civil authority for debris mitigation. This research concludes that proactive coordination offers a viable path for the United States to reinforce leadership in sustainable orbital governance.

Logan Kelsch

Discipline: Computer Science

Authors:

Abstract Name: Automated Discovery of Predictive Structures in Financial Market Behavior Using AI

This research explores predictable structure within financial markets through a systematic integration of several AI techniques. The project begins with the robust collection and preparation of high-frequency market data from the S&P 500 Index. Genetic Programming is then used to randomly generate and aggressively optimize candidate control laws--composite functions built from simple atomic transformations of prices and volumes. These control laws are interpreted as sensor-like features and are evaluated as standalone market direction signals. High-performing control laws are assembled into voting groups (ensembles) that make binary decisions by majority or thresholded voting, providing robustness to noise and regime changes. Ensembles are further leveraged as structured feature inputs to neural-network models, allowing the networks to operate not on raw prices but on a curated layer of behaviorally meaningful, evolved features. To identify robust target parameters for model generation, the solution space is surveyed using risk-normalized Expected Value, realistic frequency constraints, and Monte Carlo permutation testing. Finally, candidate contributions to ensemble performance are quantified using Monte Carlo Shapley approximations, helping distinguish stable, generalizable patterns from artifacts of any single control law. The result of this research is a reusable framework for automated feature exploration, stacking, and evaluation in complex time-series systems, together with an ensemble-building approach that delivers robust, statistically significant gains on independent financial data. For the best-performing ensembles, Monte Carlo permutation tests yield p-values typically below 0.001 (median p appx.= 0.0005), indicating that the observed improvements are highly unlikely to arise by chance. Although this work focuses on S&P 500 index data, the methodology is designed to transfer directly to other symbols and domains where complex, noisy time-series information must be converted into reliable predictive structure.

Ella Kemp

Discipline: Economics

Authors:

Abstract Name: Playing for Passion, Not Pay: Economic Trade-Offs and NIL Awareness in Division III Women's Soccer

Playing a collegiate sport is the dream for many high school athletes, yet the decision to compete at the Division III (DIII) level brings unique challenges. Although DIII athletes commit similar weekly hours to their sport as Division I and II athletes, they are the only group ineligible for athletic scholarships. For women's soccer athletes, this can create hidden financial and personal pressures that shape their college experience. This study investigates how DIII women's soccer athletes experience and navigate out-of-pocket expenses, opportunity costs, and Name, Image, and Likeness (NIL) awareness. A mixed-methods design was used. We surveyed 23 athletes from a DIII women's soccer team and conducted follow-up interviews with a purposive sample to understand patterns in financial strain, career decisions, and NIL perceptions. Most athletes reported low direct financial stress, largely due to family support. However, many players noted that greater university coverage of gear and annual fees would improve their experience. Few athletes work during the season, citing time constraints, and most expressed that soccer commitments limit their ability to pursue academic or professional opportunities. Lastly, despite awareness of NIL, many do not participate due to limited time, low social media following, and uncertainty of how to begin. Overall, athletes acknowledged the financial and time costs associated with DIII athletics. However, most athletes conclude that the community and culture of their team outweigh these burdens. This research offers insight into how DIII women athletes weigh time, money, and future goals. Findings suggest that institutional policies, NIL education, and greater scheduling flexibility could enhance the experience and long-term outcomes for these student-athletes. Understanding the pressures DIII athletes face can help universities strengthen financial transparency, provide targeted support, and expand access to NIL education.

Ella Kemp

Discipline: Environmental Science and Sustainability

Authors:
Helayna Brown

Abstract Name: Return on Investment of the Work of County Land and Water Conservation Departments in Wisconsin

As climate change continues to impact Wisconsin with warmer temperatures and increased precipitation, county conservation departments play a crucial role in protecting soil and water resources. However, it can be difficult to quantify their work. Current state reporting through the Department of Agriculture, Trade, and Consumer Protection (DATCP) Annual Survey captures information on each county's conservation practices, including nutrient management plans, water quality practices, and pollutant load reductions. However, there are concerns that this survey is not comprehensive enough. Thus, in collaboration with the Wisconsin Land and Water Conservation Association, this project aims to (1) assess how effectively the DATCP Annual Survey measures their work, (2) provide recommended revisions to the DATCP Annual Survey, and (3) estimate the return on investment (ROI) of county conservation activities using IMPLAN. We analyzed the 2024 DATCP survey data and conducted semi-structured interviews and a focus group with county conservation staff to identify data gaps and challenges in reporting. Based on our findings, we created and distributed a follow-up survey to conservation department directors to capture data not currently included in state reporting, including staff time allocation, experience, and community engagement. We found that county conservationists spend a significant amount of time building trust with landowners, collaborating with partner organizations, and responding to public complaints, activities that are essential for long-term conservation outcomes. Additionally, we heard concerns about the lack of standardization in how phosphorus reductions are calculated and reported. Overall, these data gaps might lead to staff work appearing less impactful than it is, which can have a negative impact on state funding decisions. By combining both direct and in-direct staff activities and suggesting improvements to measurements going forward, we hope to contribute to more accurate assessment of conservation programs to improve investment amidst a rapidly changing climate.

Grayson Kendall

Discipline: Chemistry

Authors:

#1 Grayson Kendall

#2 Hafsa Khan

#3 William Alexander

Abstract Name: Quantification of Microplastic Release From Bottled Water Under Simulated Daily Use Conditions

Microplastics (MPs) have been detected in human hearts, lungs, and even brain tissue, yet the pathways of exposure remain poorly understood. As college students routinely leave bottled water in hot cars, set bottles in sunlight, and repeatedly twist caps open and closed, we hypothesized that these everyday conditions may significantly increase MP release into drinking water. This study quantified MP release from three popular water bottle brands, each with different compositions including virgin and recycled PET plastic. Bottles were subjected to UV exposure for 3 hours in direct sunlight, heat exposure for 6 hours at 55°C, and a combined daily use simulation involving heat, UV, repeated cap twisting, and mechanical stress. MPs were tagged with ethanolic Nile Red dye and vacuum filtered through 1 µm glass microfiber filters, then quantified using a Nikon Ti-E A1R-Si confocal fluorescence microscope. Baseline contamination in untreated bottles ranged from 1,065 to 1,393 MPs per bottle. UV exposure alone increased particle counts by 55% to 132%, while heat treatment produced increases of 91% to 179%. The combined daily use simulation produced the most dramatic increase in MP counts, rising 3.5 to nearly 7 fold above baseline. Recycled PET bottles showed substantially greater vulnerability than virgin PET, with one brand reaching nearly 8,000 particles under daily use conditions. These findings reveal that everyday bottled water use, through the synergistic effects of routine handling, represents a significant and previously overlooked source of microplastic exposure.

Lauren Kennedy

Discipline: Visual Arts

Authors:

Abstract Name: Overstuffed and Understuffed

This painting was inspired by internal turmoil caused by conflicting emotions. Originating from concept sketches of an overstuffed bear, the idea lingered before fully materializing on canvas. During the initial process, it was just the bear, but when observing the composition, it benefited more with the addition of the understuffed bunny. Before the bunny, the bear was alone to convey the emotional weight of feeling overwhelmed. By introducing the deflated bunny, it completed both the visual structure and the emotional dialogue of the work, with the bunny representing feeling underwhelmed. The contrast between the bear bursting at the seams and the deflated bunny symbolizes conflicting emotional states - everything being too much, while at the same time, everything being too little. Representing those opposing emotions, they lean against each other, left forgotten and abandoned in the corner of a room. Painted in acrylic on a 22 x 28-inch canvas, the piece emphasizes texture by using muted tones of brown, green, and blue to evoke a melancholic mood. Using the green as the wall color it accentuates the browns and greys used on the plushes. The layers of color and detailed brushwork recreate the softness of worn fabric, while brighter reds highlight exposed seams from previous attempts to sew the rift in the original stitching. Ultimately, this work acts as a psychological self-portrait through objects. The bear and bunny are metaphors for vulnerability and resilience, revealing how opposing emotions often inhabit the same space—where one can be both bursting and collapsing at the same time.

Franklin Kennedy

Discipline: Engineering

Authors:

#1 Angel Olivas

#2 Franklin Kennedy

SLAVA OWENS

Abstract Name: Drone-deployed wireless Field Charging Station

This project presents the design and development of a Self Deployed Wireless Drone Charging Station, aimed at addressing the growing need for autonomous drone support infrastructure. As the drone industry rapidly expands, particularly in autonomous operations, there are current limitations in charging compatibility, human dependent setup, and limited flight range hinder scalability. Our design provides a portable, solar powered charging platform that can be deployed and retrieved by a drone without human intervention. The system utilizes wireless inductive charging to eliminate the need for physical connectors, supported by a 60-watt solar array, lithium-ion battery pack, and DC-AC inverter for autonomous energy conversion and delivery. The structure features a lightweight aluminum frame with ASA reinforcement for weather resistance, fiberglass over the charging coils for efficient power transfer, and TPU bumpers for impact protection. Initial prototypes will be 3D printed in PETG to validate design functionality and durability. Estimated prototype fabrication time is approximately 32 hours, with a projected cost between \$400–\$500. Potential applications span civilian, industrial, emergency, and military uses, particularly in remote or off grid environments requiring sustained drone operations. Future development will integrate AI based fleet coordination to optimize charging schedules and flight patterns, evolving the system into an intelligent, scalable infrastructure for autonomous aerial networks.

Emma Kenney

Discipline: Biology

Authors:

Abstract Name: Exploring the relationship between two parasites of American beech (*Fagus grandifolia*) in the Piedmont of North Carolina

Species-specific symbioses, such as parasitisms, are less common in temperate regions than they are in the tropics. American beech (*Fagus grandifolia*) is a native North American tree that is parasitized by two organisms, often simultaneously. One of the organisms is an annual flowering plant, beechdrops (*Epifagus virginiana*), and the other is a seasonal insect, the beech blight aphid (*Grylloprociphilus imbricator*). While there is literature on both organisms and their relationships to American beech, we found no studies on the interaction between them. Our study aims to collect data on the presence, abundance, and frequency of occurrence of both parasites on individual beech trees and to investigate the relationship between them. Specifically, we focused on how the presence of beech blight aphids affects the abundance of beechdrops parasitizing a host tree during the year of aphid infestation and the following year. We sampled beech trees in mature mixed-species forests in Shallow Ford Natural Area, Alamance County, North Carolina during late summer and fall of 2024 and 2025. At our study site, we found that 54.2% of beech trees had beechdrops present in both years, while insect infestation dropped from 8.3% of beech trees in 2024 to 0% in 2025. Compared to 2024, there was a statistically significant increase in the average abundance of beechdrops on

aphid-parasitized sample trees in 2025 (15.68, 35.55, respectively; $p=0.004$). Our data suggest that during the year in which the beech blight aphid is present, the tree does not support the same number of beechdrops as when the aphid is absent.

Alyssa Kent

Discipline: Biology

Authors:

#1 Alyssa Kent

#2 Daniela Chavez

#3 Emma Riesett

#4 Mia DeVito

Abstract Name: Characterizing Individual Variability In Domestic Cat in Vitro Embryo Development

Studies of in vitro embryo development in felines contribute to improving assisted reproduction techniques (ART) for management of threatened wild cats. Unfortunately, success rates remain low and variable, especially for wild felines. To date, most feline studies have investigated the effect of season, stage of estrus cycle, or age on in vitro embryo development. The objective of this study is to investigate the variability of embryo development outcomes for individual female cats (queens) when season, cycle stage and age are controlled. A total of 40 ovaries from 20 follicular phase females were dissected and high-quality oocytes (grade 1 and 2) harvested, resulting in an average of 8.4 quality oocytes/individual. Oocytes were cultured in media supplemented with 1 IU/mL luteinizing hormone and 1 IU/mL follicle-stimulating hormone for 26 hours followed by in vitro fertilization (IVF). Presumptive zygotes were washed of sperm and incubated for an additional 5 days. All oocytes and embryos were fixed and imaged using DAPI, a DNA stain, no later than Day 8 of incubation. Even with age, season, and stage of cycle controlled, we found that 35% of individuals had low ($<20\%$) embryo development rates whereas 15% of individuals had high ($>50\%$) rates. These results suggest that the individuals themselves are a significant source of variation in IVM and IVF success rates. These preliminary data highlight the need for further inquiry of genetic or epigenetic factors involved in the success of in vitro techniques applied to genetically valuable felids. In future studies, we aim to identify gene expression patterns associated with high and low success rates with the goal of identifying biomarkers of success and/or informing improvements in culture conditions.

Aidan Kerr

Discipline: History

Authors:

Abstract Name: The Newlands Reclamation Act and Its Role in the Genesis of the Dust Bowl: A Historical Analysis

This paper argues that the Newlands Reclamation Act of 1902 played a significant yet understudied role in creating the environmental vulnerabilities that produced the Dust Bowl. By promoting large-scale irrigation, encouraging settlement in arid regions, and enabling intensive monoculture farming, the Act disrupted native grasslands, depleted water resources, and fostered unsustainable agricultural expansion. These federal interventions created a false sense of land security that collapsed under 1930s drought conditions. Drawing on environmental history, policy analysis, and scientific research on soil and climate, this study reframes the Dust Bowl as a human-made disaster rooted in early federal land management.

Luke Kessler

Discipline: English and Literature

Authors:

Abstract Name: Shocking Into Consciousness: The Dismantling of the 'Just War' Narrative

In *The Sympathizer* by Viet Than Nguyen, the sexual assault scene of the film, the Hamlet, leaves the narrator and the Thai audience in a state of shock. This essay explores the audience's perception of the film and provides context to their reactions, which draw on the dehumanizing effects of Americanization. By implementing criticism from scholar Sylvia Shin Huey Chong's work, "Vietnam, the Movie: Part Deux," this essay expands and critiques her interpretation and the text, using theorists such as Walter Benjamin, Edward Said, and Hayden White. Through these theoretical frameworks, this essay interacts with the issue of political influence and submission through depictions of war in Vietnam films. By exposing the effects of American idealism on the audience, the film's influence on the unconscious mind continues to perpetuate war. This essay then contrasts the reception of violence with sexual assault as a method to compare the optical consciousness within extreme dehumanization of the Vietnamese. By exploring the contrast, this work discusses the importance of the sexual assault shock factor as a necessity in dehumanizing the "just war" narrative. Questioning Nguyen's inclusion of sexual assault within the narrative, this essay investigates the purpose of its inclusion while cautioning its methods. As a method of dehumanization, the sexual assault scene is argued to provide a clear path towards humanization, reclaiming the Vietnamese ability to control its own narrative. By aligning literary theories alongside this novel, this paper cautions against the complicity to the fabrication of the Eastern narrative in Western media. Calling on audiences to promote their individual narrative and counteract the idea that we cannot represent ourselves. I want to further thank the selection committee for taking the time to consider my application.

Jacie Ketchum

Discipline: Art History

Authors:

Abstract Name: Judith Slaying Holofernes and Goddess Kali Through The Gaze of Feminine Rage and Subverting Expectations of Seventeenth and Nineteenth-Century Women In Italy and India, Respectively

This study examines holy women's depiction in art in two different societies, West Bengal, in nineteenth-century India, and seventeenth-century Florence, Italy. While art history scholarship mostly focuses on the passive and submissive holy figures, I will study the violent holy women in art. This comparative research demonstrates that in both societies, the Holy Women were used to inspire resistance against social oppression of women, by reinterpreting existing religious narratives. First, I will discuss and compare the social and cultural aspects of West Bengal, in nineteenth-century India, and seventeenth-century Florence, to provide the historical context for the respective artworks. Second, I will provide a formal examination of artworks representing the respective societies, Judith Slaying Holofernes, and Goddess Kali. Third, I will compare how the composition and formal aspects of the artworks, within the framework of their social contexts, emphasize the women's resistance to social oppression. While Judith symbolizes woman taking control of her life and women's history, Kali frees herself from the social expectation of submission to male power. This research is based on scholarly art history and historical research. This study is important since it is relevant to the contemporary world, where prejudice and violence against women is very common.

Brynn Keyser

Discipline: Education

Authors:

#1 Stephen Podowitz-Thomas

Abstract Name: How Changeable is STEM Intelligence? Mindsets Towards Intelligence of Neurodivergent Undergraduate Students Majoring in STEM

Academic mindset is a pivotal motivator in a student's learning and academic persistence. Students may have a fixed mindset: they believe their intelligence cannot be changed, or a growth mindset: they believe their intelligence is malleable. A person's mindset is dependent on context and impacted by experience, which can lead to more complex views of intelligence that combine aspects of both mindsets. Prior research is inconclusive on whether neurodivergent students have different mindset profiles compared to the general population of students. However, some research indicates unique motivating factors and beliefs on control over success and failure for certain groups of neurodivergent students. The current exploratory study builds on prior studies of neurodivergent students' mindsets by investigating how neurodivergent STEM undergraduates view the malleability of their math/science intelligence. Open-ended survey responses from 115 STEM undergraduates were analyzed through thematic coding. Responses were categorized as representative of a fixed mindset, growth mindset, or a combination of both; and inductively coded to identify patterns in how students defined math and science intelligence and its malleability, as well as the origins of their beliefs. Themes under a growth mindset included: ability to learn more math/science concepts; building STEM intelligence through hard work/practice, the ability to grow intelligence from a foundational strength in math/science; and the ability to improve with patience. Themes under a fixed mindset included: math/science intelligence as an innate quality; negative treatment by others impacting views of intelligence; and prior experiences of effort not yielding success. These findings could help STEM instructors support their neurodivergent students to understand their mindsets, the reasoning for it, and ways to change it if desired. It can be used to educate university STEM faculty on growth and fixed mindsets of neurodivergent students, and use said knowledge to find alternative teaching methods.

Elaine Khachaturyan

Discipline: Biology

Authors:

#1 Elaine Khachaturyan

#2 Leonie Sarkissian

#3 Gautum Gupta

Leonie Sarkissian

Gautum Gupta

Abstract Name: The Correlation Between The Covid-19 Vaccine and The Development of MEWDS

Multiple Evanescent White Dot Syndrome (MEWDS) is a rare, self-limited inflammatory chorioretinopathy that most commonly affects young myopic women. It is characterized by acute photopsias, visual disturbances, and punctate outer-retinal lesions on multimodal imaging. The condition typically resolves spontaneously within several weeks to a few months, with most patients recovering normal visual acuity without specific treatment. However, with the rollout of COVID-19 vaccines, several case reports have

described MEWDS occurring shortly after vaccination, raising questions about whether the temporal clustering reflects true risk or coincidence. This study synthesizes available reports documenting MEWDS onset following COVID-19 vaccination. Demographics data, vaccine platform, laterality, and symptom-onset intervals were extracted for analysis. Since case numbers were small and heterogenous, findings were synthesized descriptively. Across the published literature, most reported cases emerged within several days to four weeks after vaccination. They presented with unilateral involvement and classic clinical features consistent with MEWDS. Notably, the majority of lesions occurred following mRNA vaccination, a pattern potentially influenced by global usage but also biologically plausible. mRNA platforms may elicit robust type I interferon signaling and transient T-cell activation, mechanisms that have been previously implicated in MEWDS pathogenesis through disruption of the photoreceptor-retinal pigment epithelium interface. Conversely, far fewer reports followed adenoviral-vector or inactivated vaccines, suggesting that platform-specific immune profiles may differentially trigger MEWDS in susceptible individuals. Despite the consistent temporal clustering, current evidence remains insufficient to establish causality. Coincidental timing, publication bias, and underlying immune predispositions remain viable explanations. Nonetheless, the available data support a rare but observable temporal association between COVID-19 vaccination, especially through mRNA platforms, and MEWDS, while clinical outcomes remain uniformly favorable. Larger population-based studies and mechanistic investigations are needed to determine whether these events represent a true, platform-dependent risk or reflect background incidence detected through heightened post-vaccination surveillance.

Mokhinur Khakimova

Discipline: Engineering

Authors:
Anya Gingging

Abstract Name: The Interactive Toy for Dogs

The purpose of this project is to develop an interactive solution for dog owners who are frequently away from home and concerned about their pets' emotional and physical well-being. Many dogs experience stress, boredom, and behavioral problems such as excessive barking or aggression when left alone for long periods of time. To address this issue, we designed and built an interactive smart toy that can respond to a dog's behavior, provide entertainment, and support basic training without the owner being physically present. The goal of this project is to reduce loneliness and anxiety in dogs while also giving owners peace of mind. In this experiment, we successfully created a working prototype of the interactive dog toy along with a connected mobile application. The smart toy uses basic behavior recognition to react to a dog's movements and sounds. The mobile app allows owners to observe their pets at home in real time and communicate with them by sending voice messages through the toy's built-in speaker. The toy also includes pre-set training commands and interactive responses to keep dogs mentally engaged. While the overall concept has many possible advanced features, our project focused on building a simplified but functional version that demonstrates the core idea. This project combines concepts from programming, electronics, and artificial intelligence and directly connects to our course by applying these technical skills to solve a real-world problem. Our results show that technology can be used not only for automation, but also to improve the quality of life for pets and their owners. This prototype serves as a foundation for future improvements, including more advanced behavior recognition, additional training features, and expanded app controls.

Jasmine Khalil

Discipline: Engineering

Authors:

#1 Jason Moore

#2 Hang-Ling Wu

Abstract Name: Accessible Multi-View Computer Vision for Real-Time Tool Tracking and Feedback in High-Fidelity Medical Simulation Training.

Simulation-based procedural training is crucial for improving physician proficiency in high-risk medical procedures; however, most existing systems rely on expensive sensors and static setups that lack scalability. While high-end simulators can track subcutaneous tool motion using embedded electromagnetic or force sensors, their cost and complexity prevent widespread adoption. This research addresses that gap by developing an accessible, vision-based simulation framework capable of real-time 3D tool tracking and feedback generation using low-cost multi-camera networks. The system integrates geometric computer vision, embedded machine learning, and procedural analytics to deliver accurate, adaptive feedback during simulated procedures such as central venous catheter (CVC) insertion and colonoscopies. The goal of this work is to make high-fidelity simulation more accessible and ultimately improve procedural safety. We prototype a multi-camera imaging system using low-cost stereo Arducam modules positioned above and beneath synthetic tissue phantoms to capture external and subsurface tool motion. Modular aluminum camera rigs, OpenCV-based synchronization, and a calibration pipeline using ArUco and ChArUco boards provide sub-millimeter geometric accuracy across camera views. Pilot studies demonstrate stable tool-tip detection under variable lighting and confirm the feasibility of real-time 3D reconstruction. Building on this foundation, we propose a scalable, self-calibrating vision architecture with four technical components: (1) adaptive multi-view autocalibration using fiducials, feature matching, and bundle adjustment; (2) real-time 3D pose estimation through HSV segmentation, YOLO-based detection, and temporal smoothing via Kalman filtering; (3) automated feedback generation that compares kinematic metrics (e.g., insertion angle and motion smoothness) to expert baselines; and (4) clinical evaluation across multiple medical simulation centers. This work advances accessible, vision-based simulation by combining calibration and data-driven feedback in a modular, low-cost system. Broader impacts include improved training accessibility and patient safety, as well as generalization to robotic manipulation and human-computer interaction.

Madiha Khan

Discipline: Biology

Authors:

#1 Christine Drea

#2 Caroline Shearer

Abstract Name: How Differences in Social Structure and Resource Availability Relate to Androgen and Glucocorticoid Concentrations and to Parasite Burdens in Female Dominant (*Eulemur coronatus*) vs. Codominant (*E. sanfordi*) Lemurs

In most male mammals, testosterone promotes reproductive and competitive behavior, whereas cortisol governs energetic mobilization, including the stress response to social challenges; both physiological pathways can impose costs, including increased susceptibility to parasites. To meet energetic demands, males often face trade-offs between investing in reproduction versus investing in health. Because females typically have low androgen concentrations, we lack understanding about whether they face similar trade-offs. Lemurs offer a unique opportunity to address this gap because various species show androgen-mediated female dominance. We ask if female lemurs incur measurable physiological costs associated with testosterone and cortisol production by comparing endocrine variables and parasitism in two species that differ in social structure – *Eulemur coronatus* (a female-dominant or FD species) and *E. sanfordi* (co-dominant or CD species) – and co-occur in two ecologically distinct habitats – Montagne d'Ambre National Park (rich site)

and Ankarana Special Reserve (lean site) in northern Madagascar. We quantified concentrations of fecal androgen (fAM) and cortisol (fGCM) metabolites via enzyme immunoassay and assessed relative parasite burden via fecal egg counts. As predicted, preliminary results show greater fAM concentrations across sites in FD females than in CD females; however, both species and sexes show greater fAM concentrations at the lean site than at the rich site, indicating that resource scarcity may drive androgen-mediated competition. Contrary to prediction, CD females tend to have higher parasite egg counts than FD females, suggesting an unexpected benefit of female dominance or cost of co-dominance. Consistent with weather-associated patterns, parasitism was greater at the wetter, rich site than at the drier, lean site. Ongoing analyses will test for a relationship between parasitism and fGCM concentrations, as a possible marker of stress. Once all variables are integrated, this study should clarify the potential trade-offs faced by *Eulemur* and their variation across sexes, social systems, and habitats.

Areeba Khan

Discipline: Biochemistry

Authors:

#1 Carlos Escalante

#2 Karen Cecilia Hernandez Ramirez

#3 Vadim Barnakov

Abstract Name: Characterizing the structural and functional role of the β -hairpin2 motif in AAV genome packaging

Adeno-Associated Viruses (AAV) are considered the gold standard in viral vector gene therapy because of their non-pathogenic nature, tissue specificity, and ability to integrate at specific sites. There are 14 natural serotypes of AAV, which vary in their amino acid composition, influencing the properties of both the capsid and the non-structural Rep proteins responsible for the viral life cycle. Because the Rep-capsid coordination determines the efficiency of assembly, genome loading, and ssDNA delivery, understanding the AAV genome packaging is essential for vector designing and overall safety in gene therapy. In recent cryo-EM studies, we observed that complex formation between the empty AAV capsid and the Rep protein complex is produced by the β -hairpin2 motif within the Rep protein and the five-fold pore of the capsid. The goal of this project was to characterize the role of the β -hairpin2 in the ATPase and helicase activities of Rep68. To investigate this question, the enzymatic activity of three Rep68 mutants was measured: the Rep68 Δ h2 mutant had the complete hairpin (residues 427-434) removed; Rep68(427-429A) and Rep68(432-434A) had the residues mutated to alanine. ATPase assays were run to measure the effect of mutations on ATP hydrolysis. Results show that the removal of the β -hairpin2 had a drastic effect on the ATPase activity, while the two alanine mutants were less impacted. Results from the helicase assay show that the mutations have a similar detrimental effect on their ability to unwind DNA. Taken together, our results show that the β -hairpin2 motor allosterically regulates the motor activity and that interaction with the capsid may also affect Rep DNA translocation activity.

MAHIR KHAN

Discipline: Computer Science

Authors:

#1 Maryam Roshanaei

Maryam Roshanaei

Abstract Name: Towards Trustworthy AI: Integrating Blockchain for Ethical Decision Oversight

Artificial intelligence (AI) continues to transform decision-making across healthcare, finance, and governance. While it offers major advantages in speed, accuracy, and scalability, it also introduces challenges such as bias, lack of transparency, and reduced human accountability. These issues highlight the urgent need for trustworthy AI systems that uphold fairness, explainability, and ethical integrity. This poster has two primary objectives. First, it presents a framework that leverages blockchain technology to enhance ethical oversight and transparency in AI. Blockchain's decentralized and tamper-resistant architecture enables verifiable, auditable decision processes while reducing reliance on centralized authorities, making it a strong foundation for ethical AI governance. Second, based on prior research in AI ethics and blockchain governance, this poster introduces an interdisciplinary framework demonstrating how decentralized, human-in-the-loop oversight can strengthen trust and accountability in AI systems. A central focus of this work is the development of a blockchain-based voting mechanism within the United States that enables verified human participants to influence AI decision rules. Using consensus models such as Proof of Personhood (PoP), the system prevents interference from automated agents and ensures equitable participation. This approach promotes fair, transparent, and accountable decision-making by validating each contribution through immutable blockchain records. By merging blockchain's transparency with ethical governance, this poster illustrates a practical pathway toward secure, value-aligned, and socially responsible AI. The framework contributes to ongoing efforts to connect technological innovation with human-centered ethics, reinforcing public trust in the next generation of intelligent systems.

Maysoon Khan

Discipline: Health and Human Development

Authors:

#1 Maysoon Khan

Abstract Name: Prenatal Iron, Hypoxia, and Infant Brain Development in Pakistan: Understanding Risk Pathways for HIE and Neurodevelopmental Disability

Hypoxic-Ischemic Encephalopathy (HIE) continues to be a leading cause of premature death and lifelong neurodevelopmental disability globally, with a disproportionate impact in low-resource settings such as Pakistan. HIE has consequences beyond clinical pathology, reframing HIE not just as a severe birth complication, but also as an avoidable outcome of persistent dietary imbalance and inadequate maternal-fetal oxygen exchange. This comprehensive literature review examines whether maternal iron deficiency enhances fetal vulnerability to hypoxia and raises the risk and severity of HIE by analyzing clinical data, evaluating epidemiological patterns, and examining how maternal iron deficiencies may affect oxygen transport, disrupt mitochondrial energy production, and weaken antioxidant defenses. These abnormalities are evaluated in terms of their effect in affecting placental function and fetal oxygenation. Insufficient maternal iron stores limit fetal cerebral metabolic resilience throughout critical phases of neurodevelopment, increasing susceptibility to hypoxia damage and consequent cognitive, motor, and behavioral impairments. Maternal iron deficiency is a key mediating biological factor that increases fetal vulnerability to perinatal hypoxia and amplifies HIE severity. This research emphasizes the importance of broader, nutrition-centered maternal health strategies such as improved dietary diversity, enhanced food access, community-level micronutrient education, and targeted iron interventions, as practical, cost-effective approaches to improving fetal neuroprotection in Pakistan and other low-resource regions. Future research should focus on identifying appropriate dietary strategies, delivery systems, and timing approaches to alleviate the long-term neurological burden caused by perinatal hypoxia.

Musa Khan

Discipline: Biochemistry

Authors:

#1 Musa Khan

#2 Lauren Dain

Abstract Name: Molecule Secretion From Glioma Cells in Relation to HSP27 Expression in Glioma-associated Reactive Astrocytes

Glioblastoma multiforme (GBM) is the most fatal CNS malignancy with a median survival rate of about 15 months. Regarding treatment, it has become evident that it is just as important to target cells in the tumor microenvironment (TME) as it is to target tumor cells purely. HSP27 is a heat shock protein involved with apoptosis, cancer metastasis, and other physiologic functions. HSP27 acts as a poor prognostic marker in not only GBM, but cancers involving the breast, ovaries, pancreas, and more. The purpose of this study is to determine which molecules secreted by glioma cells are involved with the upregulation of HSP27 in glioma-associated reactive astrocytes. Experiments were done in both spontaneous and syngeneic GBM models to determine where upregulation of HSP27 was the highest. To ensure observations were not due to injury by intracranial injections, sham surgeries alongside glioma implantation surgeries were performed. These findings were also tested in other cancers to determine if this was glioma specific. A variety of methods were then used to narrow down the class of molecules responsible for upregulation of HSP27. Subsequent to confirming that upregulation of HSP27 was not due to stress from injections, and the observation of increased expression of HSP27 in astrocytes was glioma-specific, further experiments suggested that the class of molecules responsible for this upregulation is a lipid that is less than 3 kilodaltons. Future directions include unbiased lipidomics to identify the lipid of interest.

Ridita Khan

Discipline:

Authors:

#1 Karen Garcia-McGowan

#2 Samuel Ediger

Saundra Austin

Abstract Name: Bright Minds, Bold Ideas: A Look Inside the OneUSF Summer Research Symposium

Undergraduate research is one of 11 high impact practices. At the University of South Florida undergraduate research is key to student success namely through research experiences for undergraduates (REUs). USF's REU programs are strategically designed to enrich the academic trajectories of undergraduate students through meaningful research engagement. In 2025, the summer REU program addressed the critical demand for practical research experiences by involving 60 undergraduates from a variety of interdisciplinary backgrounds. This initiative plays a pivotal role in promoting both the academic growth and professional development of participants, immersing them in hands-on research activities within the vibrant and innovative USF research community. The program aims to enhance students' understanding of scientific inquiry while bolstering their preparedness for future endeavors. The primary objective of the program was to provide students with collaborative research experiences, coupled with academic enrichment and professional skill development, in order to adequately prepare them for advanced studies and careers in various research domains. Over a span of 12 weeks, students collaborated with faculty mentors and graduate researchers, contributing meaningfully to projects aligned with established research goals. Participants engaged in experimental design, data collection, and scientific communication, efficiently completing laboratory procedures, performing data analyses, and presenting their findings. The impact of the program was rigorously assessed through pre- and post-program surveys measuring advancements in research skill.

Analysis of pre- and post-program data revealed significant improvements in students' research competencies, evidenced by increases in areas such as experimental design (56%), data analysis (18%), and scientific communication (54%). Participants also reported heightened confidence in their capability to conduct independent research, along with a clearer understanding of potential STEM career pathways. The USF summer REU program offers a comprehensive, intellectually stimulating experience that fosters both technical and personal growth. This program serves as a model for cultivating future scholars and leaders.

Amaan Khan

Discipline: Biology

Authors:

#1 Regina Graham

#2 Sajini Hettiarachchi

Tasfia Howlader

Srika Talanki

Abstract Name: Green Chemistry Synthesis of Carbon Dots Using Natural Oils

Carbon dots (C-dots) are zero-dimensional, carbon-based fluorescent nanoparticles recognized for their unique optical, chemical, and physical properties, along with their excellent biocompatibility, simple synthesis, and low production cost. These characteristics make them promising for a wide range of applications, including biomedical research, food packaging, anti-counterfeiting, and semiconductor technologies. While various natural products have been utilized for C-dot synthesis, the use of oils remains underexplored. Coconut oil and olive oil, which are rich in fatty acids such as lauric acid and oleic acid, respectively, were used as carbon sources in this study. C-dots were synthesized from these oils via a bottom-up approach. Separate mixtures containing each oil, citric acid, and ethylenediamine were heated at 180 °C for 12 hours (coconut oil) and at 210°C 84 hours (olive oil). The synthesized C-dots were purified using liquid-liquid extraction and subsequently freeze-dried to obtain water-free, oily fluorescent nanoparticles. Characterization using UV-Vis, fluorescence, and FTIR spectroscopy confirmed the successful formation of fluorescent oil-derived C-dots. Furthermore, cytotoxicity assessment through the MTS assay revealed that these C-dots are non-toxic, indicating their potential for safe biomedical applications. Future studies will further investigate their biomedical capabilities, particularly their antioxidant and anti-inflammatory properties, as well as their use in bioimaging, biosensing, and drug delivery.

Tanvi Khandekar

Discipline: Biology

Authors:

#1 Darshan Sapkota

#2 Hamza Lalami

Abstract Name: Alzheimer's Plaque Pathology and Glial Environment Regulation by a Novel Variant of Aquaporin-4

Aquaporin-4 (AQP4) is the brain's most prevalent water channel protein. The Aqp4 transcript undergoes a non-canonical mode of translation called stop codon readthrough. This generates a C-terminally extended isoform, AQP4x, which localizes perivascularly. Previous studies have shown AQP4 to alter amyloid beta plaque morphology and peri-plaque glial environment in Alzheimer's Disease (AD). However, the specific

roles of AQP4x versus the normal-length AQP4 in amyloid beta plaque morphology remain unknown. Here, I hypothesize that AQP4x also affects the peri-plaque glial environment and neuropathology in AD. To test this idea, I crossed the AQP4x loss-of-function mouse (Aqp4_NoX, two extra stops added to prevent readthrough) and the gain-of-function mouse (Aqp4_AllX, stop mutated to sense to allow 100% readthrough) to the APP/PS1 AD mouse model. Age-matched APP/PS1 mice were used as a control. Using immunofluorescence staining, I quantified the colocalization of astrocytes (GFAP) and microglia (IBA1) with amyloid beta plaques (6E-10 for total, X-34 for compact). Our preliminary data show that in the Aqp4_NoX mice, colocalization between IBA1 and amyloid beta is reduced. Furthermore, in the Aqp4_AllX mice, we have observed significantly higher numbers of small dense plaques. Ongoing experiments are focused on expanding our findings to include astrocytes as well as determining if all plaques, or only those of specific densities, share the same glial environment across different age points. These preliminary insights suggest a critical role for AQP4x in Alzheimer's plaque pathology. Manipulating glial involvement could prove crucial to mitigating the detrimental effects of amyloid beta accumulation, thereby potentially shaping future Alzheimer's therapeutics.

Aarushi Khanna

Discipline: Nursing and Public Health

Authors:

#1 Sara Moyer

Abstract Name: Tracing the Roots of Reproductive Inequity: How History, Discrimination, and Education Barriers Shape Care Today

Background: Reproductive health in the United States remains widely underserved, particularly for birthing individuals in Black and other marginalized communities. Structural racism, historical discrimination, and healthcare inequities contribute to disparities in access. Mental-health stigma further compounds these barriers, with over 80% of Black Americans reporting concern about stigma preventing them from seeking care. Pregnancy-related mortality rates for Black and American Indian/Alaska Native individuals are three times higher than those of white women. Foundational topics such as menstruation are also often under-discussed in adolescence, limiting reproductive health literacy and contributing to inequities in adulthood. Aim: This project explores systemic barriers to reproductive healthcare and seeks to understand how structural inequities shape access, outcomes, and health literacy. It also examines culturally responsive approaches to care, using the adaptation of the Edinburgh Postnatal Depression Scale (EPDS) to the EPDS-US as an entry point to study perinatal mental-health screening. Methods: I conducted a focused literature review and created annotated bibliographies to identify themes related to structural racism, stigma, and healthcare access. Results: Consistent themes emerged: systemic inequities, historical discrimination, limited healthcare access, and stigma around both reproductive and mental health reduce engagement with care. The EPDS-US represents a step toward culturally responsive screening, but broader structural and social factors continue to limit its impact. Conclusions: Through this work, I aim to translate these findings into real-world change as an advocate and future nurse. By improving menstrual education, supporting culturally responsive healthcare, and promoting policies that address structural inequities, I hope to help ensure reproductive health is accessible and equitable for all birthing individuals, regardless of background. This project informs not only my research but also my commitment to advancing justice and equity in reproductive healthcare.

Phyo Khant

Discipline: Biology

Authors:

Abstract Name: Investigating Hyperglycemia's Impact on Regeneration in Zebrafish Larvae

Zebrafish (*Danio rerio*) are well established as a model organism in biomedical research due to their genetic similarity to humans and their exceptional ability to regenerate complex tissues such as fins, cardiac muscle, and retinal neurons. In both zebrafish and humans, hyperglycemia, a hallmark of diabetes, is associated with delayed wound healing. However, the cellular processes linking high glucose levels to impaired regeneration remain poorly defined. This project examines the effect of hyperglycemia on fin regeneration in larval zebrafish. The central research question is whether elevated glucose conditions suppress caudal fin regrowth after amputation and whether this suppression is associated with changes in cell proliferation. To investigate how hyperglycemia affects fin regeneration, zebrafish larvae were treated with 120 mM D-glucose beginning at five days post-fertilization. At twelve days, caudal fins were amputated, and larvae were monitored for 20 hours using a microscope to capture a time-lapse video. Fin regeneration in glucose-treated larvae was compared to control larvae maintained in egg water and was assessed by analyzing the time-lapse video for changes in the fin length and blastema growth over time. Larvae exposed to glucose consistently showed slower regenerative progress compared to controls, with visible delays in blastema formation in the fin, and reduced overall growth in the injured area during the observation period. To better understand the cellular basis of this impaired regeneration, future experiments will use immunohistochemistry to examine proliferative activity in the regenerating fin tissue. While the zebrafish itself is not a therapeutic target, understanding how regeneration is disrupted under diabetic-like conditions can reveal signaling mechanisms relevant to human wound healing. By clarifying the relationship between systemic metabolic dysfunction and local tissue repair, this research contributes to the broader goal of improving regenerative outcomes in patients with diabetes and other metabolic disorders.

Sara Khattak

Discipline: Interdisciplinary

Authors:

#1 Sara Khattak

Abstract Name: Selective Humanitarianism in U.S. Foreign Policy: A Comparative Analysis of Responses to Uyghur and Palestinian Genocides

This research examines why the U.S. government responds inconsistently to mass atrocities, specifically investigating how strategic interests determine which humanitarian crises receive comprehensive policy attention. By comparing U.S. responses to China's treatment of Uyghurs versus Israel's actions against Palestinians, this study tests the hypothesis that humanitarian concern is deployed as a strategic instrument of great power politics rather than as a consistent moral principle. Since 2017, the Chinese government has detained over one million Uyghurs in what authorities call "re-education camps" in Xinjiang, where reports document forced labor, cultural suppression, and systematic human rights abuses. Since October 2023, Israeli military operations in Gaza have resulted in over 70,000 Palestinian deaths alongside widespread destruction of civilian infrastructure and displacement of the majority of Gaza's population. Despite similar allegations of human rights violations, the U.S. has imposed extensive sanctions and labeled China's actions "genocide" while framing Israeli actions as "self-defense." This study employs Critical Discourse Analysis (CDA) within a constructivist international relations framework to analyze U.S. political texts, including Congressional bills and presidential statements. Additionally, the research compares the framing of surveillance technologies when used by China versus Israel to demonstrate how discursive strategies reflect underlying strategic priorities. The analysis is expected to reveal systematic discursive differences in how the U.S. frames these two cases, with China positioned as an ideological threat to liberal democratic values while Israel is portrayed as a democratic ally exercising legitimate security measures. These findings will illustrate how narrative construction directly enables selective policy implementation based on strategic alliances rather than

consistent humanitarian principles. These results suggest that the concept of "human rights" functions as a flexible rhetorical tool in U.S. foreign policy, legitimizing containment of rivals while rationalizing abuses by allies.

Nabah Khondaker

Discipline: Biology

Authors:

#1 Jingshing Wu

#2 Sarah Lofland

Abstract Name: Oxygen-Dependent Regulation of Cardiac Metabolic Protein Expression During Postnatal Maturation

Congenital Heart Disease (CHD) affects approximately 1% of newborns, is the leading cause of congenital disabilities, and is a significant cause of childhood morbidity and mortality. Studies have shown that CHD is multifactorial and influenced by both genetic and environmental factors, yet one critical, understudied environmental factor is oxygen availability. Cardiac metabolic pathways are oxygen-sensitive, and disruptions in oxygen availability may perturb maturation programs essential for normal cardiac development. During normal postnatal maturation, cardiomyocyte metabolism transitions from a primarily glycolytic fetal state to one dominated by fatty acid oxidation. Perturbations in oxygen may disrupt these essential transitions. Chronic hypoxia activates oxygen-sensitive transcriptional regulators and shifts their reliance from fatty acid oxidation to carbohydrate metabolism, and has been shown to affect transcriptional proteins such as NF- κ B, activator protein-1, PPAR α , and RXR α . Conversely, transcriptomic profiling revealed that neonatal hyperoxia suppresses fatty acid synthesis pathways in the postnatal mouse heart. It remains unclear how oxygen abnormalities regulate protein expression and cardiac metabolism, as few studies have directly compared hypoxic, normoxic, and hyperoxic conditions. Our study aims to examine how oxygen environments regulate metabolic pathways involved in cardiomyocyte maturation. We will use top-down mass spectroscopy on sarcomeric proteins isolated from both ventricular and atrial tissue of mice to quantify proteoforms and modifications under normoxic and hyperoxic oxygen conditions. The results of this study are expected to identify key oxygen-related metabolic proteins that guide postnatal cardiac maturation. Understanding the mechanisms of oxygen-dependent metabolic remodeling is vital for CHD patients who may experience abnormal oxygen exposure either in utero or after birth.

Patrick Kielawa

Discipline: Art History

Authors:

#1 Patrick Kielawa

Abstract Name: Recreating the Past Comparing Egyptian Faience to Western Faience Through Research and Experimentation

This project examines the key differences between Egyptian faience and Western faience, two materials that share a name but come from completely different traditions. As I begin this research, my goal is to understand how each type of faience was made, what it was used for, and why it held meaning in its cultural setting. I will also attempt to reproduce Egyptian faience to gain firsthand insight into its production techniques. Egyptian faience is a quartz-based material that develops a glossy blue-green surface when heated.

These colors were closely tied to ideas of rebirth, protection, and the divine, and the material was used for objects such as beads, amulets, and small sculptures. By experimenting with mixtures of quartz powder, salts, and copper, and by testing different firing conditions, I hope to better understand the challenges ancient craftsmen faced and how they achieved such vibrant surfaces. Western faience, which developed much later in Europe, is very different in both structure and purpose. It is a clay ceramic coated with a white glaze that artists painted on. This type of faience was used mainly for decorated tableware, tiles, and display pieces, and reflected the growing interest in colorful imagery and household decoration. By comparing these two materials, this project explores how different cultures used technology and artistic techniques to express their values. Through beginning research and hands-on reproduction of Egyptian faience, I hope to show how each tradition created its own identity through the materials it chose and the objects it produced.

Sophia Kihei

Discipline: English and Literature

Authors:

#1 Yoneko Kanaoka

Abstract Name: The Language of Sexual Violence in Social Media Discourse: A Jeffrey Epstein Case Study

Sexual violence is not only experienced but also constructed through hostile and harmful language, such as victim-blaming, minimization, and deflection. These words can have material effects on legal cases, survivors' mental health, and prevent people from speaking out. This violence is further reinforced in online spaces by anonymity and lack of accountability that normalize harm, shaping public perception of survivors and perpetrators. While studies on how language shapes public perception of survivors exist, few examine how social media shapes narratives of sexual violence and reinforces harmful stereotypes. Given the rapid evolution and influence of online platforms, understanding these dynamics is critical for recognizing how they contribute to broader patterns of sexism and harm. This project asks how language used in social media discussions of the Jeffrey Epstein case shapes public perceptions of sexual violence and survivors. Comments were thematically analyzed using new accounts to avoid algorithmic bias, three search terms ("jeffrey epstein," "epstein files," and "virginia giuffre") were used to identify the top videos across Instagram and TikTok, resulting in 18 videos and 677 comments. Interviews with a campus wellness counselor and a Sex Abuse Treatment Center outreach professional were conducted to gain insight into how everyday language affects survivors offline. Results show patterns in how language shapes how sexual violence is understood and addressed online. Comments frequently supported the perpetrator, denied the occurrence or minimized harm, while others validated survivors like Virginia Giuffre and called for accountability. Interview findings reinforced that everyday phrases like "why didn't she just..." minimize harm and shift attention away from perpetrators. In conclusion, survivor-centered framing and awareness of microaggressions are crucial in preventing minimization and victim-blaming. Further research includes examining how these linguistic patterns work across diverse contexts and platforms and the long-term impact of survivor-centered language on public perception, policy, and community support.

Josiah Kilburn

Discipline: Biology

Authors:

#1 Sean Okeefe

#2 David Peyton

Abstract Name: On leading the Kentucky Ant Project, a Lab Run Entirely by Undergraduates Making Massive Scientific Impact.

Over the past 3 years I have had the wonderful opportunity to run a genetics and biology lab as an undergraduate student. In this time, I have taught over 10 students how to study ants, and we have worked on composing a document discussing the ants of Kentucky, which has never existed before the project started. Sensing needs for outreach and appreciation, I also designed an immersive public facing exhibit to help teach my lab about ants. Come and hear about this project and how it blew scientific expectations at the international ant meeting in Brazil. There will also be a brief discussion on the proper use of AI in these academic settings. (Subtítulos disponibles en Español e Português)

Alla Killins

Discipline: Law and Legal Studies

Authors:

Abstract Name: “PRIVATE” WELFARE: THE UNSUSTAINABLE AMERICAN APPROACH TO FREE SPEECH

In the aftermath of World War II, the United States reshaped the Japanese constitution into a heavily westernized version of their previous constitution. One of the additions made by the United States Government was Article 21, which granted citizens the right to free speech. This article is modeled closely on the American Constitution’s First Amendment, and yet, the two nations have an entirely different legal approach towards free speech rights. Japan uses a “public welfare” method, placing the individual rights below the common good, whereas the American approach does the opposite, and values individual free speech rights above almost all else. This approach has been a key factor in the increased amount of hate speech in the United States, a phenomenon fueled by the unrestricted nature of the First Amendment. Unlike the current legal framework, which defends an American’s right to free speech above all else, this paper argues that Japan’s constitutional prioritization of public welfare offers a more sustainable balance for modern democratic societies. This paper will propose a statute, modeled on public employee free speech rights in America and on Japanese public welfare policy. If applied, the implementation of this statute would reduce polarization and restore a sense of community in the American public by minimizing the shortcomings of the marketplace of ideas approach.

Reese KIm

Discipline: Health and Human Development

Authors:

Allysa Hayden

Abstract Name: Assessing the Impact of Various Factors on Hypoxic Response

Hypoxia is a condition in which the body’s tissues are deprived of oxygen and has deleterious effects on cognition, perception, and performance. Hypoxia has a myriad of symptoms such as euphoria, difficulty concentrating, headache, fatigue, nausea, dizziness, tunnel vision, and more. Outward signs of hypoxia include cyanosis (blueing of the fingertips and lips), tremors, loss of coordination, pallor, and complexion change, and can be used to notice the onset of hypoxia in others. Many factors are known to contribute to the manifestation of hypoxia, namely altitude, exposure duration, and certain physiological conditions such as

heart problems and low blood flow or oxygen transport. However, there are many other factors that potentially relate to hypoxic response such as age, gender, acclimatization, physical fitness, fatigue levels, recent dietary intake, etc. This study aimed to examine the impact of various parameters on hypoxic outcomes, including symptom presentation, time of useful consciousness, and physiological responses. A normobaric high altitude laboratory was used to simulate oxygen levels of 6.2%, which translates to an altitude of 30,000 ft—only slightly lower than average commercial airline cruising altitude. Demographic and physiological data was collected from participants, who then experienced hypoxia and attempted to complete cognitive and physical tasks. After recovering, participants shared their personal symptoms of hypoxia, and researchers noted participants' outward signs of hypoxia. The outcomes of this study will help to inform training protocols and high-altitude impacts for aviators, ultimately contributing to safer aircraft operation and emergency response.

Sean Kim

Discipline: Biochemistry

Authors:

#1 Manish Kumar

#2 Ina Nemet

#3 Kelley Carr

Abstract Name: Untargeted Metabolomics as a Platform for Identifying Gut Microbially Produced Metabolites

Gut microbes play an important role in host physiology. They interact with the host by producing a wide range of small molecules that can influence complex diseases such as cardiovascular disease, diabetes, and inflammatory bowel disease. However, the majority of gut-derived metabolites remain unidentified. To identify new disease-related, gut-microbially produced metabolites, we performed untargeted metabolomics on fecal extracts from mice treated with or without a broad-spectrum antibiotic (Abx) cocktail. Data analysis revealed that certain spectral features were upregulated, while others were downregulated following Abx treatment. Costunolide was among the annotated metabolites that was significantly reduced by the Abx-induced microbial suppression. Its structure was further validated through comparison of high-resolution collision-induced dissociation (CID) spectra and retention time alignment between a pure standard and the corresponding metabolite in the fecal extract. Additionally, an unknown feature (m/z 491.31345) was also significantly reduced by the Abx treatment. Using MicrobeMasst, a publicly available mass spectrometry repository of microbial cultures, this feature was matched to compounds produced by *Escherichia coli*, further validating its microbial origin. These findings highlight the ability of untargeted metabolomics to uncover both known and previously uncharacterized molecules that are microbially derived and sensitive to changes in microbial community structure. Expanding this approach may allow researchers to build a more complete map of the chemical interactions occurring between the gut microbiome and its host, especially for metabolites that have not been linked to canonical biosynthetic pathways. In future studies, we will quantify selected metabolites in human samples available in our lab, as well as in publicly available datasets, to establish their relevance to host health.

Sunwoo Kim

Discipline: Chemistry

Authors:

#1 Wuwei Li

#2 Xuewei Wang

Abstract Name: Surfactant-Assisted Control of S-Nitroso-N-acetylpenicillamine Crystal Formation

Nitric Oxide (NO) releasing compounds such as S-Nitroso-N-acetylpenicillamine (SNAP) are being studied for their potential to improve the biocompatibility of medical devices such as catheters, cannulas, and sensors because of the antimicrobial, anti-inflammatory, wound repair, and anti-thrombosis properties of NO. Current methods of SNAP synthesis form crystals with rough surface texture and dimensions between 10 to 50 μm . The size and shape of crystals affect the chemical behavior and manufacturing-related properties of the compound. The size of SNAP crystals cannot be reduced by destructive means (milling, grinding) because the application of heat causes the decomposition of SNAP. Instead, constructive methods such as crystallization must be used to control SNAP morphology. This work utilizes surfactant-assisted recrystallization to produce uniform SNAP crystals of desired dimensions and form. SNAP was dissolved in a variety of surfactant solutions. The solubility of SNAP in solution was lowered, causing SNAP to form solid crystals. Surfactants form micelles around SNAP during crystal formation, affecting its ultimate crystal habit. A variety of surfactants are featured in this work, each of which produce unique crystal habits. Dipyramidal, cubic, and rectangular prismatic crystal morphologies are reported. SNAP crystals with widths $\leq 5 \mu\text{m}$ were achieved. Control of SNAP crystal habit may be useful in controlling the dissolution and decomposition rates of SNAP in medical devices. SNAP crystals with dimensions $\leq 5 \mu\text{m}$ may be particularly useful in the development of SNAP-incorporated microdevices.

Seoyeon Kim

Discipline: Biology

Authors:

#1 Erica Ross

#2 Manning Evans

#3 Ally Turner

#4 Makayla Coursey

#5 Shreya Sharma

Abstract Name: Assessing Seasonal Patterns in the Prevalence of Antibiotic-Resistant Bacteria in Chisholm Creek, Oklahoma.

The emergence of antibiotic resistant bacteria (ARB) is an urgent global public health concern. ARB enters the freshwater environments via agricultural runoffs, wastewater treatment plant discharge, and leaching from nearby farms. This poses a significant threat, especially when these freshwater ecosystems are used for recreation and as a source of drinking water. The objective of this study was to assess the presence of ARB in the water of Chisholm Creek in Oklahoma and to examine whether ARB levels vary across different seasons. It is hypothesized that amoxicillin resistance will be higher due to its frequent use in medicine, and there will be a seasonal difference in ARB due to the effect of temperature on bacterial growth. The Chisholm Creek sampling site was chosen for its proximity to residential areas and recreational spaces. Water samples were collected in Winter 2024, Spring 2025, Summer 2025 and Fall 2025. Reasoner's 2A agar with 4, 2 and 8 mg/L of amoxicillin, ciprofloxacin, and tetracycline, respectively, was used as the growth medium. Amoxicillin, ciprofloxacin, and tetracycline were selected for this study due to their widespread medical use and differing mechanisms of inhibiting bacterial growth. Amoxicillin targets bacterial cell wall synthesis, ciprofloxacin inhibits DNA gyrase activity, and tetracycline interferes with protein synthesis. Serial dilutions of water samples were plated on media containing individual antibiotics, and no antibiotics (control). The numbers and proportions of all ARB populations were significantly ($P < 0.05$) influenced by the seasons, location, and their interaction. In general, higher bacterial counts were observed in the Winter and Fall seasons. Besides, the highest level of antibiotic resistance was observed against amoxicillin, followed by ciprofloxacin and tetracycline. The results of this study provide insights into the presence of ARB in the freshwater ecosystem of Oklahoma and identify potential seasonal variations in ARB levels.

Brian Kim

Discipline: Biology

Authors:

#1 Brian Kim

#2 Rajesh Amin

Abstract Name: A Novel AEP Inhibitor Selectively Suppresses Pathogenic Tau Species in a Neuronal Stress Model

Introduction: Alzheimer's disease (AD) is approaching epidemic levels and still lacks an effective disease-modifying therapy. Recent advances in clinically measurable biomarkers have improved the ability to evaluate emerging therapeutics. AD is characterized by the accumulation of hyperphosphorylated tau, which forms neurofibrillary tangles (NFTs), and amyloid- β plaques. The Amin Lab develops novel therapeutics targeting neurodegenerative processes, including compounds that inhibit asparagine endopeptidase (AEP), also known as legumain. AEP is a lysosomal cysteine protease that cleaves proteins at asparagine residues. Upon activation, AEP cleaves tau and contributes to downstream tau pathology. Prior studies have identified both tau and amyloid- β as physiological substrates of AEP, highlighting AEP as a promising therapeutic target in AD. In this study, we investigated the effects of Compound C, a novel AEP inhibitor developed in the Amin Lab, on AEP-mediated tau cleavage and phosphorylation. Methods: AEP activation was induced in HT22 neuronal cells using sodium arsenate (SA). Cells were treated with SA alone or with SA plus Compound C. Western blot analysis was used to quantify phospho-tau (~78 kDa) and total tau (~78 kDa) to determine whether Compound C selectively alters pathological tau species without affecting overall tau abundance. Results: SA exposure produced a robust band at ~78 kDa consistent with stress-induced tau hyperphosphorylation. Co-treatment with Compound C significantly reduced phospho-tau levels compared with SA-only controls, while total tau expression remained unchanged. These findings suggest that Compound C suppresses the formation of pathogenic phosphorylated tau species rather than altering global tau levels. Conclusion: Compound C attenuates stress-induced phospho-tau accumulation in HT22 cells without affecting total tau, supporting its potential role in modulating tau pathology. Future studies will include AEP knockdown using siRNA to determine whether the reduction in phospho-tau is specifically mediated through AEP inhibition.

Praise Kim

Discipline: Psychology

Authors:

#1 Ana Triana Hoyos

#2 Caterina Gratton

#3 Diana Perez

#4 Ashley Jaimes

#5 Gretchen Wulfekuhle

#6 Nathan Labora

#7 Youngeun Park

Abstract Name: How Arousal Relates to Brain Network Functional Connectivity: A Within and Between Subjects Precision fMRI Study

Low levels of arousal often reduce performance in settings requiring attention, decision making, and reasoning. Because these tasks require coordinated activity across brain networks, changes in arousal likely influence these connections. Functional connectivity (FC) can capture this coordination, revealing how brain networks shift with arousal. Previous research has found a positive association between light sleep and resting-state FC for most brain networks. Generally, most studies average data across subjects, obscuring patterns only visible at the individual level. However, a precision approach collects substantial amounts of data per participant, ensuring highly reliable and individualized brain networks. Here, we explore the differences in FC between high and low arousal groups. We also use precision methods to investigate differences in FC within three participants with high and low arousal. For each resting-state run, participants self-reported arousal (1 = high arousal, 7 = low arousal). We classified these ratings into high, medium, and low arousal conditions. We only analyzed runs in the high and low arousal groups and subjects with more than five minutes of data (N = 53 subjects). Brain data were divided into 300 regions using the Seitzman atlas, then pairwise correlations were computed between averaged time series of those regions for each subject. Between subjects, FC matrices were averaged within each condition and compared. During low arousal, we expect between-subject FC to be stronger within somatomotor and visual networks, as well as greater connectivity between these networks. At the individual level, we expect similar yet idiosyncratic patterns, such as increased localized FC in specific brain regions. Connectivity patterns may fluctuate with low levels of arousal, which in turn disrupts the ability to complete daily tasks. Mapping FC at the individual level may reveal how previously masked patterns correspond with these disruptions, which would inform targeted therapies for populations struggling with diminished arousal.

Hope Kim

Discipline: Biology

Authors:

#1 Dr. Engda Hagos

Abstract Name: Cells having functional KLF4 enhances DNA damage repair through regulation of pChk1 and Rad54

Krüppel-like factor 4 (Klf4) is a zinc-finger transcription factor that has been implicated as a hallmark of colorectal cancers, one of the most common cancers worldwide. In addition, it has been found to play a role in activating cell cycle checkpoints following DNA damage. However, the molecular mechanism of Klf4 and its exact role in the DNA damage repair (DDR) pathway has yet to be fully understood. Thus, it is of interest to investigate the role of Klf4 in the DDR pathway, including the molecular mechanisms involved and its relationship with key DDR proteins. Previous work from our lab has shown that, compared to mouse embryonic fibroblasts (MEFs) null (-/-) for Klf4, MEFs that are wild-type (+/+) for Klf4 exhibit increased expression of DNA repair genes including ATR, Chk1, and Rad51 and decreased expression of γ H2AX, a biomarker for DNA damage, after a chemotherapy drug treatment, etoposide. In this study, a protein assay using western blot analyses indicate that while Klf4^{-/-} MEFs treated with doxorubicin, a topoisomerase II poison, continue to express higher levels of γ H2AX, they also exhibit higher expression of phosphorylated Chk1 (pChk1) and Rad54 as compared with Klf4^{+/+} MEFs. In addition, after a 24-hour recovery period, pChk1 levels decreased and Rad54 levels increased, yet still with higher expression in Klf4^{-/-} MEFs. Furthermore, we used the comet assay to detect double stranded DNA breaks (DSBs) and found that cells lacking Klf4 exhibited more DSBs. Taken together with previous findings, the results from this study strongly suggest that Klf4 plays a role in detecting DSBs. These results support a model in which KLF4 promotes proper coordination of DDR signaling, providing a molecular basis for potential therapeutic strategies targeting KLF4-mediated genomic stability in colorectal cancer.

Sunghyun Kim

Discipline: Health and Human Development

Authors:

#1 Rin Jeon

#2 Sunghyun Kim

#3 Sumin Kang

Rin Jeon

Sumin Kang

Abstract Name: From Click to Guilt: The Emotional and Algorithmic Forces Shaping Gen Z's Online Buying Sprees

Online shopping is deeply embedded in Gen Z's routines, supported by seamless mobile access, fast payment systems, and highly personalized recommendation algorithms. These environments expose young consumers to emotionally engaging cues that may increase impulsive purchasing, especially when individuals experience stress, boredom, or negative emotions. Emotional vulnerability has been linked to reduced self-control and stronger reactions to persuasive stimuli, while algorithmic recommendations may heighten exposure to tempting products. The purpose of this study is to explore how algorithm exposure, impulsive buying tendencies, emotional vulnerability, and post-purchase regret relate to one another among Gen Z consumers. Participants were 49 individuals aged 18–29 recruited through convenience sampling. An online survey assessed four 5-point Likert constructs: algorithm exposure, impulsive buying, emotional vulnerability, and post-purchase regret. These composite variables were used to compute Pearson correlation coefficients, examining their interrelationships. Impulsive buying was moderately related to emotional vulnerability ($r = .66$). It also showed a smaller moderate relationship with algorithm exposure ($r = .29$). Other correlations were small. Post-purchase regret demonstrated a moderate positive association with algorithm exposure ($r = .50$). In contrast, its association with impulsive buying was negligible ($r = .03$). Likewise, its association with emotional vulnerability was effectively near zero ($r = .01$). This pattern suggests that regret in Gen Z is more influenced by algorithmic factors than by their internal emotional tendencies. This study provides insights into reducing algorithm-driven impulses and regret by targeting emotional vulnerability in Gen Z but is constrained by a small sample, which precluded regression, mediation, or moderation analyses. Future research should employ larger, more diverse samples to test predictive pathways and assess whether emotional vulnerability amplifies the effects of algorithm exposure. Incorporating behavioral data, such as browsing logs or recommendation interactions, could validate self-reported tendencies and deepen understanding of how algorithms shape decision-making.

Chloe Kim

Discipline: Health and Human Development

Authors:

#1 Chloe Kim

Abstract Name: Weight Change and Health Awareness Among College Students Through the Social Ecological Model

Obesity is widely regarded as a major risk factor for numerous diseases, so obesity and overweight remain key areas of global public health attention. Research has shown that the risk of obesity and overweight in adulthood is higher for those who were overweight or obese as young adults. The underlying cause of this weight gain is not easy to determine; therefore, further observation is required. The Social Ecological Model (SEM) supports the examination and promotion of sustainable health behavior change among college students through a holistic lens. According to the SEM, health behaviors are determined by the dynamic interaction of five interrelated levels of influence: individual, interpersonal, organizational, community, and

structural support. This perspective emphasizes the need for multi-level interventions that address not only personal awareness and behavior but also the environmental and policy contexts that influence students' overall well-being. This study was designed using the SEM to examine college students' self-awareness of their health status in relation to weight changes during their college years. Thus, data from surveys based on the perspectives of SEM will be used to investigate weight changes, weight management strategies, and barriers to maintain health habits. Descriptive statistics will summarize weight changes and behaviors in different academic years, while thematic analysis will identify effective strategies for maintaining a healthy weight and assess students' understanding of the risks associated with weight gain. The findings from this study are expected to highlight how weight gain is primarily driven by lifestyle and environmental factors among college students. Furthermore, these findings provide guidance on the important role universities play in shaping student health outcomes through improved dining options, wellness education, accessible fitness opportunities, and mental health support. These changes at universities could foster a healthier campus culture and lower long-term health risks among the student population.

Vivian Kindel

Discipline: Visual Arts

Authors:

Abstract Name: Using non-linear narratives and visual design to guide aspiring divers to make safe decisions before and after emergency situations.

Scuba diving is a thrilling experience, but the sport isn't without risk. Scuba-related accidents usually occur as a result of a diver's actions. It comes down to the decisions scuba divers make leading up to and in those stressful environments, which dictate the severity of the outcome. With decision-making in mind, I began my research, questioning how one person can teach another to make the right choices. Cautionary tales are a popular format shared between individuals as a means of forewarning. I desired readers to interact with these stories which led me to select a pick-your-own-adventure book for my subject. These books utilize non-linear narratives, allowing the reader to pick and choose which path they'll take. In my book, readers are guided through a series of seemingly harmless scenarios leading up to the main conflict. Their character can live, survive, or die as a result of their choices. The visual design of the book replicates a divers' needed level of awareness. For instance, when the main character enters a dive, icons will appear at the bottom of the page indicating ascent, depth, time, deco-limits, and air consumption. The reader must remain attentive to these icons as their values will increase or decrease throughout the story. The condition of the character is represented through type treatment. As words become faded and illegible their character has passed out or become light-headed. If the type becomes distorted the character is disorientated or sick. The paper is also used to indicate environmental conditions such as depth and temperature. The deeper their character goes the darker the page. The colder the water and the more prominent 'frost' will appear on the pages edges. All of these elements work together to develop the observational skills and critical thinking needed to survive a real world emergency situation.

Janea Kinder

Discipline: Psychology

Authors:

#1 Desh Nendze

Desh Nendze

Abstract Name: Military Culture: An Examination of Military Culture's Effect on African American Intimate Relationships

This study explores how the norms, values, and stressors of military culture affect the emotional and intimate relationships of African American service members. While previous research has examined the general impact of military life on relationships, few studies have focused on the intersection of race, identity, and intimacy—particularly among both heterosexual and same-sex African American military couples. The purpose of this project is to understand how the structure and demands of military service shape emotional expression, communication, and connection within these relationships. Using qualitative research methods, three focus groups of ten participants each will be conducted. Participants will include African American military personnel who have been in committed relationships for at least five years. Each group will meet multiple times to discuss shared experiences related to discipline, stress, identity, and intimacy. These conversations will be analyzed to identify recurring themes and unique insights into how military expectations influence relationship satisfaction and emotional closeness. Preliminary findings are expected to highlight the dual impact of military culture—its potential to strengthen commitment through shared discipline, yet also to strain relationships through emotional restraint and stress. This study aims to inform the creation of culturally responsive workshops and support programs designed to strengthen intimacy and communication among military couples. Attendees will learn about the intersection of race, service, and emotional well-being, as well as potential strategies for improving relationship support within the military community.

Mya Kindle

Discipline: Chemistry

Authors:

#1 Jay Amicangelo

Abstract Name: Characterization of the Deuterated Cyclohexadienyl Radical (C6D7) Using Matrix Isolation Infrared Spectroscopy

Matrix isolation infrared spectroscopy was used to characterize the deuterated cyclohexadienyl radical (C6D7), which was generated by adding a D atom to deuterated benzene (C6D6) in an argon matrix at 12-15 K. Deuterium atoms were produced using a microwave discharge plasma source with D2S and SiD4. Comparing the two D atom precursors, the SiD4 produces a higher yield of C6D7 than D2S. The D atoms reacted with co-deposited C6D6 to form the C6D7 radical, which was trapped and stabilized in the argon matrix. Multiple infrared absorptions for C6D7 were observed at 420.4, 459.0, 746.1, 751.7, 765.0, 1038.8, 1214.5, 2032.6, 2045.0, 2048.8, and 2052.9 cm⁻¹. The peak at 459.0 cm⁻¹ is the most intense C6D7 radical band. Annealing the argon matrix to 20 K resulted in increased intensities for several C6D7 features. A mercury-xenon lamp was used to photolyze the matrix with filtered (visible) and unfiltered (ultra-violet and visible) light to confirm the C6D7 peak assignments by monitoring the changes in infrared spectra. Theoretical calculations at the B3PW91/aug-cc-pVTZ level were performed to obtain an optimized geometry and harmonic vibrational frequencies for the C6D7 radical. The computational results were used to help assign the observed infrared bands and distinguish the radical features.

Alexa King

Discipline: Engineering

Authors:

#1 Cody Scarborough

Abstract Name: 2D Metamaterial Fourier Analyzer

A lattice test bench to gather the isofrequency contours and wavenumbers of a selection of engineered materials (metamaterials) was designed. The reported material test platform is made to launch a cylindrical wave into a parallel plate waveguide and supported metamaterial lattice. The upper plate is replaced by a semitransparent boundary (metallic chicken wire) in order to leak a fraction of the fields propagating within the waveguide. A near-field scanner equipped with a coaxial probe is used to detect the leaked fields just outside the chicken wire. These detected fields are then used to reconstruct the propagation behavior of the lattice. Specifically, the speed of the wave as a function of propagation angle is deduced from the spatial Fourier transform of the detected fields. For a given propagation angle, it is expected that the 2D Fourier transform of the leaked fields will produce a peak corresponding to the wavenumber in the ideal metamaterial lattice. The agreement between the measured and simulated wavenumbers will be reported. The presentation will provide an overview of the proposed methodology and its accuracy. This will include a numerical study on optimal probe orientation for the near-field scanner such that the signal-to-noise ratio is maximized. Further, these results will be compared to an ideal simulation of the metamaterial in a perfectly periodic environment. This will serve as the ground truth when validating the measurement procedure. The presentation will also detail the construction of a test-platform fabricated using low-cost materials and fabrication methods. Such a design will enable the characterization of a broad class of metamaterial lattices in a 2D setting.

McKenzie King

OK - University of Central Oklahoma

Discipline: Art History

Authors:

Abstract Name: Opposing Views of the Indigenous People During Colonization

European colonists in the Americas competed for the region's resources through political influence, exploitation, deception, and forced conversion. During their conquests, Spanish, English, French, and Dutch colonizers shaped distinct perceptions of Native peoples, as reflected in their art. These portrayals, in turn, influenced how Europeans in their homelands viewed indigenous Americans. The Spanish artwork of José de Páez, such as *Destruction of the Mission of San Saba in Texas* and *Martyrdom of Fray José de Santiesteban* and Fray Alonso Giraldo de Terreros, depicted Native tribes as violent, barbaric, or savage to justify colonization, exploitation, and conversion. When the English arrived, they saw traits of sin among the people based on their Christian beliefs and standards. The English artist, John White, showed the indigenous community attacking Christianity while dancing and acting like wild animals in his painting *Festive Dance*. Jacques Le Moyne de Morgues, René Goulaine de Laudonnière, and the Native people in Florida portrayed the indigenous as savages; the French shared similar views as the English, considering them sinners. The Dutch, meanwhile, depicted the natives as potential business partners, recognizing themselves as outsiders and the natives as the original inhabitants. Gilbert Stuart's *A Portrait of Thayendanegea* portrayed natives according to European standards. This study highlights the contrasting perspectives of Spanish, English, French, and Dutch colonists toward Native Americans through eight depictions of Native peoples and various library and government resources.

Tara King

Discipline: Biology

Authors:

#1 Rebecca E. Forkner

Abstract Name: Nectar of Ambrosia? Have palm plantations increased bark beetle densities in primary and secondary Bornean forests

Ambrosia beetles (Scolytinae, Coleoptera) attack and consume the phloem, wood, fruit, and seeds of a variety of tree species and often transmit pathogenic fungi. Damaging pathogens transmitted by introduced Scolytinae have caused economic losses in timber plantations, crop plants, and natural systems elsewhere. Recent studies found >150 species of Scolytinae in Sabah, Borneo and reported distinct species assemblages within rubber (*Hevea brasiliensis*, Euphorbiaceae) plantations compared to intact forests. Currently 39% of Borneo has been deforested to cultivate African Oil Palm (*Elaeis guineensis*, Arecaceae). The diversity of palm feeding Scolytinae is unknown, as only a few species in the subfamily have been documented feeding on palm wood or fruits globally. However, open forest structure, like that which occurs in both palm and rubber plantations, can increase trap captures of these beetles. Borneo is a biodiversity hotspot for palms, containing over 300 different species. Thus, increases in ambrosia beetles that lead to tree death could result in loss of food, shelter, or pollination services. To estimate ambrosia beetle diversity, we placed pan traps at three distances from the forest edge in each habitat type in two nature reserves - Maliau Basin and INIKEA – and one palm plantation in central Sabah, Borneo. We asked 1) does an open forest structure, such as that in plantations and secondary forests, increase trap captures of Scolytinae, 2) do *E. guineensis* plantations show similar patterns in ambrosia beetle diversity and density as rubber plantations in previous studies.

McKenzie King

OK - University of Central Oklahoma

Discipline: Art History

Authors:

Abstract Name: Impactful Art Pieces Depicting the American Revolution

Art played a vital role in the American Revolution, serving as a powerful way to express and energize colonial resistance against British rule. From early protests against the Stamp Act and the depiction of Paul Revere's The Bloody Massacre in 1770, to the symbolic images of Emanuel Leutze's Washington Crossing the Delaware in 1815, visual art captured the spirit and struggles of the revolution. Although these paintings and other representations of the American Revolution were made in various eras and settings, they reflect the people who fought for what they believed in to gain freedom. Artistic works from both the United States and Great Britain vividly depict the key moments and ideas related to the fight for independence from monarchical rule. These pieces, rich in imagery and symbolism, stand as lasting testaments to the colonists' unwavering resolve and to art's power to shape national identity. This study focuses on the American Revolution and its conflicts with Britain through artworks and objects created during and after the Revolution.

Tabitha King

Discipline: Economics

Authors:

Abstract Name: The Impacts of Covid on Labor Force Participation

Labor force participation is an important measure of productivity and growth in the economy. Covid-19 was unique as a recession because it had immediate and drastic impacts on our economy due to lockdowns and mass lay offs, disrupting labor markets greatly. My thesis is that Covid-19 negatively impacted labor force participation in the United States. Many states saw a dip in labor force participation, followed by a slight increase over the following years. Different states had different impacts on the changes in labor force participation due to covid. This paper examines the effects of covid on labor force participation state by state. It uses state CPS data to examine the differences before and after covid of labor force participation. I use OLS regression to estimate the impact using a difference in difference approach. I include labor force participation data from 2019-2025, excluding the year 2020, in my data set. I include a dummy variable for before and after covid. I include a dummy variable for states that had strict school closings during the shutdown. I am including control variables for percentage population female per state and percentage population college graduate per state. I am including a region variable to view the different impact in different regions of the country. Preliminary results suggest that along with our dummy variable for pre vs. post covid, the percentage female and percentage college graduate both help to explain the variation in difference in labor force participation per state before vs. after covid.

Kaitlyn Kinslow

Discipline: Biology

Authors:

#1 Elizabeth Hiltz
#2 Rommel Pagkalinawan
#3 Robby Buck
#4 Alexis Thai-Nguyen
#5 Grady Fleming
#6 Haley Dewitt
#7 Sara Charri

Abstract Name: Using DeepLabCut to Quantify Anxiety-Like Responding in Zebrafish Shoals Synthetically Alarmed with Hypoxanthine-3N-Oxide

Zebrafish (*Danio rerio*) are a common model organism for behavioral neuroscience research due, in part, to their elaborate social repertoire. A common behavioral characteristic of zebrafish includes shoaling, the loose aggregation of individuals without synchronized movement within the group of zebrafish. Like most other fish, zebrafish also have an antipredation chemical alarm system. When predatory attack results in skin damage to one of the members of the shoal, epithelial club cells release a substance known as “schreckstoff” that serves as an alarm signal for surrounding fish. As a result, this “schreckstoff” activates a variety of anti-predation responses, including darting, freezing, and negative geotaxis (bottom-dwelling). A synthetic version of this alarm substance has been identified as Hypoxanthine-3N-Oxide (H3NO), and exposure to H3NO is known to activate the same anti-predation responses. However, the complexity of such responding has yet to be investigated in mixed-sex zebrafish shoals. For the current study, mixed-sex shoals (n = 4, 2 males & 2 females each) were exposed to varying H3NO concentrations (1.5nM, 3nM, or 5nM). Digital video recording obtained the shoals’ behaviors for 10-minutes after administration. Videos were subsequently tracked via DeepLabCut, an open-source markless position-estimation tool for characterizing spatial movement. Positional data were subsequently analyzed with Python to quantify freezing, darting, and twirling. Results indicate dose-dependent effects across darting and freezing, indicating that different dosages elicit different patterns of behavior. Future research will investigate additional behavioral patterns such as inter-individual distance in grouping responses as well negative geotaxis by shoal members. Furthermore, this study illustrates the necessity of quantifying behaviors in multiple ways, identifying additional opportunities for future research. Understanding these responses in detail provides implications of anxiety, fear responding, and anti-predation behaviors. Better understanding these mechanisms could contribute to animal models investigating social development or disorders of social functioning.

Sierra Kirby

Discipline: Biology

Authors:

#1 Payton Miller
#2 Kaitlyn Siefert
#3 Morgan Koenig
#4 Mackenzie Sirks
Allison Diller

Abstract Name: Effects of Phytoremediation on Horizontal Gene Transfer

The widespread use of antibiotics in medical, veterinary, and agricultural practices has resulted in the accumulation of antibiotic residues within aquatic systems. This environmental contamination fosters the development and dissemination of antibiotic-resistant bacteria and antibiotic resistance genes, posing significant ecological and public health challenges. This study investigates the potential role of aquatic plants, specifically *Vesicularia montagnei* and members of the Lemnoideae family, in influencing horizontal gene

transfer (HGT) among bacterial populations. Two *Escherichia coli* strains were employed: an F⁺ tetracycline-resistant donor capable of HGT and an F⁻ ampicillin-resistant recipient. We examined whether co-cultivation with aquatic plants promoted the emergence of dual-resistant strains, signifying HGT. Preliminary data revealed an initial increase in HGT activity within plant-containing systems during the first 24 hours, followed by a progressive decline in total bacterial populations over a 10-day observation period. These trends were not observed in control systems lacking aquatic plants, where bacterial populations and HGT activity remained relatively stable. Collectively, these findings suggest that aquatic plants may influence microbial community dynamics by initially facilitating gene exchange before contributing to the suppression of bacterial abundance and a potential reduction in antibiotic resistance gene prevalence over time. Ongoing research seeks to determine how plants influence HGT, with the goal of informing phytoremediation strategies to reduce antibiotic resistance in aquatic ecosystems and protect public health.

Kasturi Kirubaharan

Discipline: Health and Human Development

Authors:

#1 Kasturi Kirubaharan

#2 Rema Padman

Abstract Name: Youth Access to Health Education in Sri Lanka: A Nationwide Needs Assessment

This independent research project investigates disparities in health education access among Sri Lankan youth aged 12–25. After the civil war in Sri Lanka from 1983 to 2009, the quality of healthcare and health education has decreased, leaving the citizens with a lack of an effective healthcare system and knowledge on important health topics. Through a digital survey distributed across urban and rural provinces, the study is being conducted to gather data on knowledge of key health topics such as hygiene, nutrition, reproductive health, and mental wellness. Through these surveys, the goal is to understand how much access to health topics students in Sri Lanka have, while also understanding the topics which they wish to learn more about and to identify regional gaps and cultural barriers to health knowledge, within and out of Sri Lanka. Not only that, as part of the study virtual workshops in Sri Lanka to go over various health topics, listed on the survey, will be conducted starting October 2025. After these workshops, the students will fill out another survey with similar questions, and the data will be used to compare how health education can be implemented in Sri Lanka for the youth. The data will inform the creation of virtual workshops and future interventions. Findings will be shared with Sri Lankan youth organizations, such as PEARL, CMU clubs, and global health research mentors.

D'Amore Kitchell

Discipline: Architecture, Construction Management, and Interior Design

Authors:

Abstract Name: Reimagining Wellness: Transforming Space into a Holistic Healing Haven

The Wellness Center on a college campus does not provide sufficient resources for wellness beyond physical movement. With many college students struggling with wellness in multiple areas of their lives, including mental, nutritional, and therapeutic, there is a growing need to provide holistic wellness resources on campus. The goal of the Wellness Center redesign is to create a space that addresses this need for holistic wellness resources on campus by providing a facility for physical, mental, and nutritional wellness. Survey findings

identified key wellness priorities, with students expressing a strong interest in a nutritional restaurant. Research also has shown that malnutrition increases health risks and diminishes students' ability to focus and perform academically. The redesign includes the addition of a restaurant, which will serve wholesome meals using ingredients from the community garden on the patio of the wellness center. The facility provides the community access to quick, nutritious meals and the opportunity to enrich their knowledge of preparing nourishing food. The facility addresses the growing concern for student mental wellness by incorporating a clinic staffed with trained healthcare professionals, offering both nutritional support and mental health resources. The clinic offers spaces for therapy, health exams, and sensory support, providing students with accessible mental and physical wellness care on campus. The redesign also provides a fitness space to support students' overall physical health. The project will create a campus wellness resource that supports holistic well-being by addressing the major areas of students' physical, mental, and nutritional health.

Ava Klennert

Discipline: Economics

Authors:

#1 Monica Haynes

#2 Chris McIntosh

#3 Neil Wilmot

#4 Alison Hoxie

Abstract Name: Investigating the Potential for Distributed Solar Energy Production on Commercial Properties in the Greater Duluth, Minnesota Area

This project investigates the conditions necessary to incentivize commercial property owners in the Greater Duluth, Minnesota area to install distributed rooftop solar. Although the price of solar photovoltaics (PV) has been declining and numerous incentive programs are available for businesses, commercial solar installations remain a small share of Minnesota's total solar capacity. At the same time, commercial buildings are the largest source of greenhouse gas emissions in Duluth, and local utilities such as Minnesota Power must increase solar generation to meet the state's 100% clean energy by 2040 legislation. Existing research identifies financial, informational, and organizational barriers as the most common obstacles to solar adoption, with enablers including subsidies, environmental concerns, and the opportunity to reduce expenses. Few studies estimate property owners' willingness to pay for solar, the return on investment required to make adoption compelling, or renters' preferences, and this project addresses gaps by examining these factors and other considerations affecting commercial rooftop solar feasibility in Duluth. Personal contributions focused on supporting survey development, testing, and analysis of incentive structures. I worked to translate feedback from interviews with solar stakeholders and local experts into survey questions designed to capture commercial property owners' views on solar adoption and inform the research team's ability to assess the financial performance required for adoption. Additionally, I assisted in facilitating focus groups with local commercial property owners to test the survey, collecting feedback and incorporating revisions. Additional contributions include researching federal solar incentive changes introduced through the "Big Beautiful Bill," including updates to tax credits, sourcing requirements, and accelerated depreciation, and applying these provisions in evaluating a solar financial calculator to understand how different incentive structures affect owners' return on investment. Findings from the study will help provide guidance to local policymakers and utilities seeking to expand distributed rooftop solar across the Duluth area.

Haley Klingenberg

Discipline: Psychology

Authors:
#1 Geoff McKinley

Abstract Name: The Continued Influence of Health-Related Misinformation

Misinformation is not a new phenomenon, but the advent of artificial intelligence and social media has allowed bad actors to create misinformation that can be designed to be spread widely or can be specifically tailored to specific audiences. Health misinformation is especially dangerous because it is often unaccompanied with corrections, or as was the case with the COVID-19 pandemic, the corrections are often delayed. Misinformation is especially dangerous because it is difficult to eliminate their influence or revise the information after it has been learned to be false. Indeed, misinformation often influences our reasoning despite it being known as false (i.e., the Continued Influence effect). The purpose of this study is to examine the effectiveness of the type of correction in a health misinformation setting. Participants are exposed to multiple (false) causal claims related to how something affects health. For some of these stories, a correction follows that is either simple or elaborative. A control condition is also included in which the stories are not corrected. Participants are told that the study is an experiment about learning. After reading the stories and corrections (if appropriate), participants answer a questionnaire about the story and their beliefs. We hypothesize that participants will rely on the misinformation less often when the correction is more elaborative than when it is a simple negation. This study has the potential to inform policymakers and researchers alike on methods that can be used to effectively combat health misinformation. Even with the large amount of research examining health misinformation, there has been less examining how corrections influence reasoning when the state of knowledge is tentative, and subject to revision.

Melia Klingler

Discipline: Philosophy, Ethics, and Religious Studies

Authors:

Abstract Name: Political Polarization in the Christian Church

How can Christians who claim the same scripture hold opposing positions on politically charged topics? Rather than seeking to determine the definitive biblical position on certain topics or explain why different Christian groups hold certain views, this study examines which politically charged topics Christian pastors believe the Bible addresses clearly and how they perceive Christians who hold opposing views. Based in Tucson, Arizona, this research draws on a series of semi-structured interviews with Christian pastors across the political spectrum, classified as conservative, progressive, or mixed based on their descriptions of their congregations' political leaning. A grounded theory analysis reveals that both conservative and progressive pastors view faith as the center of their worldview and see their political beliefs as emerging directly from scripture, yet they disagree on which issues have clear scriptural mandates. Each group perceives the other as imposing political beliefs onto scripture rather than allowing scripture to guide their politics. In communities where certain issues are considered "biblical," disagreement becomes difficult, as challenging these positions is seen as challenging scripture itself. Pastors of mixed and moderate congregations adopt more varied strategies for navigating the relationship between faith and politics. These findings contribute to a more nuanced understanding of political fault lines in the American Christian community by highlighting differing assumptions about the clarity of scripture on various issues.

Julia Klinker

Discipline: Economics

Authors:

#1 Samantha Snyder Cakir

Abstract Name: The Effects of Carbon Labeling Techniques on Consumer Purchasing Behavior

Agriculture accounts for approximately 21% of global greenhouse gas emissions, necessitating a dramatic reduction in agricultural emissions to prevent worsening climatic conditions. One strategy to facilitate this shift is through carbon labels—a label added to food products to notify consumers of the environmental impact of a product. Traditional carbon labels present quantitative emissions information, an ordinal rating (color-coding or star rating), a certificate, or combine quantitative emissions information with color-coding. This study experimentally examines consumer choices in relation to four different carbon label designs with the goal of understanding which label design most effectively steers consumers toward environmentally-friendly products. Our study expands upon previous work by examining the effects of carbon labels on U.S. consumers, an understudied population in carbon label research, and employing a comprehensive carbon label design (presenting color-coding, a star rating, and quantitative emissions information). Nearly 400 participants completed a survey assessing participant product choices when presented with different carbon label designs, alongside participant concern for the environment and shopping priorities. The results suggest the comprehensive carbon label design most effectively steers consumers toward environmentally-friendly products, indicating this novel labeling strategy may be more effective than previous carbon label designs. However, individuals who express low levels of environmental concern prefer no label. Accordingly, labels may not encourage sustainable purchasing behavior for individuals with low levels of environmental concern. Overall, this study indicates label design impacts consumer choice, and the comprehensive label design has strong potential for directing consumers toward environmentally-friendly products and opens up new avenues for researchers to explore expanded label designs in other contexts.

Noah Klugman

Discipline: Biology

Authors:

#1 Noah Klugman

Abstract Name: Severe Traumatic Brain Injury Induced Chronic Motor and Sensorimotor Deficits in Sprague Dawley Rats

Introduction: Traumatic brain injuries (TBIs) affect 2 million Americans annually, causing an economic and healthcare burden. Patients with severe TBIs (sTBIs) suffer from sustained volumetric brain tissue (~1.5%) loss each year, and functional impairments. Therefore, we assessed the impact of sTBIs on the overall motor and sensorimotor function, over time, in a rat model. Hypothesis: We hypothesize that sTBI causes chronic motor and sensorimotor impairments. Methods: We performed functional assessments for 16 weeks post-sTBI using tests such as the vertical cylinder test and modified neurological severity score (mNSS), on Naive (uninjured, n=4), Sham (craniotomy only, n=4), and controlled cortical impact (CCI sTBI, craniotomy with injury, n=4) animals, that received unilateral injuries to the right brain hemisphere (rostral forelimb area or RFA, ML: +2.5 mm, AP: +3.0 mm, DV: +2.0 mm). Results: Our mNSS data demonstrates significantly higher motor and sensorimotor deficits through an overall higher mNSS score in the CCI animals over 16 weeks, compared to Naive ($p < 0.0001$) and Sham controls ($p < 0.0001$). Our vertical cylinder test showed that the CCI sTBI animals had significant functional deficits through fewer unsupported rearings, compared to Naive ($p < 0.0001$) and Sham controls ($p < 0.001$). We also observed a significantly lesser number of left forepaw touches in the CCI group, compared to Naive ($p < 0.0001$) and Sham controls ($p < 0.01$). Conclusion & Future Directions: Together, these findings indicate that sTBI induces

sustained and progressive functional deficits that impair chronic recovery. This study opens avenues for circuit-level assessments of motor and sensorimotor function after severe TBI.

Arianna Knowles

Discipline: Engineering

Authors:

#1 Katharine Polasek

Aaron Thomas

Claudia Van Winkle

Abstract Name: Comparing Cortical Responses to Mechanically and Electrically Evoked Somatosensations

Phantom limb pain (PLP) is characterized by pain and discomfort in an amputated extremity. Our overall goal is to develop an at-home therapy to reduce PLP by restoring sensation in the amputated extremity through electrical stimulation. Our hypothesis is that there will be changes in the cortical activity related to this decrease in phantom limb pain. This project aims to find similarities between brain responses due to mechanically and electrically-evoked tapping sensations in able-bodied participants in preparation for working with participants who have PLP. A 96-electrode electroencephalogram (EEG) cap was used to measure cortical activity in response to two types of stimuli: i) Using transcutaneous stimulation of the common peroneal nerve behind the knee (stim condition 1), and on the top of the foot (stim condition 2) to electrically evoke sensations on the top of the foot, and ii) Mechanically-evoked sensations with and without vision by tapping on the foot at the match location corresponding to the perceived area of the stimulated sensation on the top of the foot. The EEG data were analyzed using EEGLAB and the ERPLAB plugin. After preprocessing, evoked responses were compared across conditions in both timing and amplitude. Preprocessing steps included filtering, artifact rejection, and epoching the data around each stimulus onset to isolate neural responses. Evoked responses were then compared across conditions by examining both the timing (latency) and size (amplitude) of key somatosensory ERP components. It is anticipated that some participants will show similarities in cortical responses at common peak latencies, although the exact nature of these relationships will be determined through further analysis.

Aspen Knox

Discipline: Engineering

Authors:

Mohammadparsa Ghasemi

Abstract Name: Simplified Multimodal Imitation Learning for Day–Night Autonomous Driving

Traditional approaches to autonomous driving in structured environments, such as cities, heavily rely on path-planning algorithms and kinematic models for low-level vehicle control. These approaches are complex, requiring detailed system modeling and parameter optimization. While such systems are generally intended for use in unconstrained urban environments, this raises the question of whether a simpler model could be effective in more constrained settings, such as a university campus. This study investigates a simplified, conditioned Imitation Learning (IL) model for day–night autonomous driving on a university campus. An initial proof of concept was tested using an end-to-end CNN model, inspired by NVIDIA's approach, which controlled only steering and throttle to perform low-level commands. The model used RGB cameras for daytime driving and a thermal camera for nighttime operation. The test involved a 0.3-mile route from the

College of Engineering to the College of Business. Although the trained model for daytime driving achieved 99% accuracy, it performed worse than its counterpart trained on thermal imagery, which achieved only 94–97% accuracy. A total of three interventions were required during nighttime testing. The daytime model failed to operate autonomously, as the go-kart consistently oversteered toward bright patches of grass or sidewalks. This failure is likely explained by an imbalance in the training data, as the go-kart was tested later in the day under lighting conditions that differed from those in the dataset. Future work will incorporate high-level commands, enabling the model to execute specific turns based on input from a path-planning algorithm.

Aspen Knox

Discipline: Engineering

Authors:

Mohammadparsa Ghasemi

Abstract Name: Monocular Visual-Inertial Depth Estimation in Off-Road Environments Using Uncertainty-Aware Neural Networks

Autonomous navigation in off-road environments remains challenging due to unstructured terrain, unreliable GPS signals, and the inaccuracy of wheel odometry caused by frequent slippage. Localization in autonomous and manually operated vehicles enables the system to determine its position within the immediate environment, and, when combined with global path planning, supports optimal navigation and obstacle avoidance. Conventional LiDAR-based localization, currently used in the industry, while accurate, is costly, computationally intensive, and susceptible to degradation under vibration. To address these limitations, we present a monocular visual–inertial depth estimation framework designed specifically for off-road conditions using uncertainty-aware deep learning. Our method employs a U-Net–based architecture with dual outputs for dense depth prediction and pixel-wise uncertainty estimation. The model is trained on a custom RGB dataset collected on a modified electric go-kart platform, using stereo-derived pseudo-ground-truth depth and synchronized inertial measurements from a CAN-based IMU. Unlike tightly coupled visual–inertial odometry systems that fuse IMU data during the estimation process, our approach maintains modularity by predicting depth independently, with uncertainty intended for integration into downstream back-end fusion modules. This separation allows for more flexible integration into existing system architectures and enables targeted improvements to the perception module. The proposed architecture provides the accurate depth perception needed to overcome key challenges for localization in unstructured off-road environments and provides a foundation for robust depth-aware navigation. Preliminary qualitative results on held-out off-road sequences demonstrate the model's ability to generate consistent depth maps in rough dirt terrains. Future work will focus on incorporating the predicted depth and uncertainty into dense mapping frameworks such as TSDF fusion, with the goal of achieving full integration into an MVS-VIO pipeline for off-road autonomous navigation.

Carolyn Ko

Discipline: Nursing and Public Health

Authors:

#1 Elena Baldo

#2 Zach Costanza

#3 Gianna Gallo

#4 Lina Begdache

Abstract Name: The Relationship Between Alcohol Use, Dietary Habits, and Academic Productivity in College Students

Alcohol use is a prevalent concern among college students and may influence nutrition and academic engagement. Stress, social pressure, and irregular schedules can increase the disposition to alcohol consumption and contribute to unhealthy lifestyle patterns. Understanding how alcohol consumption relates to nutrient intake and academic functioning is essential for identifying factors that hinder student productivity. This study examined the relationship between alcohol use, dietary habits, and academic productivity among college-aged individuals. It was hypothesized that higher alcohol use is associated with less nutrient-dense diets and reduced academic engagement. A total of 1,409 participants aged 18 to 29, primarily from North and Central America, completed the AUDIT-C, Food Mood Questionnaire, and Academic Performance Scale through an anonymous Google Forms survey. Pearson's Correlation Coefficient in SPSS Version 28.0 was used for statistical analysis. Significant relationships were found between alcohol use and dietary habits. Students who drank alcohol in the past year consumed sugary foods more frequently ($r = 0.063$, $p < 0.05$). Among those who drink, greater alcohol intake was associated with lower consumption of green leafy vegetables ($r = -0.078$, $p < 0.05$), fruits ($r = -0.073$, $p < 0.05$), fish or shellfish ($r = -0.098$, $p < 0.01$), and whole grains ($r = -0.116$, $p < 0.01$). Academic productivity also showed meaningful associations with alcohol use. Higher alcohol consumption was linked to reduced classroom attention ($r = -0.120$, $p < 0.01$), a lower likelihood of initiating long-term projects early ($r = -0.120$, $p < 0.01$), and to engaging in social activities rather than studying ($r = 0.138$, $p < 0.01$). Overall, these findings suggest that frequent alcohol use coincides with poorer nutrition and reduced academic engagement, emphasizing the need for campus strategies promoting healthier eating, reduced alcohol use, and academic motivation. This research has not received any funding.

Vivienne Ko

Discipline: Computer Science

Authors:

#1 Vivienne Ko

#2 Prithvi Kapilavai

Prithvi Kapilavai

Abstract Name: EEG Signal Analysis System for Detection of Epileptic Seizure

Electroencephalography (EEG) provides a detailed representation of neural activity and contains physiological indicators—including alpha, beta, theta, and delta rhythms. These rhythms often shift dramatically prior to neurological events such as epileptic seizures. Sudden amplitude jumps, oscillatory abnormalities, and instability across brain regions like FP1 (left frontal pole), FP2 (right frontal pole), C3 (left central cortex), C4 (right central cortex), F7 (left frontal region), and O1 (left occipital cortex) can indicate the early onset of pathological neural behavior. These EEG changes are subtle to the human eye but detectable through computational modeling, making EEG-based epileptic seizure forecasting an essential direction for improving safety and clinical response. This project develops a machine-learning EEG epileptic seizure prediction system using the widely adopted CHB-MIT scalp EEG dataset from IEEE DataPort. The dataset includes multi-channel recordings sampled at 256 Hz from pediatric patients with intractable epilepsy, allowing the model to learn pre-seizure patterns. After preprocessing the signals, the system extracts both statistical and neurophysiological features, such as band-power ratios, spectral entropy, peak-to-peak amplitude variation, and short-time frequency shifts. These features form the input to a learning pipeline combining Support Vector Machines, Random Forests, and XGBoost classifiers. The final seizure probability is determined through majority voting across the models, where probability values approaching 1.0 indicate increased seizure likelihood. An interactive Streamlit dashboard was developed that displays raw EEG traces, extracted features, probability curves, and prediction outcomes. Users can upload EEG clips and receive immediate assessments indicating whether a seizure is likely to occur. The system can reliably demonstrate

strong potential for clinical decision support and early warning tools for individuals with epilepsy. Full details will be presented in the conference.

Claire Kobal

Discipline: Biochemistry

Authors:

#1 Samantha Katner

#2 Jessica Heinch

#3 Keyur Karmacharya

Abstract Name: Glypican-3 abundance within the microenvironment of Glioblastoma Tumor Cells

Glioblastoma multiforme (GBM) is an aggressive and highly invasive brain tumor with a poor prognosis, known for its rapid growth and resistance to standard treatments. GBM's complex tumor microenvironment further drives disease progression and limits clinical effectiveness. Proteoglycans, major components of the tumor microenvironment, play crucial roles in regulating cell signaling, adhesion, and proliferation. A type of proteoglycan, glypican 3 (GPC-3), is especially important because it shapes growth factor pathways in GBM, making it a promising biomarker and potential therapeutic target. In this study, we learned mammalian cell culture techniques and performed sandwich enzyme-linked immunosorbent assays (ELISA) to detect the level of GPC-3 on the cell surface and in the tumor microenvironment across multiple GBM tumor cell lines. The abundance of particular proteoglycans such as GPC-3 on GBM tumor cells and in its microenvironment will provide more clues on the mechanisms involved in driving GBM tumor progression.

Adam Koc

Discipline: Psychology

Authors:

#1 Rammy Salem

Abstract Name: Assessing the Effects of Race on NFL Head Coaching Tenures

Much commentary and discussion by professional football media pundits has centered around the issue of race in National Football League (NFL) head coach hiring and firing decisions. Motivated by this long-standing public debate and media portrayals suggesting unequal treatment of Black coaches, this study investigated whether measurable disparities existed in the lengths of employment between White and Black NFL head coaches. Prior research has documented the underrepresentation of coaches across many professional sports, including in the NFL. This study aims to contribute to that discussion by providing an empirical analysis of head coach employment data. Data was collected for all Black and White NFL head coaches hired between 1989, the year of the first Black head coach hire in the modern era, and 2024. Active coaches were excluded to ensure complete employment data. A between-subjects ANCOVA test was used to compare employment lengths of Black and White head coaches, controlling for prior NFL head-coaching experience, win-loss records, and team performance before each coach's hiring. Results revealed no statistically significant differences between racial groups in their coaching tenure lengths. These findings suggest that race did not predict head coach longevity in the NFL.

Discipline: Chemistry

Authors:

#1 Carl Jacky Saint-Louis

#2 Lingaraju Gorla

#3 Alexandru Tapu

Abstract Name: New Electron-Rich Polycyclic 1,2-BN-Heteroarenes with Phenyl Spacer: Synthesis and Photophysical Properties

Incorporating a B–N bond into polycyclic aromatic hydrocarbons generates planar azaborine scaffolds with unique optoelectronic features, including high photochemical stability, strong absorption, high fluorescence quantum yields, large Stokes shifts, and tunable emission. These attributes make BN-substituted heteroarenes promising candidates for applications such as organic light-emitting diodes (OLEDs) and related optoelectronic devices. However, enhancing electron density and controlling conjugation without compromising stability remain significant challenges. To address this, we designed and synthesized new electron-rich polycyclic 1,2-BN-heteroarenes incorporating strong electron-donating groups, including carbazole and dimethylaminodiphenyl, attached through a phenyl spacer. This design improves conjugation, introduces steric modulation, and enables control over charge-transfer interactions while mitigating aggregation-caused quenching (ACQ) of emission. Using palladium-catalyzed cross-coupling method, we successfully synthesized two target compounds featuring extended π -systems and enhanced donor–acceptor character. We propose that the phenyl spacer and bulky substituents reduce ACQ, improve photophysical stability, and yield tunable optical responses with potential multi-stimuli responsiveness. These structural modifications highlight a versatile strategy for tailoring BN-based heteroarenes. Beyond OLEDs, such multifunctional chromophores hold promise for chemical and biological sensors, adaptive optoelectronic systems, and security applications, expanding the utility of BN-embedded materials in next-generation technologies.

Timothy Kochany

Discipline: Biology

Authors:

#1 John Campitell

#2 Jane Flinn

#3 Jennifer Brielmaier

Abstract Name: Investigating Effects of rmTBI on BDNF, PGC-1 α , and ICAM-1 to Evaluate BBB Disruption, Oxidative Stress, and Neuroinflammation in Wild-type Mice

Roughly 10 million people experience a traumatic brain injury (TBI) every year and in the US alone, roughly 5.3 million people live with a TBI related injury. Previous studies have shown that TBIs can induce neuronal death and contribute to neurodegeneration. Repetitive mild traumatic brain injuries (rmTBIs) influence this process because they have also been shown contribute to neurodegenerative disease and cognitive decline, often times leading to cumulative effects and worsening damage. Proteins such as Brain derived neurotrophic Factor (BDNF), peroxisome proliferator-activated receptor gamma coactivator 1-alpha (PGC-1 α), and intercellular adhesion molecule 1 (ICAM-1) act as biochemical markers that can be detected in brain tissue to observe neuroinflammation, oxidative stress, and blood-brain barrier (BBB) disruption. BDNF plays an important role in facilitating cell growth and survival and decreased concentrations can be seen in those suffering from neurodegenerative disease. PGC-1 α has been shown to impact mitochondrial functions,

influence mitochondrial biogenesis, reduce oxidative stress, and modulate neuroinflammation in cells. This is important because TBI has been shown to increase oxidative stress, worsening neuronal injury. Neuroinflammation is also a key factor that contributes to neurodegeneration. ICAM-1 helps facilitate cell adhesion, specifically in the context of blood cells in response to inflammation. This process is vital for the BBB to function properly, as variations of ICAM-1 concentrations can impact BBB permeability and have been noted in neurodegenerative disorders such as Parkinson's Disease.

Emma Koeman

Discipline: Economics

Authors:
#1 Neil Silveus

Abstract Name: Exploring the Effects of Pay-for-Performance Contracts in Community Corrections Facilities

In the United States, approximately two-thirds of those released from prison are rearrested within three years. One common approach to reduce recidivism in the US has been the implementation of halfway houses, often administered by contracts with private entities. Using a policy change in Pennsylvania's halfway housing contracts, we study the impact of pay-for-performance contracts resident recidivism rates. Our research adds to the scant literature on the impact of pay-for-performance contracts in the provision of social services. We analyzed administrative data from the Pennsylvania Department of Corrections which allowed us to see the impact of the implementation of pay-for-performance contracts using a difference-in-difference model. Results provided little evidence to suggest that those released from halfway houses impacted by the change in contracting differed in parole violations compared to individuals in a facility without the contracting change. However, there is evidence that facilities impacted by the contract change were less likely to house inmates with drug history. This suggests evidence of "cream-skimming" as drug programs are expensive making rates of recidivism for drug offenders difficult to improve. Overall, evidence suggests that pay-for-performance contracts with halfway house facilities did not reduce rates of recidivism, but led to a potential "cream-skimming" effect.

Shelby Koeppen

Discipline: History

Authors:

Abstract Name: The Flower Child vs The War Hero: How Media in the 1960s Divided a Nation

The topic of this paper addresses the legacy of divisive media in the United States during the Vietnam War, and the media's exploitation of conflict between returning veterans and their families against the counterculture movement and the protesters involved. Historians and sociologists, such as Jerry Lembcke in his book *The Spitting Image: Myth, Memory, and the Legacy of Vietnam*, argue that news outlets purposely used inflammatory language and cherry picked stories to push unsubstantiated narratives about counterculture protesters. However, there is still a large debate surrounding certain events that took place during this time. Many people can imagine the stereotype of spat upon veterans and protesters screaming at returning soldiers, but historical reports have failed to confirm the accuracy of these eyewitness accounts. By exploring how protesters and Vietnam veterans were portrayed in the media during the Vietnam War, this paper will argue that news outlets fueled an ideological war at home to discourage citizens from realizing that soldiers were fighting a losing war overseas. It will also argue that protestors and pro-veteran citizens were not as different

as portrayed, and instead both just wanted their friends and family to stop being sent to Vietnam. This study examines newspapers, footage from protests, and historical accounts in texts to convey how media sources' depiction of the counterculture movement in the 1960s is why the average American and those who were involved with these counterculture groups were so heavily divided. This legacy of divisive media has only continued to exploit and misinterpret Americans' differences instead of celebrating them.

Andja Kola

Discipline: Interdisciplinary

Authors:

#1 Nafisa Nipun Tanjeem

Abstract Name: Europeanization or Colonization: Immigration Policies in Albania

This study investigates how Albanian television constructs public narratives about emigration and the refugee situation, situating these representations within the country's broader social and political landscape. Albania continues to grapple with the dual realities of sustained outward migration and the arrival of refugees from regional conflicts, making televised discourse a key arena for negotiating ideas of national identity, belonging, and moral responsibility. Using critical discourse analysis, this study examines a purposive sample of political talk shows, current affairs programs, and news commentary segments broadcast. The analysis focuses on the language, tone, and visual framing used to represent emigrants, asylum seekers, and state policies. Findings reveal that television hosts and commentators often frame emigration as a symptom of national loss and frustration, while refugees are alternately portrayed through humanitarian and securitized lenses. These representations expose underlying tensions between empathy, fear, and national pride. This research highlights how Albanian television both reflects and reinforces public sentiment toward migration. Ultimately, this project contributes to ongoing debates about media responsibility, identity politics, and migration communication in Southeastern Europe, emphasizing how small-state media systems mediate complex global narratives within a localized cultural context. This research also incorporates a comparative analysis of immigration debates in the United States and Albania.

Drew Kolber

Discipline: Political Science

Authors:

#1 Antti Pentikäinen

Abstract Name: Blue Dog Bark: "God Talk" and Religious Cues by Centrist Democrats

Despite extensive research on "God talk" among conservative Republicans, the use of religious language by moderate Democratic politicians remains understudied. This gap is particularly significant for members of the Blue Dog Coalition, who represent constituencies with many "split ticket" voters; those who elected Democrats locally while voting Republican in the national election. Previous research has focused on coded religious cues in conservative political communication, primarily relying on media appearances and campaign rhetoric, while largely leaving House floor speeches unexamined. This study analyzes all 2,059 congressional floor speeches offered by the ten current Blue Dog Coalition members from the 116th through the 119th Congresses (2019-2025). It employs comparative content analysis alongside thematic analysis to capture both the frequency of religious language and the contexts in which it appears. Preliminary findings reveal that Blue Dog Democrats explicitly appeal to faith during commemorations of retiring or deceased

constituents and colleagues, as well as when honoring mass casualty events. "God talk" - implicit, coded religious language - was found in references to community stewardship, heritage, and the value of "neighbors" in civic life. Blue Dog Democrats primarily deploy religious rhetoric during moments of change and loss, rather than in policy debates, suggesting a "Blue Dog Bark" focused on the virtue of associational life rather than partisan identity.

Parth Kommidi

Discipline: Health and Human Development

Authors:

#1 Parth Kommidi

#2 Andrea Comba

#3 DIlani Patel

Abstract Name: Reproducing Glioblastoma Architecture: A Miniaturized Organotypic Slice Model for Studying Tumor Microenvironment Interactions

Glioblastoma is the most common and aggressive primary brain tumor, marked by rapid growth, invasion, and poor survival of 12–18 months. Many current laboratory models fail to capture the native spatial organization of glioblastoma, including its cellular diversity, extracellular matrix structure, and specialized niches such as vascular and perivascular regions. These limitations restrict their usefulness for studying the tumor microenvironment and for developing effective, patient-specific treatments. To address this gap, we created a rapid and versatile 3D Miniaturized Glioma Organotypic Slices (MiGOS) model using freshly resected human glioblastoma tissue. The goal of MiGOS is to preserve the native architecture and cellular complexity of patient tumors while enabling real-time biological studies and therapeutic testing. Fresh GBM tissue was collected within 30 minutes of surgery, embedded in low-melt agarose, sectioned into 300 μm slices, and punched into 1.5 mm miniaturized tissue units. These were cultured at an air-liquid interface for up to 15 days in serum-free, defined media. MiGOS samples were analyzed by hematoxylin and eosin staining, immunofluorescence, and confocal microscopy to assess overall structure, cellular composition, vascular features, immune cells, and extracellular matrix proteins. We also developed an ex vivo invasion assay by transplanting fluorescently labeled MiGOS onto normal mouse brain slices. MiGOS preserved hallmark features of the original tumor, including cellularity, pleomorphism, necrosis, microvascular proliferation, and extracellular matrix organization. They also maintained perivascular niches and spatial heterogeneity of the tumor microenvironment. The invasion model showed robust tumor cell infiltration into healthy brain tissue within 72 hours. Overall, the MiGOS platform provides a physiologically relevant and rapid preclinical model that maintains native tumor structure and supports studies of tumor biology, cell interactions, invasion, and therapeutic response, offering strong potential for advancing personalized glioblastoma research.

Angelina Kondratenko

Discipline: Chemistry

Authors:

#1 Riana Green

#2 Aima Tajriyan

#3 Akira Kawamura

Abstract Name: Synthetically Available Vittatalactone Analogues for Improvement of Pheromone-Based Control for *Acalymma vittatum* (Striped Cucumber Beetle) and Other Cucurbit Pests

Current methods of biological control for *Acalymma vittatum* (striped cucumber beetle) in the United States are limited to pesticides that bring up significant environmental and health concerns. Adult beetles lay eggs and overwinter alongside them—a single infestation requiring long-term attention. The use of traps offers an ecological alternative, in which lures attract these invasive beetles to draw them away from possible host plants. *A. vittatum* prefer to feed on the Cucurbitaceae family, including squash, zucchini, and other agriculturally important crops. Vittatalactone is an aggregation pheromone released by male *A. vittatum* when actively feeding. Previous studies identify this compound as an efficient lure for cucurbit pests, but synthesis methods are difficult due to the many chiral centres on the aliphatic chain. We hypothesize that the rigid β -lactone core of vittatalactone is essential for molecular recognition, mediating specific hydrogen bonds with the insect receptor that demand precise spatial arrangement. In contrast, the sidechain, which mediates hydrophobic interactions with the receptor, is expected to be more permissive of structural variation because hydrophobic interactions rely primarily on surface complementarity and desolvation rather than strict geometric constraints. As such, we are synthesizing vittatalactone analogues with simplified sidechains. With aldehyde and imide starting material, we optimized an initial aldol addition reaction for the purpose of maintaining sufficient yield. The addition product then undergoes cleavage and cyclization to mimic the vittatalactone headgroup while keeping the hydrocarbon chain achiral. Structurally simplified analogs of vittatalactone are expected to facilitate the development of new pheromone-based behavioral control strategies for *A. vittatum* and other cucurbit pests. This presentation will outline the synthesis of the promising vittatalactone analogues and their further analyses of stability and volatility, laying out the groundwork for subsequent behavioral assays aimed at identifying compounds with the most promising bioactivity.

Caroline Koons

Discipline:

Authors:

Lundon Salley

Abstract Name: Mentoring Research Writing Success: Cross-Campus Collaborations in Student Research and Campus Writing Centers

Collaborations between campus research institutions and writing centers can be a fruitful means by which undergraduate researchers develop their research writing skills beyond a relationship with their research mentor. Writing centers are sometimes pigeonholed as a remedial resource for student essays or grammar and punctuation help, which undervalues the depth of research writing expertise offered by peer mentorship. We present a model for collaboration between undergraduate research offices and programs and university writing centers at multiple stages of the research development process. The Undergraduate Research Institute at Embry-Riddle Aeronautical University, Prescott requires student researchers to acquire feedback from peer writing center tutors on their research proposal prior to the initial funding request submission each semester. The writing center and Undergraduate Research Institute also host a poster design session in the lead up to the campus research showcase to provide student researchers with visual design and writing feedback before submitting finalized posters for approval. The writing center director will describe the administrative set up and coordination for these interactions, the benefits to both the campus writing center and the undergraduate research offices and programs and some of the unique constraints and opportunities offered by the quirks of a small STEM university. An experienced undergraduate peer tutor from the writing center will describe these peer mentoring interactions and how they differ from the conversations about research writing that often happen between student researchers and mentors. Through these collaborations, student researchers gain clarity on their research design process, outside perspective on how best to communicate their research to others, and feedback from peer writing tutors that can benefit the student researcher and mentor relationships. We will provide a framework and possible avenues for developing similar peer tutor collaborations at other institutions.

Alyssa Kornegay

Discipline: Biochemistry

Authors:

#1 James Shorter

#2 Edward Barbieri

Abstract Name: Targeting TDP-43 Aggregation with Novel Small RNA Chaperones Using the FIT System

Protein aggregation of TAR DNA-binding protein 43 (TDP-43) is a hallmark in many neurodegenerative diseases, particularly in Amyotrophic Lateral Sclerosis (ALS) and Frontotemporal Dementia (FTD). Recent findings have proven that short RNA chaperones consisting of 34 nucleotides are able to bind to TDP-43 to prevent aggregation. To enhance the therapeutic potential of these RNA chaperones, my project is focused on finding reduced-size RNAs consisting of only 20 nucleotides that prevent TDP-43 aggregation in both wild-type and disease-associated mutant variants. To identify potentially potent 20-nucleotide RNAs, 105 randomized RNA sequences were screened using a feedback inhibition of translation (FIT) system in yeast, yielding promising candidates. To validate the most promising RNA candidates, RNA-1, RNA-K, and RNA-Q, the RNAs were then cloned into the yeast FIT system and assessed using yeast viability spotting tests. Secondly, in vitro TDP-43 aggregation assays were performed against wild-type, Q331K, and K181E variants to test the candidate RNAs at various concentrations. Preliminary tests show that small RNA-1, RNA-K, and RNA-Q prevent TDP-43 aggregation at 5 μ M concentrations and delay aggregation at 1.25 μ M concentrations. Additionally, yeast spotting assays suggest that RNA-1 and RNA Q inhibit toxic wild-type TDP-43 aggregation. Our findings suggest that 20-nucleotide RNAs may be a viable therapeutic approach for treating TDP-43 proteinopathy. Furthermore, future directions include concentration gradient tests to determine 50% inhibitory concentration (IC-50) values, as well as testing in human cells.

Melissa Kosharek

Discipline: Computer Science

Authors:

#1 Michael Tetzlaff

#2 D. Magda Hannen

Abstract Name: Expanding Cultural Heritage Digital Curation and Dissemination Using Kintsugi 3D Viewer

Kintsugi 3D is a software platform that uses a photographic technique called photogrammetry to create 3D models of cultural heritage objects. Kintsugi 3D includes two software applications: Kintsugi 3D Builder and Kintsugi 3D Viewer. Viewer is intended to be a free, open-source software directly targeted to cultural heritage institutions and their needs for disseminating models and intended to be an alternative to SketchFab, a popular web-based 3D model viewing website. The goal of this research was to implement an improved workflow experience to ease the transition between building and refining models in other software and then setting up models to be viewed by the public in Viewer. The solution we've created is to have a desktop version of Viewer act as a configuration menu, providing tools to prepare model data to be sent to a server, which the web version of Viewer will be able to read to create a curated viewing experience for the public. This research is supported by multiple cultural heritage institutions including the Minneapolis Institute of Art (MIA), Cultural Heritage Imaging (CHI), and the National Gallery of Art (NGA). I worked closely with individuals responsible for digital imaging and preservation of items at their respective institutions, this

application's primary users, to find solutions to their wants, needs, and pain points through regular meetings and user testing. When discussing needs with stakeholders, we found that top priorities included model viewing configurations such as camera constraints, environment selection, artifact placement, and lighting settings. These settings are essential, allowing models to be viewed in intentional and culturally appropriate ways over a generic western gallery display. Other tasks related to the functionality of this workflow include developing a local save system with read/write functionality to allow for seamless use between different instances of the application on different machines.

Madeline Koshuta

Discipline: Political Science

Authors:

#1 Eric Loepp

Abstract Name: One Candidate, Under God? How Gender, Partisanship, and Religiosity Shape Voting Behavior

This study investigates how intersecting identity traits—gender, partisanship, and religiosity—shape political impression formation among American voters. While existing research typically examines dyadic interactions (e.g., gender $\times$ partisanship), few studies explore how multiple identity dimensions jointly influence voter evaluations. Given the increasing conceptualization of partisanship as a social identity, it is essential to consider how demographic traits interact to produce intersectional effects on candidate perception (see, e.g., Gershon & Lavariega Monforti, 2019). This inquiry is especially timely amid rising support among some voter segments for traditional gender roles and recent upticks in Christian identification (e.g., Smith, et al. 2025). Using a nationally representative sample, I will conduct a survey experiment in which participants evaluate political candidates described in vignettes that systematically vary gender, party affiliation, and religious identity, all while holding policy positions constant (e.g., support for quality schools and a strong economy). This design enables a rigorous test of hypotheses concerning the interactive effects of identity cues on impression formation, offering new insights into the psychological underpinnings of voter decision-making in contemporary political life.

Anum Kotecha

Discipline: Engineering

Authors:

#1 Anum Kotecha

Abstract Name: 3D Corneal Phantoms: An Accessible Simulation for Penetrating Keratoplasties

The rising cost and limited availability of surgical training models for ophthalmology have restricted access to critical education in corneal transplantation techniques. Traditional training relies on cadaveric tissue, animal eyes, or commercial kits, all of which present ethical, logistical, and financial barriers. This study presents a novel, affordable, and globally accessible corneal model designed to simulate penetrating keratoplasties (PK). Using modified bio-inks composed of sodium alginate and pectin, combined with 3D-printed molds, we developed a corneal phantom. This phantom is part of a greater PK Simulation kit costing approximately \$11 per unit. The model, and greater kit, eliminates reliance on animal products, cadaver tissue, improves inclusivity in surgical education, and expands accessibility for students worldwide, particularly in low-resource geographic locations. The novel bio-ink that is the basis of these corneal phantom

demonstrated suitability as a tool for surgical training and for wider applications in corneal transplant research. This innovation provides a scalable path toward democratizing ophthalmic surgical education while potentially improving patient outcomes in regions with high burdens of corneal disease.

Alekhya Kotha

Discipline: Mathematics

Authors:

Abstract Name: Analyzing the Effects of Vaccination and Sanitation on the Viral Spread of Hepatitis B

SIR Models (Susceptible, Infected, and Recovered) are popular epidemic models that are used to better explain disease spread in specific populations. While previous research has focused on disease transmission and even the rate of spread with vaccination, there is a lack of studies that consider the effects of proper sanitation measures on reducing the spread of Hepatitis B. My research aims to mathematically show the effects of sanitation and argue for its funding in certain sub-Saharan African countries, specifically Nigeria, that would greatly benefit from these preventative measures. I recognize that vaccines are extremely expensive to create, manufacture, and distribute and understand that low-income countries rarely receive an adequate amount of doses to effectively handle an epidemic. Therefore, this model is important not only to understand the spread of Hepatitis B in sub-Saharan countries but also to emphasize the implementation of lower-cost sanitation strategies to mitigate the effects of the disease while waiting for vaccines. Through a series of math models in Maple, I studied the general equilibrium and stability of the disease-free and endemic state under four conditions: (1) No Vaccination or Sanitation, (2) Vaccination, (3) Effective Sanitation, and (4) Vaccination and Sanitation. In evaluating each of these conditions in the disease-free state where there are no infections and the endemic state where there are a certain number of existing cases, the combination of effective sanitation in hospitals and current vaccination success leads to Hepatitis B in Nigeria becoming stable in the disease-free state.

Nidhi Kothari

Discipline: Biology

Authors:

#1 Akash Kumar

#2 Sumana Karmakar

#3 Shalini Prasad

Abstract Name: A Deep dive into surface chemistry and binding dynamics in biosensor stack formation

In order to create highly efficient biosensors with high stability and sensitivity, it is important to characterize and optimize the binding interactions between the sensor surfaces, crosslinkers, and antibodies, as well as the binding interactions between the sensor surface and aptamers, especially in the field of biosensors. This research study takes a deep dive into the concepts of surface functionalization and characterizations of antibody binding to the crosslinker (3,3'-dithiobis(sulfosuccinimidyl propionate) also known as DTSSP, which will bind to the surface of the sensor. Many characterization techniques were used to understand the different aspects of surface chemistry and the efficiency of binding. Fourier Transformation Infrared Spectroscopy (FTIR) was used to directly confirm the creation of thiol and amide linkages between the antibody and crosslinkers, which shows the high binding efficiencies. Zeta Potential (Zeta) measurements provided insight into each surface charge modulation, which demonstrated the charge stabilization of binding

interactions, and the hydrodynamic size informed about the change in size upon binding. Cyclic Voltammetry (CV) and Electrochemical Impedance Spectroscopy (EIS) showed us the changes in the charge transfer resistance and double-layer capacitance, which show the biomolecular binding and the degree of crosslinker and the antibody coverage over the surface of the sensor. By using all these different methods, we are able to establish an extensive, multifaceted approach towards characterizing and optimizing biosensor surfaces, making it easier to create a noninvasive health monitoring program that uses sweat in real-time, which will help with disease diagnosis in future biosensor applications.

Nirav Kottury

Discipline: Biochemistry

Authors:

Abstract Name: Bulletproofing the Heart: Investigating GLP-1 Pathway-Mediated Protection Against Alcohol-Related Cardiomyocyte Injuries

Alcoholic cardiomyopathy (ACM) is a chronic, progressive form of cardiac dysfunction driven by long-term alcohol exposure and associated cellular damage. Despite its prevalence, there are currently no therapies that directly protect cardiomyocytes from alcohol-related injury. Semaglutide, a GLP-1 receptor agonist with known metabolic and cardiovascular benefits, has been suggested to enhance nitric oxide signaling and promote protective intracellular pathways; however, its potential role in reducing cardiomyocyte injury in ACM is not well understood. In this project, AC16 human ventricular cardiomyocytes were exposed to alcohol-related stress and examined in the presence or absence of semaglutide to evaluate whether semaglutide could mitigate cell damage. Initial experiments were conducted using ethanol as the injury source, and cell viability was measured using an MTS-based assay, while changes in apoptosis and fibrosis markers were assessed through immunohistochemistry and Western blotting. These early results showed only minimal reductions in viability and limited activation of apoptosis pathways following ethanol exposure, making it difficult to assess the protective effects of semaglutide. Based on these findings, the experimental model has been refined to use acetaldehyde, a more reactive and physiologically relevant metabolite of ethanol known to induce stronger cellular stress responses. The ongoing phase of the study will evaluate whether acetaldehyde produces clearer injury phenotypes and whether semaglutide can meaningfully reduce this damage. Through this work, we aim to clarify the potential of semaglutide as a protective agent in ACM and contribute to the development of therapies that directly address cardiomyocyte loss in alcohol-related heart disease.

Kadija Kourouma

Discipline: Business

Authors:

#1 Kadija Kourouma

Abstract Name: Nostalgia Marketing: Using Disney's Model to Revitalize Nickelodeon Subscriptions and Revenue on Paramount+

The role of nostalgia marketing on consumer behavior has been a growing topic of discussion within the field of marketing. Peer-reviewed studies discussing nostalgia marketing's effect on Purchase Intention, Ad-attitude, Brand attitude, Brand Loyalty, and Self-Continuity, worldwide, were examined and analyzed to determine the effects of nostalgia and nostalgia marketing on a consumer. A comprehensive literature review

was conducted to determine how the use of nostalgia marketing by childhood brands in the US is, their differences between marketing styles, and the levels of success that have been found with each style. Instagram posts from Disney, Disney+, Nickelodeon, and Paramount+ were analyzed to ascertain the differences between nostalgic and non-nostalgic advertising. The findings suggest that the application of nostalgia marketing on Instagram may have positive effects on generating revenue through subscription growth stemming from interactions on the platform's posts. This paper aims to discuss how the use of nostalgia marketing from childhood brands such as Disney can promote the utilization of their model of marketing to generate revenue for similar brands like Nickelodeon and Paramount+. More research focusing on how much of the nostalgic content encompasses the revenue generated from the streaming platforms should be conducted.

Christina Kouyoumdji

Discipline: Biology

Authors:

#1 Karim Bahmed

#2 Nhung Nguyen

Abstract Name: Impact of ALCAM Impairment on Mitochondrial Function in Idiopathic Pulmonary Fibrosis

Idiopathic Pulmonary Fibrosis (IPF) is a chronic and irreversible disease that causes scar tissue formation in the lungs and changes their architecture, thereby restricting movement necessary for respiration. IPF primarily limits the function of Alveolar Type II Epithelial (ATII) cells, which enable alveolar regeneration and produce the surfactant protein needed for lung tissue to glide against itself during breathing. Those diagnosed with IPF have a prognosis of 3-5 years. The cause of the disease remains unknown. The Activated Leukocyte Cell Adhesion Molecule (ALCAM), which is a membrane protein that plays a protective role in cell adhesion, is downregulated in IPF. Similarly, mitochondrial function, including biogenesis and mitophagy, is also downregulated, meaning that the removal and replacement of damaged mitochondria is reduced. Altogether, this means that ATP production is lowered and reactive oxygen species (ROS) increases, leading to oxidative stress, DNA damage, and cell death. We were interested in exploring a potential relationship between mitochondrial dysfunction and ALCAM impairment in IPF. We hypothesized that ALCAM impairment impacts antioxidants, inflammatory proteins, and DNA repair proteins, which leads to mitochondrial dysfunction, ATII cell injury, and IPF development. To test this, we used human lung tissue, including IPF tissue from transplant patients and healthy tissue from post-mortem organ donation. We also looked at ALCAM knockout in A549 cells, which are a model for ATII cells. We found that some antioxidants and products of ROS are significantly upregulated in IPF and that, unexpectedly, markers of DNA damage and repair are downregulated, which we suspect is to combat the ROS increase. We concluded that cells are likely trying to rescue ROS balance, or redox homeostasis. In the future, we hope to directly analyze ROS levels in ALCAM knockout cells and definitively link IPF to ALCAM to determine if antioxidants can be a therapeutic target.

Jess Kowalski

Discipline: Biology

Authors:

#1 Gunnar Kramer

#2 Patrick Kelley

Abstract Name: Behavioral Complexity in Joint Territorial Defense of a Tropical Understory Bird

Many species use vocalizations to distinguish between familiar territorial neighbors and unfamiliar strangers, a phenomenon known as neighbor-stranger discrimination. The Chestnut-backed Antbird (*Poliocrania exsul*, CBAN), a tropical understory bird, vocalizes in response to territorial intrusions, yet it is unclear whether males and females differ in their territorial responses. This study aimed to provide insights into the behavioral ecology of CBAN to determine whether CBAN portrays neighbor-stranger discrimination in joint territory defense and whether responses are influenced by sex. I tested two hypotheses describing potential territorial responses: the “dear enemy” hypothesis (stronger reaction to strangers versus neighbors) and the “nasty neighbor” hypothesis (stronger reaction to neighbors versus strangers). To test these hypotheses, I conducted 56 playback trials of different intruding neighbor, stranger, and sex combinations in Soberanía National Park in Panama in summer 2025. I found that CBAN display neighbor-stranger discrimination, supporting the “dear enemy” hypothesis. CBAN pairs duet more to any stranger intrusion, regardless of sex. The sex of the intruder and the territorial bird plays a role: females approach intruders faster and closer than males. This research provides a deeper understanding of communication networks, challenging the assumption that females are passive followers of males in joint territorial defense. Future studies should consider the complexity of pair responses in year-round joint territory defense strategies.

Aditi Kowta

Discipline: Health and Human Development

Authors:

#1 Chris Wei

#2 Vanshika Lohia

#3 Ajay Niranjana

#4 Constantinos Hadjipanayis

#5 L. Dade Lunsford

Abstract Name: Tumor Control after Gamma Knife Radiosurgery for Meningiomas

Meningiomas account for approximately 36% of all primary brain tumors. Leksell Gamma Knife provides an effective treatment for patients with intracranial meningiomas by targeting tumors and minimizing peripheral cell damage. We evaluate the connection between radiologic dosing and post-surgery outcomes. We reviewed outcomes of 56 patients (41 female, 73.2%) who underwent stereotactic radiosurgery (SRS) treatment from 2022-2024. Median age of patients was 68 years (32-85 years). Median follow-up time was 16.4 months (0-40 months). Median WHO grade was 1 (range 1-3), Ki-67 was 7% (range 2-46%). The median Karnofsky Performance Score (KPS) score before SRS was 80 (range 60-90). Presenting symptoms included headaches (22 patients, 39.3%), seizure (11 patients, 19.6%), gait dysfunction (17 patients, 30.4%), motor deficits (2 patients, 3.6%), sensory dysfunction (32 patients, 57.1%), and cranial nerve palsies (5 patients, 8.9%). Thirty-one (55.4%) patients underwent pre-SRS surgical resection. Median prescribed margin dose was 13 Gy (range: 11-40). The median cumulative tumor volume was 1.75 cc (range: 0.02-13.35) while the median 12Gy volume was 2.96 cc (range: 0.04-31.0 cc). Overall, 8 patients (14.3%) experienced local tumor progression at their last follow-up with the median timespan between SRS and local tumor progression of 14 months (range: 5-44). None of the patients had any distant tumor progression. Three patients (5.5%) required repeat-SRS treatment due to local tumor progression. Adverse radiation effects (ARE) were seen in 1 patient (1.8%) as an edema, which was treated with surgery and steroids. Three patients (7.1%) had improved neurological function, and 9 patients (92.9%) had no change in neurological function. Median KPS at last follow up was 80 (range: 50-100). Overall, SRS demonstrated favorable outcomes with low associated morbidity, low rate of progression, and minimal toxicity, suggesting that current dosing strategies remain effective and well-tolerated in meningioma management.

Sophie Koz

Discipline: Communications

Authors:

#1 Sophie Koz

Abstract Name: The Reality of the Reality: Dating Shows on Dating Experience

This research focuses on the question of: How do dating shows influence their viewers' dating expectations and dating actions? This includes seeing what people believe the social norms of dating are, as well as communication styles and social scripts used in a romantic setting. The research area of this project is Television Production and the importance of how television production decisions have a social influence on audiences. The theoretical framework of the research is based on the idea of Social Scripting and Social Cognitive Theory. The methodology behind the research was a qualitative Google Form Survey with over 20 responses. The survey asked a multitude of questions, such as asking the participants for their dating background and television watching habits, as well as asking the participants social and behavioral questions. The results found that there were no major/conscious influences that reality dating television shows have on their audiences. Still, there is some correlation between social scripting and how watching reality dating shows is then reflected on a person's dating experiences and behaviors. In addition, if not for guiding scripts and expectations, reality dating shows instill some type of confidence and self-worth in their viewers. Limitations of this research include a lack of exploration on the effects of gender identity and gender roles in dating, the survey was only attained via the researchers' socials (which made the results not generalizable), and there was not enough time to perform a study of super-fans via social media (for example, Reddit and X).

Elliot Kozlowski

Discipline: Environmental Science and Sustainability

Authors:

#1 Matthew Ehresman

Abstract Name: Effects of Light Pollution on the Activity of Bat Populations within the Schlitz Audubon Nature Center

Bat populations have been in rapid decline in recent years, with 4 out of the 8 native bat populations in Wisconsin listed as endangered. There are many reasons for this decline, but despite the findings on light pollution in other species, including humans, there is very little data on the effects of light pollution on different species of bats. Within the bounds of the Schlitz Audubon Nature Center, the parking lot's lights serve as direct light pollution. From June 1st to July 31st, 2025, 4 different areas within the grounds were surveyed using Audiomoth bioacoustic recorders, all at variable distances from the parking lot lights. Data collected during the summer was analyzed and coded depending on whether the lights were on, off, or if there was a wedding, into the averages for each area. Each Audiomoth bioacoustic recorder filters and converts noise to a spectrogram in order to look at the frequency and duration of each echolocation call. This data can then be used to determine which species of bat made the call. The data also shows how many pulses per instance, which is used to get the average of how active the bats were during each randomly selected lighting setting. With the data collected, there is already an emerging trend that the most bat activity is on nights with lights off, while nights with weddings on the grounds had the least bat activity. Moving forward, further analysis will be done into the presence of certain species of bats and their frequency, as well as how distance from the light affects each area's bat sightings.

Katy Kraenzlein

Discipline: Environmental Science and Sustainability

Authors:

#1 Jelili Adebisi

Jordan Bethke

Dylan Frey

Abstract Name: An Empirical Study of Waste Generation and Disposal at NMU

This study examines patterns of waste generation and disposal across Northern Michigan University's (NMU) campus to evaluate the effectiveness of current sustainability efforts and identify areas for improvement. The project involved conducting weekly waste audits over 1.5 months at 13 key academic and residential sites, covering 20 dumpsters. Each audit consisted of collecting the full contents of selected dumpsters, sorting the materials on a tarp, and categorizing them into food waste, recyclables, compostables, e-waste, and general waste. The sorted data were recorded and analyzed to assess recycling accuracy and determine the volume of recoverable materials being sent to landfills. The results revealed widespread contamination in recycling bins, along with a significant amount of compostable and recyclable materials misclassified as general waste. Food waste was particularly prevalent in residential areas, highlighting the need for improved composting infrastructure and enhanced education on proper waste separation among students. These findings highlight the importance of integrating sustainability practices into NMU's daily operations and student culture. By comparing academic and residential waste streams, the project offers valuable insight into campus waste behaviors and identifies opportunities to expand recycling and composting programs. Ultimately, this research supports NMU's broader goals of reducing landfill dependency and promoting environmental stewardship within the university community.

Adeline Kraus

Discipline: Interdisciplinary

Authors:

Abstract Name: Analyzing Impactful Methods of Supporting Migrant and Refugee Integration in Mexico City, Mexico

In Mexico City (CDMX), migrants and refugees experience disadvantages and discrimination in the process of resettlement, particularly in labor and social integration. The integration of these groups has been highly studied in the United States and Canada, however, this issue remains understudied in Latin America, specifically in Mexico, where the focus has been on migrants in transit. To investigate this issue, I conducted a qualitative case study on Programa Casa Refugiados (PCR), a non-profit migrant and refugee support organization in Mexico City. Over the course of my three month internship with PCR, I conducted six semi-structured interviews with employees and clients of PCR. The interview questions focused on the functions of the organization, and the perceptions and experiences of participants relating to Programa Casa Refugiados. Participant observation was conducted at two PCR offices, the CeahPaz shelter, and several PCR events. Critical race theory informed both the interview questions and the analysis of my observations. My investigation finds that Programa Casa Refugiados offers a holistic approach to migrant and refugee integration that values the unique experiences, skills, and needs of clients. The findings demonstrate the importance of the workplace environment in employee productivity, performance, and satisfaction. This research fills a gap in the current scholarly literature by revealing the strategies employed by Programa Casa Refugiados that are effective in addressing the social and economic challenges faced by migrants and refugees in CDMX. Finally, the findings identify the challenges facing PCR and the methods they have

developed to withstand these pressures and strengthen their services. These findings offer valuable insight for other non-profit organizations in the Americas with similar goals and financial restrictions. The implementation of PCR strategies could be beneficial for these organizations and strengthen migrant and refugee support systems throughout the Americas.

Grace Krenn

Discipline: Economics

Authors:

#1 Divya Sadana

#2 Sarthak Behera

Adrien Stoen

Abstract Name: Labor Supply Behavior: A Study on the Role of Culture

In this paper, we study the role of peoples' attitudes on their labor market behavior. Focusing within a household, we estimate how one's labor market decisions are dependent on their partner's labor market outcomes, and how these decisions are driven by their culture component. Historically, man has been associated as the primary earner in a family. We argue that culture might play a role in determining a person's labor market outcomes as it induces an aversion to the situation of when the wife earns more than the husband. We find that husbands increase their participation as well as hours worked in the labor market if their wives earn more and this effect is even more prominent if they are from a country where people have the traditional view that man should be the primary bread-winner for the family. However, wives do not exhibit any such behavior. We argue that this irregularity is explained by the role that culture plays on forming labor market decisions. This result is important as it might contribute to the explanation of the slowdown in the convergence of the gender gap in the recent past.

Alexandra Krieger

Discipline: Linguistics and World Languages

Authors:

#1 Joshua Rodriguez

Abstract Name: Language Learning in Childhood: Impacts on Brain Development and Academic Success

This research continues my previous work from Fall 2025 and deepens the understanding of why learning a second language in childhood is so important. Learning another language in early childhood is recognized as a powerful tool that enhances both cognitive and social development. This study explores the benefits of early second language acquisition through findings in neuroscience, education, and psychology. Children who grow up in bilingual or multilingual environments show greater cognitive flexibility, stronger memory, and improved problem-solving skills. They also demonstrate higher academic performance and increased success in areas such as music. Beyond cognitive and academic advantages, children who learn another language gain exposure to cultural diversity and develop stronger cultural awareness. In a world where diversity remains a pressing issue, language learning offers children meaningful tools for understanding and engaging with the environment around them. Despite these advantages, access to second-language instruction remains limited, especially in underserved regions. This research identifies practical steps that expand opportunities for language learning. The study focuses on three key factors: how the brain receives and retains language depending on developmental stage; the current benefits of learning a language in childhood; and ways parents

can use available resources to support language learning at home. Although the emphasis centers on childhood, the research also explains that it is never too late to learn another language. Studies, including those involving individuals with dementia, show that bilingualism helps slow cognitive decline associated with Alzheimer's and related conditions. Overall, this research affirms that early language learning provides meaningful developmental, academic, and social benefits in a multilingual world.

Shreya Krishnamurthy

Discipline: Psychology

Authors:

#1 Shreya Krishnamurthy

#2 Niani Erskines

#3 Vyshnavi Ravipati

#4 Natalie Dautovich

Niani Erskines

Vyshnavi Ravipati

Abstract Name: Evaluating Sense of Purpose as a Protective Factor in the Link Between Sleep Disturbance and Depressive Symptoms

Sleep disturbances are correlated with various outcomes, such as an increased risk for depression. However, few studies have focused on understanding how this risk can be minimized. According to the Stress-Buffering Model, the effects of negative stressors can be reduced with coping mechanisms known as buffers. One understudied buffer is the sense of purpose, which supports psychological resiliency. When navigating sleep concerns, a sense of purpose could reduce stress reactivity and promote emotional regulation, which could buffer the effects of poor sleep on depressive symptoms. The goal of this study is to assess whether sense of purpose functions as a protective factor when analyzing the association between sleep outcomes and depressive symptoms. Participants will be recruited from Project 2 of the Midlife in the United States (MIDUS) study, which includes a nationally representative American population aged 34 to 84 (N = 3,487). Using moderated hierarchical regression analyses, we will evaluate if the association between sleep and depressive symptoms varies as a function of purpose in life. Sleep will be operationalized as the PSQI (Model 1) or sleep onset latency (SOL), wake after sleep onset (WASO), total sleep time (TST), and sleep efficiency (SE) from sleep diaries (Model 2) and actigraphy (Model 3), and these will serve as primary predictors of depressive symptoms. Depressive symptoms will be studied through a questionnaire measuring depressive affect with Purpose in Life being introduced as a moderator of this relationship. By demonstrating that purpose in life can moderate sleep and depression, the findings could strengthen theoretical frameworks that emphasize psychological resilience. Because purpose in life is a modifiable factor, these findings could offer a meaningful target for prevention and intervention efforts. Future research can test purpose building interventions as a tool to reduce depressive symptoms among individuals with sleep disturbances.

Govind Krishnan

Discipline: Nursing and Public Health

Authors:

#1 Govind Krishnan

#2 Aarav Menon

Aarav Menon

Abstract Name: Mitigating Bias in Heart Disease Prediction Models Using Machine Learning on IBM Watson Platform

Heart disease is a top cause of death globally, but traditionally has been underdiagnosed in marginalized populations due to clinical bias in prediction models. This study is based on the hypothesis that machine learning models trained on clinical heart disease datasets may reflect demographic biases, particularly across sex and age. IBM Watson was used to select an ML algorithm, and Google Colab was used to perform subgroup fairness analyses. The dataset was a consolidated heart disease dataset from the Cleveland and Hungarian heart disease records. It contains 1,190 instances and 12 different demographic and clinical features. The target parameter was the presence or absence of heart disease in the patient. IBM Watson determined Logistic Regression as the top model (87.2% in Watson, 83.8% in Colab). Subgroup analyses showed accuracy differences (female 91.5% versus male 81.5%; <55 years 83.8% versus ≥55 years 83.7%), but selection rates differed. Males were classified as having heart disease more frequently at 61.5% versus females at 22%, and older patients at 72.7% versus younger patients at 33.5%. In the data, male participation was about ~76.4%, whereas the corresponding participation of women was about ~23.6%. Similarly, the population 55 and older was ~49.24% as compared to the younger population ~50.76%. These disparities reflect both underlying dataset imbalances and the model's difficulty accounting for sex-based differences in clinical presentation. To address this bias, efforts are being made to mitigate bias using sample reweighting, which is a bias-mitigation technique that increases the influence of underrepresented demographic groups during model training. This approach is being evaluated for its potential to reduce subgroup prediction disparities while preserving overall diagnostic performance. The preliminary results are meaningful and will be presented with full details in the conference.

Cole Krudwig

Discipline: Computer Science

Authors:

#1 Steven Fernandes

#2 Alison Kleffner

Izzie Nielsen

Abstract Name: Building Generative AI Applications - GANs, RAG and Agents

This project integrates three distinct generative AI applications into CSC 590 to provide undergraduate data science students with practical, real-world development experience. We deployed a Generative Adversarial Network (GAN), a Retrieval-Augmented Generation (RAG) system, and an agentic AI application via a JupyterHub-based science gateway on Jetstream 2. The instructor pre-developed each application and made them accessible as individual web links within the JupyterHub environment, allowing students to access the applications through their web browser without requiring SSH, tunneling, or direct JupyterLab access. Through instructor-guided tutorials, students explore the development process and underlying architecture of each application, gaining hands-on experience in building generative AI systems while developing industry-relevant skills. This pedagogical framework prepares undergraduate students for AI careers through accessible, cloud-based learning environments that lower technical barriers to entry.

Alexis Krueger

Discipline: Psychology

Authors:

#1 Kevin Zabel

Abstract Name: Suicide Prevention: Understanding the Factors that Influence Intervention

In 2023, 1.5 million Americans attempted suicide (CDC, 2025). Studies have investigated how personality and situational variables interact to impact bystander intervention in emergency situations. However, these factors are often studied in isolation or within contexts that are not directly applicable to the domain of suicidality. The purpose of this research is to examine how one's personality perception of a person disclosing suicidal ideations as well as their relationship with that person interact with situational factors such as group size to predict likelihood of intervention. Approximately 300 undergraduate students are participating in in-person laboratory sessions (175 students have completed the study thus far). A 2 (Number of Bystanders: Self Only vs. Group) x 2 (Relationship to Person Expressing Suicidal Ideation: Friend vs. Stranger) x 2 (Extraversion of Person Expressing Suicidal Ideation: Low vs. High) between-subjects design is being used with likelihood of intervention as the dependent variable. Participants first complete measures of empathy (Davis, 1996) and personality (Soto & John, 2017). Then, participants read a vignette about a character who is described as an introverted or extraverted friend or stranger who expresses suicidal ideation when they are alone or with a group. Next, participants complete a measure of likelihood to intervene (Aldrich & Cerel, 2024) and three manipulation check questions. I will conduct a between-subjects factorial ANOVA with likelihood of intervention as the dependent variable and extraversion of person expressing suicidal ideation, relationship to person expressing suicidal ideation, and number of bystanders entered as independent variables. I expect an interaction to emerge such that likelihood of intervention is highest when the person expressing suicidal ideation is described as a friend low in extraversion disclosing to the participant only. This research will give insight into interactions between factors that influence suicide intervention and guide subsequent research on facilitating intervention.

Lucas Kruse

Discipline: Physics and Astronomy

Authors:

#1 Lucas Kruse

#2 Gwendolyn Brandt

#3 Yousef Almuyaly

#4 Analía Dall'Asén

Abstract Name: Characterizing Meteorites with Atomic Force Microscopy

Atomic force microscopy (AFM) is a technique that can be used to analyze different properties of the surface of a sample (e.g., topographical, magnetic, chemical, electrical, optical and mechanical properties) through accurate and non-destructive measurements with very high resolution at the nano- and micro-scales. In particular, it can be used to characterize carbonaceous chondritic meteorites, which are mainly composed of micro/millimeter sized inclusions, surrounded by a matrix of microparticles, that date from around the time of the formation of our solar system. The study of the physical properties of these relics by carrying out AFM experiments can help to understand how planets formed since they can give evidence of the conditions (e.g., thermal, temporal and barometric) in which the materials found in the meteoritic samples developed in our solar system. In this work, we use an AFM system in contact mode to characterize carbonaceous chondritic meteorites (e.g., Northwest Africa, NWA, 6603) in different regions of the sample (inclusions, matrix and inclusion-matrix interface) at the nano- and micro-scales. From our measurements, we observed that these regions present distinctive physical characteristics. For instance, considering the topography of NWA 6603, the matrix reveals a relatively homogenous distribution of circular/elliptical-shaped particles of 0.5-1 micrometers in diameter, while the inclusions exhibit more irregular structures. In addition, the AFM findings are correlated with the results obtained with other experimental techniques (e.g., optical microscopy and Raman spectroscopy) applied to the same regions to look for signatures of the physical processes that drove the formation of these meteorites.

Julia Krzyształowicz

Discipline: Interdisciplinary

Authors:

Abstract Name: Playing with Mystery: Understanding Catalan Identity Through Medieval Performance

Within medieval European society existed a world surrounded by the inexplicable and mysterious. To unite people, language, and traditions, medieval societies practiced the Christian religion within the realm of the outside world, incorporating the tangible in the intangible and creating a presence in absence. Many took part in processions and in cyclic dramatic reenactments of biblical scenes, called Mystery plays. While a universal catholic practice in Europe, even if the “scripts” had the same content—starting from the creation of the universe and ending in the final judgement—each society depicted the events distinctly. This project analyzes the “Misteris” (or Mystery plays) and other performances that took place in medieval Catalonia, when the region was independent of Spain. My focus is not solely on the performances themselves, but on their effect in creating Catalan communities. The project analyzes the impact of performances recited in Catalan and performed in the open streets as a socio-political motive. It studies the aspect of drama, or play, as medieval folk would perceive it, before theatre etiquette, with open space to ad lib, as a device to explain the divine. To better embody how the Catalan people would have felt, the paper stresses medieval scholar Lauren Mancia’s methodology of reperformance to understand a time when so little was documented. The project expands on these Mystery plays as well as other performances, like the Dansa de la Mort (Dance of Death), as something inherently Catalan, as mentioned in the notable works of scholars Francisc Massip and Lenke Kovács, and demonstrates that this remains embedded in traditions that persist and comprise part of modern Catalan identity. Alongside studying archives in Catalonia, it captures my personal experience in the fall of 2025 in the ecclesiastical and urban spaces where these performances took place, and where some still do.

Discipline: Nursing and Public Health

Authors:

Abstract Name: The Hidden Cost of Helping Others: Understanding Compassion Fatigue, Burnout, and Paths to Prevention

Compassion fatigue and burnout are present in a variety of different careers, but they're especially prevalent in helping professions. Helping professions include, but are not limited to nursing, social work, teaching, and child life specialists. Although these careers can be rewarding, they can often cause negative psychological, physical and emotional impacts to one's life. The specialized knowledge and advanced skills that are needed in these fields are often emphasized, but the emotional aspects are equally crucial to these careers. These professions require a set of personal values and qualities along with a deep desire to devote their lives to helping others. A few of these needed individual characteristics include empathy, patience, and resilience, but the persistent compassion that is shown by these helping professionals is a factor associated with the increased fatigue and burnout. For example, research has shown that on average 68% of nurses experience burnout, which is considered part of compassion fatigue. Recognizing the widespread presence of these harmful effects- such as depression, anger, sadness, negative relationships- that result from the continuous act of helping others, contributing factors and evidence-based strategies to mitigate this issue, have been explored by researchers. This presentation provides an in-depth examination of the concept of compassion fatigue, specifically burnout, in helping professions, and how the underlying cause is rooted in the demands of their professional responsibilities. Attendees will gain a better understanding of this complex and abstract concept, and they will learn about several promising studies that highlight effective strategies for reducing both compassion fatigue and burnout. It will provide pre-service and in-service professionals in these related fields with key knowledge that should assist in mitigating these issues in their practice.

Aditi Kumar

Discipline: Biology

Authors:

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Abstract Name: Stability of Neuron-Derived Extracellular Vesicle microRNAs in Adolescents and Young Adults

Neuron-derived extracellular vesicles (nEVs) enriched using L1CAM antibodies provide a minimally invasive approach to measure microRNAs (miRNAs) originating from the central nervous system (CNS). Although nEV miRNAs are increasingly studied as candidate biomarkers, their stability across individuals has not been systematically characterized. This study used a twin design to quantify the stability of nEV miRNAs and to identify miRNAs that show relatively consistent versus variable expression across twin pairs. Plasma samples were collected from 174 adolescent and young adult twins (76 monozygotic and 98

dizygotic). nEV miRNA expression was quantified using the Affymetrix GeneChip miRNA 4.0 Array, and 138 miRNAs passed detection and quality-control thresholds. We computed within-pair stability metrics for each miRNA across the full sample. Metrics included mean absolute twin difference, percent difference, coefficient of variation (CV), and twin–twin correlation. Stability varied widely across the nEV miRNA transcriptome. The most stable miRNAs, such as miR-4505, miR-4743-5p, miR-607, miR-3185, and miR-4801, showed very low mean absolute twin differences (<0.25) and relatively low CVs, indicating high within-pair similarity. In contrast, the least stable miRNAs, including miR-3613-5p, miR-5787, miR-638, and miR-1469, exhibited large mean twin differences (>0.85) and higher CVs, reflecting greater variability across twin pairs. Ongoing bioinformatic analyses will evaluate whether these stable and unstable miRNA subsets differ in their predicted gene targets and pathway enrichment profiles. These findings provide the first characterization of expression stability for L1CAM-enriched nEV miRNAs. We used twin pairs which are uniquely informative because they naturally control for many background factors, including shared genetics, in utero environment, early-life experiences, and family-level exposures, allowing within-pair comparisons to highlight miRNAs that remain consistent under highly similar conditions. Our design strengthens inferences about which nEV miRNAs are stable or unstable, providing insight into how reliably different miRNAs reflect underlying biological processes.

Nikhil Kumar

Discipline: Physics and Astronomy

Authors:

#1 Richard Schugart

Abstract Name: Celestium: Invariant-Manifold and Perturbation-Driven Orbit Propagation for Next-Generation Mission Architectures

The proliferation of satellite constellations and the emergence of autonomous deep-space mission architectures demand orbital modeling tools that extend beyond classical two-body formulations while retaining computational tractability. In response, this work presents Celestium, a mathematically rigorous astrodynamics framework that synthesizes higher-order perturbation theory, invariant manifold dynamics, and optimized boundary-value algorithms into a unified propagator capable of modeling trajectories from Low Earth Orbits (LEO) to multi-body regimes. We begin with the canonical two-body Hamiltonian expressed in Keplerian orbital elements and introduce a time-transformed numerical integrator that admits the inclusion of perturbative forces - atmospheric drag, Solar Radiation Pressure (SRP), oblateness effects, tidal forces, third-body gravitational potentials, and more - treated as non-autonomous perturbations to the baseline Hamiltonian flow. Building upon this structure, we formulate a novel representation of the Circular Restricted Three-Body Problem, deriving Lagrange-point dynamics and associated variational equations in a form suitable for efficient computation of multi-body orbits and stable/unstable manifolds. Trajectory design is further enhanced through an optimized solver for Lambert's Problem, constructed as a modified boundary-value method with accelerated convergence properties, enabling rapid generation of transfer arcs within the perturbed dynamical field. Interplanetary capability is achieved via a patched-conic maneuver architecture employing Variable-Impulse Leveraging Maneuvers (VILM), allowing the synthesis of gravity-assist trajectories and complex mission profiles such as Mars transfers. Validation against empirical ephemerides from Space-Track and CelesTrak demonstrates centimeter-scale agreement when assimilating measurements through a Kalman-filter pipeline coupled to the full perturbation set. The resulting framework provides a high-fidelity, mathematically grounded, and fully extensible system for modern orbital mechanics, uniting analytical structure with practical mission design in an open-source tool.

Nikhil Kumar

Discipline: Biology

Authors:

#1 Gabriela Schneider
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#5 Nichola Garbett

Abstract Name: Development of a Novel Point-of-Care Differential Scanning Calorimeter for Early Detection Across Diverse Cancer Types

Early-stage cancer detection remains constrained by the limitations of contemporary diagnostic modalities, which are often invasive, cost-prohibitive, and insufficiently sensitive to proteomic perturbations preceding clinical symptoms. Differential Scanning Calorimetry (DSC), however, has demonstrated that the thermal denaturation profiles of blood plasma encode robust signatures of disease state, reflecting global changes in protein composition, stability, and intermolecular interactions. Yet traditional DSC instruments are inherently incompatible with point-of-care deployment due to their scale, thermal inertia, and operational complexity. In this work, we present the foundational development of a miniature, sensor-driven micro-DSC platform engineered for clinical translation. Central to this effort is the reformulation of the DSC's thermal feedback architecture at the microscale, achieved through the fabrication and comparative evaluation of two custom sensor geometries: a radial "spiderweb" trace layout and a redesigned rectangular trace configuration. By systematically analyzing their resistance-temperature response curves under controlled thermal ramps, we establish that sensor stability, governed by material selection, heat distribution symmetry, and trace topology, is the critical determinant of accurate calorimetric measurement. The rectangular architecture exhibits a predictable monotonic response, resolving the nonlinearities and discontinuities inherent to the spiderweb design, and thereby establishing a viable microscale foundation for reproducing diagnostic thermograms. These findings constitute a necessary first step toward the realization of a portable DSC capable of generating clinically meaningful thermal fingerprints directly from undiluted patient plasma. We conclude by discussing the implications of integrating machine-learning frameworks for automated thermogram classification, and the broader potential of micro-calorimetric proteome profiling as a diagnostic modality scalable to low-resource clinical environments.

Arun Kumar

Discipline: Health and Human Development

Authors:

Abstract Name: The Influence of Health Literacy on Adherence to Prescribed Eye Drop Medications and Attendance at Follow-up Visits Among African Americans with Glaucoma

Glaucoma is currently one of the leading causes of irreversible blindness around the world, characterized by damage to the optic nerve due to an increase in intraocular pressure. African Americans disproportionately face the burden of this disease, with higher prevalence rates, earlier onset, and faster progression compared to white populations. Despite vision loss being largely preventable through consistent adherence to prescribed eye drop medications and regular attendance at follow-up ophthalmology appointments, these outcomes are significantly poorer among African Americans. This inequity suggests that sociobehavioral factors, particularly health literacy, may play a central role in shaping glaucoma management. Health literacy influences a patient's ability to understand glaucoma's initially asymptomatic yet progressive nature, the purpose of lowering intraocular pressure, and the long-term consequences of uncontrolled disease. Prior studies have shown that African Americans are more likely to score within the poor health literacy range, which has been associated with reduced comprehension of glaucoma, lower perceived severity, and

diminished motivation to adhere to treatment. Furthermore, systemic barriers such as inconsistent patient-provider communication and intricate glaucoma education material further complicate glaucoma management. This review synthesized over 20 peer-reviewed studies to assess how health literacy relates to medication adherence and follow-up attendance among African Americans with glaucoma. The findings reveal that the low health literacy is strongly associated with missed eye drop doses, inconsistent follow-up attendance, and limited understanding of disease severity. Culturally tailored interventions, however, have shown promise in improving such outcomes.

Kavya Kumar

Discipline: Biochemistry

Authors:

#1 Kaustav Das Gupta

Abstract Name: Identification of Host Cell Receptor Involved in *Candida auris* Adhesion

Candida auris is an emerging multidrug-resistant fungal pathogen that has been designated a top-priority threat by both the World Health Organization (WHO) and Centers for Disease Control and Prevention (CDC). *C. auris* can colonize a wide range of abiotic and biotic surfaces, including human tissues and medical devices, allowing it to spread rapidly in healthcare environments. A key determinant of this colonization is adhesion to host cells; however, the molecular basis of this process remains poorly understood, including the identity of the host and pathogen receptors involved. In this study, we compared nine clinical *C. auris* isolates belonging to different geographic clades for their ability to adhere to human embryonic kidney (HEK) cells and human keratinocyte (TERT) cells in vitro. Adhesion assays revealed striking strain-dependent variability. Notably, the clade I isolate T033 consistently exhibited significantly enhanced adhesion across both cell types compared to the other isolates. This hyper-adherent phenotype suggests that T033 may possess unique molecular interactions that strengthen its ability to colonize host tissues. To identify host factors that may mediate this interaction, we biotinylated surface proteins from HEK and TERT cells to generate enriched membrane-protein fractions that could be used as "bait" against the T033 strain. Early findings reveal a distinct protein interaction pattern associated specifically with T033, indicating the presence of host receptors that may facilitate its heightened adhesion. These interaction patterns are currently under further proteomic and biochemical investigation to validate receptor candidates. Identifying the host-cell receptors exploited by *C. auris* during the earliest stages of infection contributes to the broader goal of understanding its colonization biology. Ultimately, defining these interactions may support the development of targeted strategies to prevent *C. auris* adherence and limit its spread within healthcare environments.

Sameera Kunaparaju

Discipline: Philosophy, Ethics, and Religious Studies

Authors:

Abstract Name: Blow the Whistle, Get a Dismissal: Expose Government Secrets, Then Vanish Like You Were Never Official

This research examines disclosure of institutional wrongdoing as a moral act situated at the intersection of ethics, law, culture, and identity. Acts of revealing concealed harm can expose abuses of power and reorient public judgment, yet individuals who disclose often face retaliation, criminal charges, and social exclusion. Existing scholarship typically approaches whistleblowing through organizational procedure, democratic

accountability, or compliance frameworks, but these perspectives frequently overlook the deeper moral and cultural structures that shape how such actions are interpreted. This project addresses that gap by integrating Kantian ethics with comparative cultural analysis and case studies of Edward Snowden and Chelsea Manning. Kant's account of duty and the good will provides a framework for understanding disclosure as a principled act grounded in universal moral law rather than personal advantage. The categorical imperative clarifies why truth-telling retains moral authority even when it conflicts with institutional preservation. The cases of Snowden and Manning illustrate how duty-based action collides with political narratives that frame dissent as disloyalty. Their experiences show how states deploy national-security rhetoric, media strategies, and appeals to identity to control public interpretation and suppress accountability. The research also analyzes how cultural expectations structure the reception of disclosure. Comparative studies of individualist and collectivist contexts demonstrate that loyalty, harmony, and dissent are morally coded in divergent ways, shaping whether truth-telling is seen as civic obligation or betrayal. Legal frameworks further complicate this terrain, as vague standards and inconsistent protections create uncertainty for individuals acting from conscience. By synthesizing Kantian moral theory with cultural and legal analysis, this project develops an integrated account of disclosure as a form of public reasoning. It argues that democratic legitimacy requires protecting duty-based truth-telling, and that societies must recognize disclosure not as defiance but as an affirmation of moral autonomy.

Navya Kundula

Discipline: Biochemistry

Authors:

#1 Alexej Dick

Abstract Name: Metabolic Targeting of Breast Cancer Brain Metastasis Using ACSS2 Inhibitor Analogues

Breast cancer brain metastasis (BCBM) is a severe and often fatal progression of breast cancer, affecting nearly one-third of patients, with an 80% mortality within one year of diagnosis. Current studies indicate that BCBM tumors are highly dependent on ACSS2, an enzyme that converts acetate into acetyl-CoA to sustain tumor growth through altered metabolic programming. Inhibiting ACSS2 presents a promising therapeutic strategy, particularly for brain-metastatic tumors. In this study, I screened and evaluated a group of small-molecule ACSS2 inhibitor analogues derived from lead compounds AD-8007 and AD-5584, previously shown to induce BCBM tumor cell death. Compounds were first assessed using a GFP-based viability assay, where lower GFP fluorescence following treatment indicated reduced tumor cell survival. This initial screen identified 17 high potency candidates. To determine brain accessibility, compounds underwent Parallel Artificial Membrane Permeability Assay (PAMPA) testing to model passive blood-brain barrier (BBB) penetration. Top-performing molecules were then evaluated in an ex-vivo murine brain metastasis model, tracking tumor reduction over nine days in tumor-injected brain tissue. Results revealed multiple analogues with both strong cytotoxic potency and favorable BBB permeability. These findings supported advancement into Phase 2, where isomers of lead candidates are now being tested through additional ex-vivo, in-vivo, clonogenic, and SPR binding affinity assays to further assess therapeutic durability and molecular interaction strength. The most effective compounds will serve as promising candidates for the creation of the final drug. Our ongoing work contributes to the development of a metabolically targeted treatment for BCBM by disrupting acetate utilization through ACSS2 inhibition.

Autumn Kunjbehari

Discipline: English and Literature

Authors:

Abstract Name: Digital Media Literacy: Do American Romantics Dream of Electric Screens?

Contemporary Americans rely on digital media for information, socialization, and expression of our identities – yet we rarely question how this information is broadcast to us. Today, we can plug an idea into a large language model program and receive a seemingly well-thought out response. Yet, recommender systems and machine learning technologies are algorithms one can imagine would have Ralph Waldo Emerson rolling in his grave. Due to its focus on philosophy and questions surrounding man and spirit, Transcendentalism is still relevant for the 21st century American reader. Transcendentalists questioned nearly everything, from logic and institutions to nature and the divine. Transcendentalism pits the true self against universal truths, but a question remains for the modern consumer of online media: How do we trust our spirits, intuitions, imaginations, and individual experiences when we are relying on a digital landscape? Understanding how machine learning technologies are intended to interact with the interface user (to handle complex tasks and large data pools using prediction regimes) is the first step towards digital media literacy. When misinformation and its malevolent counterpart, disinformation, are predatory and rely on user engagement, critical thinking becomes a crucial skill in navigating the digital world. Today, sharing false information can have real-world consequences. Interface users must learn how to identify, evaluate, and fact-check information; a difficult task when personal and demographic data is brokered without the explicit knowledge of the user. If they were alive today, the American Romantics would direct us to think for ourselves, to live our online lives deliberately and with the responsibility of a free and fair thinker.

Evan Kunkle

Discipline: Engineering

Authors:

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Mei Salemi

Ella Crocker

Abstract Name: Media-Dependent Changes in Candida Morphology and Biophysical Properties

Dielectrophoresis (DEP) is an important technique for cell sorting, as different cells exhibit characteristic DEP signatures based on their size and morphology. DEP assays usually require the resuspension of cells in media that is optimized to facilitate the characterization of such DEP signature. However, resuspension alters the physical properties of the cell. The objective of this study is to evaluate how different culture and resuspension media affect cell characteristics, specifically size and morphology. To this end, the characteristics of multiple *Candida* strains were quantified using Logphase 600 and hemocytometer counts across Yeast Mold Broth (YMB) culture conditions and both a DEP media and a mannitol solution. The study of *Candida* cells is important because of the clinical impact candidiasis has on immunocompromised people. Data was collected on cell size and shape in YMB media, and after washes in DEP, and mannitol medias. Results suggest that the composition of the resuspension media and number of washes can alter *Candida* cell morphology. These findings contribute to the field by helping assess the impact of the media on cell morphology and likely its DEP signature. The most notable size and shape comparison across *Candida* in resuspension medias are as follows. B) Average and deviation in diameter of *Candida* after one wash in DEP media. *C. dubliniensis* and *C. krusei* show an increase in size, while *C. parapsilosis*, *C. albicans*, and *C. tropicalis* all showed a decrease in diameter. E) Average and deviation in diameter of *Candida* spp after 3

washes in mannitol. *C. dubliniensis* remained the largest in size. *C. krusei* showed a size increase, while *C. tropicalis* showed a decrease. The others consistently showed a decrease in size throughout the three washes. F) Average and deviation in diameter of *Candida* spp after 3 washes in DEP media. *C. dubliniensis* showed an increase, while the other strains showed a decrease.

Shreeya Kurapati

Discipline: Biology

Authors:

#1 Shreeya Kurapati

#2 Aryan Tummala

Aryan Tummala

Abstract Name: Investigating Plasma-Induced Changes in Red Blood Cells under Varying Ionic Conditions

Cold atmospheric plasma is increasingly explored for biomedical applications, but its direct effects on blood cells are not fully understood. This project investigates how plasma exposure influences red blood cell (RBC) morphology in saline solutions with varying ion concentrations. The hypothesis is that plasma exposure increases the effective ion concentration in the surrounding solution, creating a hypertonic effect that causes RBC membrane shrinkage and produces additional structural changes related to wound coagulation. RBCs were suspended in saline solutions of differing ionic strength to examine how external ion concentration affects osmotic balance and cell morphology. Under hypertonic conditions, where the ion concentration outside the cell exceeds that inside, RBCs demonstrate predictable shrinkage as water exits the cytoplasm. These responses served as controls for distinguishing normal osmotic behavior from plasma-induced effects. Identical saline environments were then treated with cold atmospheric plasma, and RBCs exposed to these plasma-modified solutions displayed additional changes beyond normal osmotic shrinkage, including changes in membrane texture. The experimental setup allowed imaging of RBCs under control conditions (hypertonic, isotonic, hypotonic) as well as plasma-treated RBCs. The changes in the RBC's membrane may be attributed to the interaction of plasma-generated reactive species and their interaction with the lipid bilayer. By comparing plasma-treated and untreated samples under matched salinity conditions, clear morphological signs are shown. These findings contribute to a broader understanding of how plasma interacts with blood components and highlight potential implications for medical treatments involving plasma, including wound healing and coagulation support. Ongoing work will examine plasma dosage, exposure duration, and reactive species composition to further characterize the viability of plasma-based biomedical technologies.

Kate Kurotani

Discipline: Interdisciplinary

Authors:

#1 Yuko Taniguchi

Abstract Name: Healing through Music: Tracing Rochester's Local Music Scene from Street Events to Hospital Halls since 1858

Background: Since the mid-19th century, there has been a vibrant music community in Rochester, Minnesota, even before the founding of the Mayo Clinic in 1889. Some of the early musical groups, like the Rochester Music Union (1869) and the Rochester Philharmonic (1920), have shaped the city's musical and cultural identities. As the Mayo Clinic became a global name in medicine, the intersection between music and

healthcare has increased, from volunteer singers in the hospital atriums to the Harmony for Mayo concert series. This research project investigates the evolution of Rochester's music community alongside the establishment of Mayo Clinic as a medical center and whether the city's musical roots contributed to the development of a "healing" community within the clinical scenes. Methods: Using an archival historical approach, digitized newspapers from the Rochester Post Bulletin (1858–2023) were reviewed. Keywords such as "music performance," "concert," "healing," "Mayo Clinic," and "patient entertainment" were used to identify articles. A qualitative content analysis compared two periods: (1) Pre-Mayo (1858–1889) and (2) Post-Mayo (1889–present). Results: Findings indicated a strong foundation of community-led music activity before the establishment of Mayo Clinic, including orchestras, school programs, and public concerts. After Mayo Clinic grew, music became more connected to therapy and community health. Articles highlighted healing-focused programs like Harmony for Mayo, music volunteering programs, and research-supported activities that demonstrate how music reduces pain and anxiety. Music became more meaningful for both members of the Mayo Clinic and the broader Rochester community. Conclusion: The strong preexisting music scene in Rochester seemed to have shaped how Mayo Clinic incorporated music into patient care. Over time, the presence of the clinic has strengthened the community's identity towards music and healing. This demonstrates how Rochester's local culture and the healthcare mission of Mayo Clinic mutually reinforced a city's social and emotional well-being.

Kate Kurotani

Discipline: Biology

Authors:

#1 Enis Kostallari

Abstract Name: Liver Fibrosis-Induced Interorgan Crosstalk: Investigating Fiber Morphology, Muscle Vascularization, and Lipid Accumulation

Background: Liver cirrhosis is the scarring of the liver caused by excessive alcohol consumption, high-fat diet, and hepatitis virus infection. It is one of the leading causes of mortality worldwide, affecting an estimated 1.5 billion people with the rates of prevalence and mortality increasing in the United States in recent years. Sarcopenia (muscle wasting), which leads to a decrease in muscle mass, is commonly observed in patients with cirrhosis and in 50% of patients considered for liver transplantation. Mechanisms on why sarcopenia seems to prefer liver-disease complications, either due to metabolic consequences of transplantations or other confounding factors, remain unknown. Methods: The mice model for liver injury includes mice injected with Carbon Tetrachloride (CCl₄) to induce liver fibrosis (1 µL/g) for 6 weeks and olive oil as a vehicle. Skeletal muscles were sectioned using a cryostat for Hematoxylin and Eosin (H&E), immunohistochemistry (IHC), and immunofluorescence (IF) staining. Images were taken under a histology microscope and live-cell immunofluorescence microscope. Images were analyzed using Fiji (ImageJ). Results: The diameter of the muscle fibers decreased for mice exposed to CCl₄ conditions compared to olive oil. CD31 immunofluorescence staining indicated reduced muscle vascularization in CCl₄-treated mice compared to olive oil. BODIPY 494/503 analysis revealed that there is no differential lipid accumulation in myofibrils exposed to olive oil or CCl₄. Conclusion: Our results suggested that skeletal muscle fiber diameter was reduced in CCl₄-treated mice compared to olive oil controls. A non-significant decrease in muscle vascularization was observed in CCl₄-treated mice vs olive oil. Lipid accumulation appeared lower in CCl₄-treated tissue but without statistical significance. CCl₄-treated mice (fibrotic mice) exhibited reduced muscle fiber diameter, with trends toward decreased vascularization and lipid accumulation. These findings highlight key muscle alterations relevant to understanding the relationship between liver cirrhosis and sarcopenia.

FAITH KURTYKA

Discipline:

Authors:

Abstract Name: “We do research too!”: Empowering Students in Humanities Research Through Mentorship

The science-centric branding of undergraduate research—typically seen in images of laboratories, test tubes, and beakers—can obscure the vibrant research opportunities for undergraduates within the humanities. This misperception creates a barrier to student engagement, particularly among students who might be eager to contribute to knowledge but cannot picture themselves as researchers outside of STEM. This presentation explores how intentional mentorship practices can counter these narratives and spark a Research Renaissance among undergraduate humanities scholars. Drawing from the presenter’s 10+ years of mentoring undergraduate researchers in the humanities, this presentation shows how to demystify humanities research via mentorship. Mentors must articulate what inquiry looks like in the humanities—including archival exploration, textual analysis, ethnographic interviews, and collaborative coding—while showcasing how these methods make meaning and teach skills transferable to the real world. Students can serve as co-investigators, archivists, coders, theory translators, project designers, and even community liaisons. This mentoring approach centers on treating students as paid collaborators and training them in rigorous scholarly practices. Through these collaborations, students learn interviewing techniques, grounded theory, and interpretive reading, empowering students to identify patterns, ask meaningful questions, and see themselves as emerging scholars. With the right mentorship, students don’t just learn that humanities scholars do research—they learn that they can do it as well.

Sophie Kusek

Discipline: Biology

Authors:

#1 Alyssa Walters

#2 Aidan Peers

#3 Monica Lohr

#4 Michael France

#5 Israel Borokini

Abstract Name: Abiotic drivers of ecological resilience and stability of plant communities across the United States

Climate change is predicted to have extensive impacts on species persistence and the dynamics of ecological communities. Therefore, this study aims to assess temporal beta diversity of plant communities across the United States and Puerto Rico, between 2013 and 2023 surveys. We used long-term field surveys of plant presence and percent cover collected by the National Ecological Observatory Network (NEON) from one site each in the 20 eco-climatic domains, resulting in 1105 1 m² individual plots. We ran separate generalized linear mixed models (GLMMs) to investigate the effects of soil and climatic variables on three temporal turnover metrics – temporal beta Sorensen (beta.sor), temporal beta index (TBI), and stability, accounting for NEON site and plot nestedness, as random effects. We also used variance partitioning to quantify the relative contribution of these predictor groups on temporal beta diversity. Analyses were conducted both at 1 m² plot and aggregated for each NEON site. Results show species loss in seven of the 20 NEON sites, while the stability metric varied between 1.62 and 234.3. We also observed that temporal beta diversity was higher for NEON sites in lower latitudes and longitudes. Our GLMM results show that soil pH, silt content, and fine organic carbon, as well as standard deviation of minimum and maximum temperatures, and coefficient of variation of actual evapotranspiration have significant effects on beta.sor and TBI. Variance partitioning show

that soil and climatic variables explain 6% and 8% of the temporal beta diversity, respectively, while both predictor groups jointly explain another 20-22% variance in the response variable. These findings highlight varying degrees of resilience in plant communities across ecological regions in the United States; furthermore, both soil and climatic variables contribute to floristic changes in these sites. These results can be used to inform conservation policies and climate adaptation management.

Hilary Kwofie

Discipline: Business

Authors:

#1 Theodora Aryee

Abstract Name: AN EXPLORATION INTO INVESTOR RESPONSES TO FINANCIAL INNOVATION IN GHANA: THE CASE OF OPEN BANKING.

The study aims to explore how the perceptions of retail investors in Ghana, following multiple adverse financial shocks, influence their response to and adoption of open banking. Evidence from existing studies suggests that trust is a key factor in the adoption of these financial innovations, particularly for open banking, where individuals consent to sharing their bank data with other financial service providers such as fintech companies. Ghana has announced plans to implement open banking. While promising, it remains unclear how retail investors will respond to this innovation, given that they have experienced multiple adverse financial shocks over the last decade. Retail investors are the primary focus of this study because they are the key stakeholders affected by negative financial shocks, and their trust is more challenging to repair. This study aims to address the existing knowledge gap in the literature through a qualitative research design guided by the interpretivist research philosophy. Data will be collected through interviews and analysed through thematic analysis. A sample of 25–30 investors will be selected using purposive sampling from Accra, Ghana's economic hub. The findings will be interpreted within the context of how negative financial shocks affect investor trust and adoption of open banking. The study's findings are expected to reveal the experiences of each of these investors following the negative financial shocks, how retail investors in Ghana felt after those shocks and how likely they are to adopt open banking. Finally, variations in the responses of investors from different demographics should be evident. If these findings are obtained, the study will be relevant for informing policymakers and financial service providers on how to design and implement a consumer-centred open banking system.

Preston Kwok

Discipline: Interdisciplinary

Authors:

#1 Parker Northrup

Abstract Name: Future of Fuel – Unleaded Fuel Initiative

The aviation industry has shown a rapidly growing desire to transition from leaded fuel to unleaded fuel. Since the establishment of the Eliminate Aviation Gasoline Lead Emissions initiative on February 23, 2022, stakeholders in aviation have worked to accelerate this shift. This urgency soon increased after the Environmental Protection Agency's acknowledgement on October 18, 2023, regarding the health risks associated with lead exposure from aviation emissions. These findings clearly indicate that the industry must therefore transition to unleaded fuel quickly, efficiently and safely. Over the past year, research has examined

multiple categories related to this transition. This includes certification, maintenance, infrastructure and supply chain logistics. While many methods of certification for unleaded fuel have been evaluated, maintenance stands out as the primary safety concern for this transition. The University of North Dakota experienced valve seat recession in 2023, similar to the automobile industry's own transition away from leaded fuel. Despite this issue, airports like Centennial Airport in Denver have found success in their distribution of unleaded fuel to consumers. This project not only provides justification for Embry Riddle Prescott's Cessna 172 fleet to adopt unleaded fuel but also plans to be a framework for other airports and flight schools around the country to apply. Ultimately, this research aims to support the aviation community in its transition to unleaded fuel as well as promote public education and awareness on aviation's role towards achieving a cleaner and more sustainable future.

Jordan Kyler

Discipline: Interdisciplinary

Authors:

Abstract Name: Permissible Deception Vs. Impermissible Coercion

Courts have long tolerated limited police deception in custodial interrogations, reasoning that tactics like fabricated witness statements or false forensic reports do not necessarily render confessions involuntary. Artificial intelligence, however, destabilizes the already wavering "gray line" between permissible deception and impermissible coercion. AI interrogation tools can fabricate hyper-realistic deepfakes, generate adaptive feedback through behavioral analytics, and manipulate rapport by mimicking race, culture, or emotion. The use of AI in this way heavily influences a suspect's likelihood of confessing, while simultaneously shaping interrogator tactics based on AI-provided information. Unlike traditional deception, these tools operate in an opaque way that neither suspects nor courts can meaningfully scrutinize. The result is twofold: AI deception both magnifies the risk of false confessions and undermines constitutional doctrines that rely on the voluntariness and reliability of confessions under the Fifth and Fourteenth Amendments. Some scholars defend AI's beneficial uses and advantages in the realm of interrogation, but such optimism often overlooks how AI can subtly manipulate suspects' choices in real time, which makes confessions less voluntary and undermines constitutional protections. Current jurisprudence, from *Frazier v. Cupp* onward, has failed to articulate a defined limit to deception. Thus, courts lack the tools to evaluate whether AI-enhanced deception is fundamentally coercive. This article argues that AI-enhanced deception should be treated as a per se category of unconstitutional structural coercion. It proposes categorical bans on AI-generated false evidence, mandates statutory disclosures, and requires independent validation of any algorithmic tools used in interrogations. By reframing AI-enhanced deception as coercion rather than mere trickery, the paper offers a normative framework to ensure that technological innovation does not erode guarantees of fairness, voluntariness, and evidentiary reliability in the criminal justice system.

Joseph La Barbera

Discipline: Engineering

Authors:

#1 Mohammed Ahmed

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#3 Ian Janusz

#4 Ryan Mueller

Abstract Name: From Laundry Waste To Material Resource: Lint-Reinforced Nylon Composites

Lint microfibers are a byproduct of the clothes making and laundering industries and are one of the most commonly produced waste products. Making up as much as 35% of all marine microplastic pollution, lint microfibers augment the global saturation of microplastics and contribute to degradation of the environment and human health. However, recent interest has emerged in finding practical uses for lint, saving resources that would otherwise be spent on disposal and containment. One such use case lies in upcycling lint into useful plastic composites. This research aims to assess the feasibility of such plastic composites through production and examination of their mechanical properties. Through the facilities of the NIU bioplastics lab composites of nylon with 20% lint were, prepared, cryogenically ground, successfully compression molded, conditioned and mechanically tested for their ultimate tensile strength per ASTM standard. Through parametric study, consistent results were demonstrated for UTS in the range of 20 to 25 MPa. A chemical treatment process tailored to the characterization of lint was also incorporated resulting in a further UTS increase of ~90% compared to the best past average. Ultimately, the research shows that lint can be converted into plastic composites with useful mechanical properties, with and without intensive processing, while also demonstrating the benefits of any further processes. These composites have broad implications in the areas of textile processing and environmental protection, presenting completely new avenues for repurposing a largely unexplored form of waste.

Jesus La Paz

Discipline: Philosophy, Ethics, and Religious Studies

Authors:

#1 Jesus La Paz

Abstract Name: Making Room for Morality: Kant's Third Antinomy

The Resolution to the Third Antinomy of the Critique of Pure Reason presents Immanuel Kant's attempt to reconcile freedom of the will with the deterministic structure of nature. The Resolution is thus crucial for Kant's philosophical system, since Kant's practical philosophy in the Critique of Practical Reason is entirely grounded in freedom. However, there is no interpretative consensus on precisely what Kant proves in the Resolution. The standard interpretation in the literature holds that Kant merely shows that freedom and natural causation do not logically contradict each other. I argue that this interpretation is too thin and does not provide Kant with the necessary preconditions to ground his practical philosophy on freedom. By contrast, Bernd Ludwig's strong interpretation, which sees Kant as proving that freedom of the will could really exist, also faces significant problems as it oversteps the boundaries of what Kant claims theoretical reason can prove. Through a constructive engagement with these interpretations, I formulate an alternative "middle ground" interpretation that argues that the Resolution to the Third Antinomy demonstrates how both freedom and the laws of nature can determine one and the same action. It is uniquely positioned to be stronger than the standard interpretation without going as far as the strong interpretation, thereby providing practical philosophy with the theoretical ground it needs to place freedom at its core without overstepping the boundaries of theoretical reason.

Rose La Serte

Discipline: Nursing and Public Health

Authors:

#1 Rose La Serte

#2 Jennifer MacCormack

#3 Alison Quigley
#4 Tehya LePage Drummond
#5 Savannah Meade
#6 Eunsun Lee
#7 Paula Sherwood

Abstract Name: Analyzing Correlations Among Biological and Behavioral Stress Markers in College Students

Pursuing a college degree is often accompanied by emotional distress; occupational, financial, and social concerns can trigger an emotional response. As students perceive distress, biological stress pathways are initiated signaling release of substances such as cortisol to prepare the body for a stressful event. Unfortunately, prolonged stress can result in immune dysfunction. The purpose of this study is to evaluate the association between behavioral markers of emotional distress and levels of cortisol in the hair of students at a four-year university. A convenience sample of 19 students completed measures of perceived stress, somatic symptom burden, and interoceptive bodily states and underwent collection of ~100 hair strands cut from the posterior vertex of the head. The majority of the sample are white (68%, N=13) women (84%, N=16) with a mean age of 26.59 (SD=14.41) who are pursuing Psychology (26%, N=5) or medicine/nursing degrees (21%, N=4). Cortisol levels from hair samples are currently being processed through a validated protocol developed by the Biomolecular Analysis Core using liquid chromatography tandem mass spectrometry. Pearson/Spearman analyses will be performed in SPSS to evaluate 1) the degree of association between cortisol and measures of behavioral stress, and 2) the impact of academic factors on biological measures of stress. I anticipate a strong correlation between behavioral and biological markers of stress, particularly in students majoring in Psychology or medicine/nursing degrees. Within these majors, there is pressure to perform well academically, gain acceptance into graduate programs, and obtain clinical experience. Understanding the presence of biological markers of stress and their association with behavioral stress measures is vital as college students are prone to mental health concerns due to lifestyle changes following enrollment into college.

Benjamin LaBell

Discipline: Physics and Astronomy

Authors:
#1 Kiran Prasai

Abstract Name: Computational Modeling of Amorphous Silicon Nitride as Optical Coatings for Future Gravitational-wave Detectors

The sensitivity of current gravitational-wave (GW) observatories, such as Advanced LIGO, is limited in their most sensitive frequency band (around 100 Hz) by Brownian thermal noise originating from the mirror coatings. To enhance the sensitivity of current and future detectors, coatings made from materials with reduced thermal noise are essential. Research stemming from a more advanced GW observatory would provide invaluable data for testing major astrophysical theories. One of the promising candidates for such coatings is amorphous silicon nitride (SiN_x), particularly for cryogenic detectors. A detailed understanding of the origins of SiN_x coatings' mechanical loss and optical absorption, in terms of their atomic and electronic structure, could be useful in guiding experimentalists toward optimal GW coating design. However, such understanding is currently lacking. My work in this project aims to fill this knowledge gap. To do so, I generate atomic models of SiN_x by using state-of-the-art Molecular Dynamics (MD) simulations with varying values of x . It has been empirically observed that Nitrogen-to-Silicon ratio, denoted to x , is critically important parameter scientists can tune to influence coating behavior. I then use quantum calculations, specifically Density Functional Theory (DFT), to compute electronic structure based on the resulting atomic

structure. Using this data, we predict key properties like bond angles, geometric defects, optical band gap, and defect states. By varying x above and below the stoichiometric level ($x=1.33$), I will predict its effects on mechanical loss, optical absorption, and refractive index—the key performance metrics for high-performance GW detector coatings.

Percy Lachman

Discipline: Psychology

Authors:

Abstract Name: The Relationships Among Anti-immigrant Attitudes and Behaviors, Moral Foundations, and Distributive Justice Beliefs

The current research investigates moral foundations and distributive and procedural just world beliefs as foundational in forming anti-immigrant attitudes and behavior in an undergraduate population. This study aimed to show a causal relationship between distributive justice beliefs for others (DJO) and prejudice, based on previous research demonstrating that increasing one's DJO belief increased one's likelihood to support anti-immigrant policy. I also aimed to find positive correlations between binding moral foundations, prejudice, and justice beliefs. A population of 85 students participated in a DJO scenario- response manipulation, where they read situations in which they witnessed another student or outgroup members receiving the benefits of a resource distribution. Those in the control condition read scenarios pertaining to Distributive Justice to the Self (DJS), where the participant was said to benefit from resource distribution. Following the scenarios, participants completed measures of anti-immigrant attitudes and behavior. There was no significant difference found between the DJO and DJS conditions, despite a measured change in pre/post DJO scores for both conditions. Moral Foundations of authority and ingroup/loyalty were shown to have a significant impact on how much a participant was affected by the scenarios. As predicted, binding moral foundations were positively correlated with both DJO and prejudice; DJO was positively correlated with prejudice. Contrary to predictions, Procedural Justice Beliefs for Others (PJO) were positively correlated with binding moral foundations and prejudice. Binding foundations, DJO beliefs, and PJO beliefs were negatively correlated with pro-immigrant behavior. This research confirms previous findings, where binding foundations and justice were shown to influence anti-immigrant prejudice, but expand understanding to consider the unique features of undergraduate belief systems, including the connected nature of binding foundations and justice beliefs. Findings indicate further research is necessary to understand how undergraduates use moral foundations and justice beliefs in conjunction to develop prejudiced beliefs.

Carleigh Lacroix

Discipline: History

Authors:

#1 Carleigh Lacroix

Abstract Name: Broadside Ballads and Warrior Women: A Look at Eighteenth Century England Through an Unofficial Lens

The everyday lives of people from the past are often shrouded in mystery for modern day historians. While official documents from the past preserve information from legal trials, military conflicts, and political institutions, they often overlook the more nuanced aspects of society at the time. My aim is to use less substantiated primary sources to look into underrepresented aspects of history. Specifically, this research will

take an in-depth look at broadside ballads from eighteenth century England in order to gain a deeper understanding of the role women played in society. I will be doing a close analysis of several different ballads in order to identify patterns that emerge in the writing, which will then signify common themes and knowledge from the time. I will also be referencing the work of experts like Dianne Dugaw to gain a more well-rounded understanding of ballads and their purpose in early modern English society. I will in no way be arguing that broadside ballads provide a foolproof and accurate depiction of history, but their limitations don't take away from the stark societal implications that seem to be accepted as common knowledge during the time they were originally published. Through the course of my research, I have found that broadside ballads have a wealth of information to reveal about how women were perceived in eighteenth century England. The common themes that stood out the most were the descriptions of the physical strength of women in the eighteenth century, the role of women within the military during the constant upheaval of turn of the century England, and the common use of cross-dressing and disguise as a way for women to gain independence and power over their own lives.

Sarah Lafreniere

Discipline: Psychology

Authors:

#1 Sarah Lafreniere

Abstract Name: How Horror, and Subsequently an Obsession with said Horror Can Influence the Human Psyche

The horror genre is very popular among avid viewers and is responsible for inducing fear and excitement in individuals, while also aiming to make them uncomfortable. The genre of horror in the context of films may not seem important in the study of human psychology, but it is. The paper has a focus on the sub-genres: extreme horror and hardcore horror, that will guide an exploration of an individual's psychology. Psychological studies emphasize that empathy and fear shape individuals' reactions to frightening content. Repeated exposure to fear can reduce an individual's flight or fight reaction, which may be why horror veterans are more desensitized to the genre. Fear can also be viewed as positive in the context of control. Furthermore, psychological studies on obsessive compulsive disorder (OCD) conclude that OCD obsessions can arise from a misinterpretation from "self-as-is" and "self-as-could-be". Obsessions can be triggered by film for some. It is important to note that obsessions, a lack of empathy, and little fear does not necessarily imply a person is dangerous. Ultimately this paper argues that a person's reaction to horror can imply a baseline of their ability to handle and process empathy and fear, along with their relationship of an obsession with horror. Although, there are various ways that empathy, obsession, and fear can play into the experience of watching and thinking about horror that differ from person to person. It is also important to note the relationship between the dangerousness of a person and an obsession with horror through the content of those films can interfere with the "self-as-is" and "self-as-could-be" relationship in OCD. In conclusion, the relation of horror and psychology can reveal a lot about a human's psyche.

Samuel Lagos

Discipline: Chemistry

Authors:

#1 Madaline Farina

#2 Frank Gupton

Abstract Name: Exploring Cobalt-Based Heterogeneous Catalysts for Suzuki-Miyaura Cross-Coupling Reactions

Palladium, a costly precious metal, is the standard catalyst for the extremely common Suzuki-Miyaura Cross-Coupling Reaction (SMCCR). The SMCCR creates carbon-carbon bonds by coupling organic groups on an organohalide and a boronic acid. Using a different metal to catalyze the SMCCR is a way to reduce spending and lower drug prices. This experiment aimed to investigate cobalt as a heterogeneous SMCCR catalyst. Cobalt catalysts were prepared and then tested in SMCCRs, and results were produced via GC-MS and TEM imaging. Catalytic nanoparticles were agglomerated on multi-walled carbon nanotubes by ball-milling, and reactions were run at 50°C in a 2:2:1 ethanol:water:tetrahydrofuran solvent system. Of the nine cobalt precursors tested in 96 SMCCRs, only cobalt acetate and cobalt stearate yielded catalytically active species. Cobalt was successful in catalyzing the SMCCR in high yield, showing its viability as an eventual palladium replacement. More research is needed to reliably predict cobalt catalyst behavior, but it is hypothesized that varying oxidation states in the precursors (confirmed by XPS) could influence subsequent catalytic activity, as could the number of active sites created by the ball mill.

Klejdi Lako

Discipline: Chemistry

Authors:

#1 Nilesh Dhumal

Abstract Name: Consequences of Alkane Chain Length to Structure, Dynamics, and Frequencies in Imidazolium Chloride Ionic Liquids: A Molecular Dynamics Study

The alkyl chains attached to the cation in ionic liquids play a significant role in stabilizing the cation-anion ion pair. We performed classical molecular dynamics (MD) simulations to analyze the effect of alkane chain length on the local structure in imidazolium chloride ionic liquids. The local structure and hydrogen bonding between the cation and anion were studied using radial distribution functions and vibrational frequency analysis. The mean square displacement of the cation and anion increases with alkyl chain length, possibly due to a weakening of the cation-anion interaction. The presence of intra- and intermolecular interactions in the system is reflected in vibrational frequency shifts. Local mode analysis revealed the effect of the alkane chain on the hydrogen bonding between the ring CH bonds and the Cl anion. The weakening of the cation-anion interaction is evident in the stretching and bending regions of the vibrational spectrum. These molecular-level insights provided a clearer understanding of how structure-property relationships are important for designing ionic liquids for catalysis, electrochemistry, and other applications where hydrogen-bonding networks are essential.

Jonathan Lalla

Discipline: Engineering

Authors:

#1 Mojtaba Abyaneh

#2 Jinwoo Jang

Abstract Name: Voxel Reconstruction as a Tool for Building Geometry Correction

Urban-scale 3D geometric models have enabled a new capability to run city-scale wind field simulations at

higher resolutions. However, currently available models often contain distorted or incomplete building geometry due to the photogrammetry errors. These geometric errors render the models unsuitable for scientific simulations, necessitating hours of manual repair to correct surfaces, fill gaps, or smooth irregular shapes. This project aims to automate the model reconstruction step by developing a method to clean and correct building geometry using voxelization techniques. Voxelization converts a 3D model into a grid of small cubes (voxels) that represent the structure's volume. By reconstructing a building from a voxel grid, we can remove noise, enforce solid walls, and generate more uniform surfaces without altering the overall shape of the building. This process helps standardize buildings that originally contain messy triangulated meshes, floating geometry, or holes. After voxel reconstruction, the resulting model is suitable for simulation tasks. This project demonstrates a workflow that transforms publicly available models into simulation-ready models with minimal manual editing. The goal is to provide researchers, urban planners, and engineers with a faster and more reliable method for preparing city-scale datasets. By automating geometry correction, this approach saves time, reduces human error, and makes large-scale environmental simulations more accessible and efficient. However, the current method has a few limitations, such as over-voxelization, which creates a blockier model, and distortion in model images and models with severely poor geometry.

Phong Lam

Discipline: Engineering

Authors:

Christian Truong

Ryan Alberti

Abstract Name: Designing a Novel and Effective Childproof Gun Lock for Gun-Ownning Families

In Virginia, nearly 50% of adults own a firearm. Glock 17 and 19 models are the most common handgun models owned. Both handguns also cause the most self-inflicted youth and adult gun injuries, with a majority of unintentional children's injury deaths being from handguns. Gun locks are the most common solution, but the majority of gun owners do not use locks, especially with handguns. Current gun lock limitations are high cost and not user-friendly for adults. Simple childproof locking mechanisms are already prevalent in the medical field. Pharmaceutical companies developed multiple successful systems like push-and-turn and squeeze-and-turn locks that prevent children from accessing dangerous products. These locks significantly reduced youth poisoning rates. Similar techniques can be applied and transformed into a mass producible gun lock that can reduce firearm injury rates for children. We propose a lock that is made of plastic/polymer that can both protect the firearm from damage and the user from unintentional injury. This holster-inspired lock can be easily and quickly removed by an adult user, featuring a locking mechanism which can be disengaged via a squeezable tab similar to those found in standard childproof pill bottle designs. This gun lock aims to successfully disincentivize firearm usage by children while also providing a user-friendly design for adults.

Felicity Lamb

Discipline: Physical/Occupational Therapy and Speech Language Pathology

Authors:

#1 Felicity Lamb

Abstract Name: The Impact of Chemotherapy-Induced Peripheral Neuropathy on Quality of Life in Pediatric Cancer Survivors Background

Chemotherapy-Induced Peripheral Neuropathy (CIPN) is a dysfunction of the peripheral nerves caused by chemotherapy. Occurrence is unknown, but estimated at >90% in pediatric cancer populations. CIPN can reduce children's ability to perform physical activities, play, and engage in activities of daily living, potentially affecting quality of life (QoL). The purpose of this study is to analyze how CIPN affects the QoL of pediatric cancer survivors and how they compare to their peers. Age and sex-matched controls and cancer survivors between ages 12-22 completed the validated and standardized measure, the PROMIS Physical Function Pediatric Short Form, to measure physical QoL, such as the ability to keep up with peers and perform certain activities. The Pediatric Modified Total Neuropathy Score (Peds-mTNS), a validated CIPN measure, defines sensory or motor neuropathy as a score >1 in a relevant subtest, and general neuropathy >4. Subjects included 17 cancer survivors (mean age 16.7±3.83 years, 58.8% female) and 45 controls (mean age 17.3±3.1 years, 60% female). Statistically different values between cancer survivors and controls were found on the PROMIS (Mann-Whitney 602, p<0.001, median=2 (95% CI 1-3)) and the Peds-mTNS (Mann-Whitney 2568, p<0.001, median=-4 (95% CI -5--3)). When comparing PROMIS scores in those with and without neuropathy, cancer survivors had a significant difference (Mann-Whitney 304, p=0.003, 95% CI 2 (0-4)). PROMIS scores were not significant in those with sensory-only neuropathy (p=.056) but were in motor-only neuropathy (Mann-Whitney 58.5, p<0.001, 5 (95% CI 3-6)). A measurable difference in the physical QoL of pediatric cancer survivors was found for those with motor and general neuropathy. This indicates assessing QoL in pediatric cancer survivors with motor and general neuropathy may be fundamental to ensuring overall well-being 6 or more months following cancer treatment.

James LaMore

Discipline: Biology

Authors:

#1 Robert Vick

Abstract Name: Effects of Sleep Deprivation on Cardiac Health determined by Heart Rate Variability (HRV)

Sleep deprivation is a major issue in human health. Studies (Hollis et al. 2025) have shown that adequate sleep is necessary for many cellular and neural functions. Despite this, it remains that 1/3 of Americans report less than the recommended 7-9 hours nightly, with 70 million of them reporting chronic sleep deprivation (Barber et al. 2025). An individual's cardiac health is an essential system affected by sleep deprivation. This study measures Heart Rate Variability (HRV), using a noninvasive, relatively inexpensive method to collect data through electrocardiograms (ECGs). Increased or decreased cardiac health due to sleep deprivation will be reflected as an increase or decrease in HRV. Previous research has identified positive correlations between sleep and HRV (Gouin et al. 2015), but the effects of chronic versus acute sleep deprivation on HRV are further explored in this study (Elon IRB 23-160). This study utilized surveys and HRV data from ECGs to examine differences in chronic (n = 40, avg age = 25.75) and acute (n = 36, avg age = 26.36) sleep deprivation. Chronic sleep deprivation vs average R-R time was more strongly correlated (R = 0.363) than acute sleep deprivation vs average R-R time (R = 0.156). Paired ANCOVA analysis demonstrated significant differences between chronic and acute RR average data (p = 0.0470) as well as chronic vs acute pRR50 data (0.0469). These results show that chronic sleep deprivation has a significantly greater impact on HRV, and thus cardiac health, than acute sleep deprivation. The hypothesis that an increase in chronic sleep deprivation will lead to a decrease in HRV is supported by these results. Future research that uncovers direct links between sleep deprivation and HRV could be used to advance public awareness of chronic sleep deprivation. Funded by Elon University's Undergraduate Research Program and Biology Department.

Christinn Lampkins

Discipline: Business

Authors:

Abstract Name: The Social Media Marketing of Formula One: Using Parasocial Relationships to Increase American Fanbase in Individuals Aged 18-25

Formula One, the highest class of single-seater, open-class racing, is often regarded as the pinnacle of motorsport. However, by 2017 the sport was facing a decline in both profit and popularity, with its worldwide viewership decreasing from 600 million people in 2008 to 352 million people in 2017. A major factor in this decline was Formula One's failure to effectively engage younger audiences. For years, the sport's leadership dismissed the appeal of younger viewers, assuming that they lacked the financial resources to contribute meaningfully to the sport, focusing instead on traditional broadcasting and corporate sponsorships while neglecting digital and social media engagement. The turning point for the sport came in 2017 when Liberty Media bought the rights to Formula One, Liberty Media shifted the focus toward leveraging the power of social media to engage fans in new and innovative ways. Recognizing the influence of platforms like Twitter, Instagram, Facebook, and YouTube, Liberty Media launched targeted campaigns that built parasocial relationships, one-sided connections between fans and media figures, between audiences and drivers. This approach particularly resonated with Generation Z, who are highly active on social media and inclined toward forming emotional connections with online personalities. This strategy was particularly effective in the United States, where Formula One had historically struggled to gain a foothold. By fostering these parasocial relationships, Liberty Media cultivated a more loyal and engaged fan base, creating a sense of community and excitement that significantly boosted fan involvement and profitability. This literature review examines how increased social media engagement contributed to the rise of parasocial relationships among Formula One fans and how Liberty Media strategically used this phenomenon to revitalize the sport. The findings highlight the growing importance of social media marketing, demonstrating how digital engagement can strengthen consumer loyalty and drive financial success across industries.

Brianna Land

Discipline: Law and Legal Studies

Authors:

Abstract Name: Unraveling Political Discourse: A Stand for Missing and Murdered Indigenous Persons

This project explores the intersection of Native American identity, legal jurisdiction, and Missing and Murdered Indigenous Persons (MMIP) initiatives, using the veto of Oklahoma House Bill 1137 (2025) as a key case study. We ask: Should Native American identity in U.S. law be treated primarily as a function of race/ethnicity or of political identity? This distinction has serious implications for criminal jurisdiction and tribal sovereignty as viewed in historical, legal, and political contexts. The investigation will focus on how the legal framing upholds and undermines political identity in recent policy decisions. We specifically examine the rationale and apparent motivations behind Governor Stitt's veto of HB 1137, a bill which aimed to improve MMIP reporting and inter-agency coordination through the removal of federal funding limitations and grant requirements. Given Oklahoma's complex tribal landscape and past jurisdictional disputes (McGirt, Castro-Huerta), this veto raises questions about state-tribal cooperation and the willingness to prioritize Indigenous persons' safety. With Oklahoma ranking second in the US for MMIP cases, the urgency of such an investigation is clear. We then explore how current political trends and legal definitions may shape the future of MMIP initiatives. By bridging legal theory and political analysis, this project aims to illuminate the systemic barriers that persist in protecting Indigenous communities and propose pathways for reform.

Jayde Landreth

Discipline: English and Literature

Authors:

Abstract Name: The Power of Language: Harriet Beecher Stowe's Construction of Empathy and Moral Authority in "Uncle Tom's Cabin"

This project examines Harriet Beecher Stowe's sentimental novel, *Uncle Tom's Cabin*, and analyzes how it transforms language into a moral tool to advocate for abolitionist persuasion. This study explores how Stowe uses sentimental diction and stylized dialect to construct empathy for enslaved characters while positioning herself as a moral and religious authority for her nineteenth-century readers. The paper argues that Stowe utilizes the domestic sphere and a Christian ideology to appeal specifically to her white, Christian audience, whose moral values she wanted to activate against slavery. Her use of both Black and Southern white characters with accent-filled dialogue challenges the assumptions about the relationship between race, speech, and intelligence, further humanizing the enslaved by portraying them as linguistically and emotionally familiar to white readers. The methodology involves close textual analysis of Stowe's narrative strategies as well as secondary scholarship in literary studies, nineteenth-century cultural history, and rhetoric. Through her sentimental diction and direct address to the audience, Stowe pushes the readers toward seeing emotional identification with enslaved characters as a moral responsibility. She frames slavery as a spiritual and religious issue rather than merely a political or economic one. By invoking religious language and presenting herself as a translator of God's will, Stowe elevates her narrative voice to a position of moral authority. The results indicate that *Uncle Tom's Cabin* functions both as a literary text and a form of moral persuasion capable of influencing public sentiment. It positions Stowe's novel as a linguistic and cultural artifact that highlights how rhetoric, sentimentality, and moral authority can shift politics. This research contributes to the discussion of rhetoric, racial representation, and nineteenth-century American literature by showing how Stowe's methods combined emotional appeal with moral authority to shape public morals.

Kate Landsteiner

Discipline: Biology

Authors:

#1 Leif Hembre

#2 Kathryn Ostgaard

Abstract Name: Are *Daphnia* Naive to Chemical Cues From the Invasive Predator *Bythotrephes longimanus* (Spiny Waterflea)?

In aquatic ecosystems, prey use chemical cues released from predators (kairomones) and/or chemical alarm cues from injured conspecifics to gauge predation risk. In response to those cues, prey may adjust their behavior or development to minimize their vulnerability to predation. Laboratory experiments have shown that *Daphnia* (a common zooplankton prey species) from lakes with established populations of the invasive zooplankton predator *Bythotrephes longimanus* (spiny waterflea) display light-avoidance behavior (negative phototaxis) in response to *Bythotrephes* kairomones. In situ, negative phototaxis behavior is presumed to equate to *Daphnia* migrating into deeper, darker waters during the daytime to minimize predation risk from the visually-oriented *Bythotrephes*. However, little is known about the vertical migration behavior of *Daphnia* from populations of uninvaded lakes. Our research compared the phototactic responses of *Daphnia pulicaria* from two Minnesota lakes where *Bythotrephes* has been present for several decades, to *D. pulicaria* from populations of three uninvaded lakes. In our phototactic assay experiment, *Daphnia* from five lakes were exposed to different media: control media (no chemical cues), *Bythotrephes* kairomones, and *Bythotrephes* kairomone/*Daphnia* alarm cue combination media. We hypothesized that, compared to kairomone-free

controls, *Bythotrephes kairomones* would elicit a more negative phototactic response in *Daphnia* from invaded lakes, while the behavior of “naive” *Daphnia* from uninvaded lakes would not differ from the control. Consistent with our hypothesis, we found that *Daphnia* from invaded lakes showed a significantly more negatively phototactic response ($p < 0.001$) to *Bythotrephes* media compared to *Daphnia* from uninvaded lakes. These findings imply that 1) *Daphnia* from the invaded lakes have evolved to respond to this non-native predator, and 2) the lack of a response by the “naive” *Daphnia* from the uninvaded lakes may contribute to successful early establishment of *Bythotrephes* populations in ecosystems where they have not previously existed.

Olivia Lanz

Discipline: Political Science

Authors:

#1 Alina Oxendine

Abstract Name: Malleable Ideologies and Opposition to Welfare

As egalitarian values have become more widespread, prejudice has shifted from overt expressions to more subtle and socially acceptable forms. One expression of this phenomenon is malleable ideologies, where individuals alter minor details of egalitarian principles to maintain social hierarchies. The purpose of this study was to examine whether opposition to welfare can operate as a malleable ideology. We conducted a nationally representative survey experiment ($n = 298$) using a pretest–posttest design. For the experiment portion of our design, we presented participants with an article to induce perceived symbolic threat, perceived realistic threat, perceived benefit, or no stimulus (control). We found that among individuals low in hierarchical orientation, exposure to different article conditions significantly influenced welfare attitudes and shifted the justifications they provided for their positions. In contrast, individuals high in hierarchical orientation showed more stability across conditions. These findings suggest that those lower in hierarchy attitudes are more responsive to messaging, while those higher in hierarchy attitudes maintain consistent rationales. This indicates that messaging interacts with hierarchy orientation in shaping welfare justifications. The malleability of welfare justifications based on hierarchy orientation contributes to the broader literature of how social attitudes shape the way people respond to political messaging.

Elizabeth Lappano

Discipline: Theatre/Drama

Authors:

#1 Ralph Janes

Abstract Name: Creating Spaces for All: A Study on Accessibility in Theatre Experiences

The present study is exploring the lack of accessibility measures in the performing arts across the United States, with a major focus on how to combat these barriers. The researchers at UWM are committed to working with and for the community of disabled artists that surround them. Local accessibility-based companies and theaters are involved in achieving this goal by working closely with the UWM researchers to achieve their goal of accessibility in the arts. To do this, the researchers are working towards what has been coined “UWM’s Most Accessible Show Ever”, which would involve a wide range of inclusive measures, including, but not limited to, in-ear audio description, braille playbills, a presentation on invisible disabilities, ASL interpretation, and much more. A show like this has never been performed on the UWM stage, nor in

theaters in the area. This research will lead to better accommodation and understanding of accessibility and inclusivity at not only the university, but for all the patrons and artists as well. Beyond that, the researchers hope to induce these changes on a much larger scale and inspire others to do the same.

Izamary Lara

Discipline: Geography/Geology

Authors:

#1 Clinton Vincent

#2 Brian Schubert

Abstract Name: Mother Tree Resilience: Tracking Plant Stress

Stable carbon isotopes provide a powerful tool for evaluating plant physiological stress and tracing carbon exchange between trees and their associated fungal networks. In this study, we analyze $\delta^{13}\text{C}$ values from southern live oaks (*Quercus virginiana*) across five distinct regions of the University of Louisiana at Lafayette campus to assess spatial patterns of water stress and intrinsic water-use efficiency. We further test the hypothesis that these oaks function as “Mother Trees,” distributing carbon resources through shared mycorrhizal fungal communities. Carbon isotopes from leaves, bark, soil, and associated fungi allow us to identify environmental drivers of stress and determine whether fungi are sourcing carbon primarily from C_3 or C_4 plants. By correlating isotopic variation with site-specific factors, we aim to map zones of heightened stress across campus and evaluate the extent of carbon transfer within tree–fungus networks. Previous work has demonstrated that $\delta^{13}\text{C}$ signatures effectively track changes in water availability and fungal resource acquisition, providing a framework for interpreting our results. This research contributes to a broader understanding of how live oaks respond to environmental pressures and how belowground symbioses may enhance their resilience. Future directions include modeling the effects of rising atmospheric CO_2 on photorespiration and intrinsic water-use efficiency, with the goal of better predicting how long-lived canopy trees may adapt to ongoing climate change.

Jasmine Larijani

Discipline: Health and Human Development

Authors:

#1 G. Lynn Mitchell

#2 Lauren Schneider

#3 Heather Anderson

Abstract Name: Comparison of Two Instruments to Measure Optical Imperfections in Eyes Before and After Dilation

Purpose: Optical distortions of the eye are described by Zernicke polynomials, the values of which can be combined to provide a single value of distortion termed higher order root mean square (HoRMS). In this study, we compared measures of HoRMS using the single capture COAS wavefront aberrometer to the newly developed video capture Wavedyn in both dilated and undilated eyes. **Methods:** 34 young adults were measured using the COAS and the Wavedyn in random order both pre and post dilation (three repeated captures with each). Eyes were dilated using 1% tropicamide and 2.5% phenylephrine. The instruments measured to the 10th Zernicke order. Images were analyzed over a 4mm pupil diameter, and the root mean

square of the individual Zernicke polynomials was calculated to determine the HoRMS for each condition. Comparison of the instruments was completed using an ANOVA with instrument, condition, and eye as repeated factors. Findings are reported as adjusted means (from ANOVA) with 95% CI. Results: 33 participants completed all testing, while 1 participant only had nondilated measurements. For COAS, the HoRMS pre and post dilation adjusted means were 0.16 (0.13, 0.19) and 0.17 (0.14, 0.19), respectively. For the Wavedyn, the HoRMS changed significantly pre and post dilation ($p=0.025$) with adjusted means of 0.17 (0.14, 0.19) and 0.19 (0.17, 0.22), respectively. While HoRMS did not differ between instruments at pre-dilation ($p = .80$), there was a significant difference when comparing post-dilation values of the COAS and Wavedyn ($p=0.031$). Conclusions: Although the Wavedyn provided statistically significantly higher values of HoRMS after dilation, the differences were small and unlikely to be considered clinically relevant. Additional analysis of individual Zernike polynomials can be performed to identify which term(s) may be contributing to the differences after dilation.

Emely Larios

Discipline: Psychology

Authors:

#1 Jan Sinnott

Samantha Desi

Christopher Green

Abstract Name: The Effects of VR Nature on Stress and Anxiety

The question being pondered here is regarding whether Virtual Reality (VR) nature environments effectively reduce stress among individuals with limited access to real-world nature situations? The purpose of this research is to explore whether VR nature can replicate the effects typically associated with spending time in nature. In today's fast-paced and urban world, many people face barriers such as limited access to green spaces, busy schedules, or mobility restrictions that prevent them from engaging with tangible nature. Therefore, it is important to identify accessible alternatives, like VR nature, that might have meaningful implications for wellness and mental wellbeing. Research by Rapuano et al. (2022) stresses the importance of green spaces and their stress-reducing qualities, emphasizing how nature exposure supports mental health and emotional regulation. Ultimately, this study aims to understand whether VR nature can provide similar psychological benefits. The research methodology includes gathering participants via Towson University's research pool. Participants must be at minimum 18 years old. Participants answer questions relating to sleep quantity, substance use, etc. Upon completion, participants have five electrodes placed on them to gauge Electrodermal Activity and Heart Rate Variability. Participants then answer math questions, provided by the Trier Mental Challenge Test. Participants then answer the first ten questions of the State-Trait Anxiety Inventory, which serves as a manipulation check and pre-test. Participants then watch the virtual reality nature video, either on the desktop or VR headset. Participants are then given a two-minute reacclimation period. Finally, the participants take the subsequent ten questions of the State-Trait Anxiety Inventory and answer post-qualitative questions to gauge post-formal thought. Researchers expect and predict that viewing the virtual nature video will decrease stress and anxiety within participants.

Julia Larson

Discipline: Engineering

Authors:

#1 Julia Larson

#2 Jason Forsyth

#3 Christine Toh
#4 Michael Stewart

Abstract Name: Do you feel the burn? Exploring lightweight haptic feedback and how it can improve exercise performance.

Automated, computerized exercise feedback systems have become favored proposals to monitor and provide live feedback to users while completing unsupervised exercise training at home. Positive impacts such as reducing errors in motor learning, detecting missed repetitions, and enhancing exercise performance have been observed. Haptic feedback has shown to be an effective method of feedback for these systems and has been explored via various metaphors. Forceful haptic feedback is effective in guiding motion, but has also been reported to be difficult to interpret. In contrast, tapping haptic feedback has shown to be more distinguishable than forceful, while remaining effective in motion trajectory correction. However, there is another feedback method used in practice that has not yet been explored. In addition to forcefully guiding a patient through an exercise, and gently tapping their arms or legs to move into a certain position, they'll also tap on certain muscle regions of the body where a patient should be feeling activation in certain muscles. We propose a new haptic feedback metaphor, MyoTap, that utilizes vibrotactile cues similar to that of the tapping metaphor, but instead of placing an actuator on an end effector that is being instructed to move, the actuator is placed on a muscle region that is supposed to feel. We propose this feedback method will result in a more positive user experience in terms of usability while remaining comparable in motion trajectory correctness.

Kelvin Lartey

Discipline: Biology

Authors:
#1 Quyen Hoang
#2 Jaime Blair
David Nieves

Abstract Name: Genetic and Functional Diversity of Plant-Pathogenic Oomycetes Isolated from Industrial Hemp Soils in Southeastern Pennsylvania

Oomycetes are common aquatic and soilborne microbial eukaryotes that have the capacity to infect a broad range of plant and animal hosts. Understanding the relationship between genetic diversity and virulence is crucial for developing effective management strategies to control disease. In this study, we focus on two oomycete species, *Globisporangium irregulare* and *G. ultimum*, which vary in their reproductive mode (sexual versus clonal) and pathogenicity on agricultural crops. Multiple isolates from both species were collected in a recent biodiversity survey of industrial hemp soils in 2022. We have assessed both genetic diversity (nuclear microsatellite, nuclear and mitochondrial gene sequencing) and functional traits (pathogenicity assays, fungicide resistance) across isolates to explore variation in virulence levels within these two species. For *G. irregulare*, molecular data suggest a complex pattern of sexual recombination among genetically diverse lineages and the possible occurrence of a cryptic species, *G. cryptoirregulare*, within some of the sampled locations; isolates of *G. ultimum* showed low levels of genetic diversity consistent with clonal reproduction. Both species showed pathogenic phenotypes on two strains of industrial hemp (Bialobrzeskie, Henola) and soy, but neither were pathogenic on a cover crop control (hairy vetch). Despite high genetic diversity, isolates of *G. irregulare* showed significant variation in virulence against soy but not hemp or vetch. Only one isolate of *G. ultimum* showed significantly lower virulence on all hosts compared to other isolates. Fungicide sensitivity assays showed higher levels of mefenoxam resistance for *G. irregulare* compared to *G. ultimum*, although variation among isolates was observed for both species at different exposure levels. Our results suggest that despite different modes of reproduction, both species exhibit low levels of variation for the functional traits measured here. Future research will characterize additional morphological and physiological attributes related to host-pathogen interactions.

Krystal Lassala

Discipline: Biology

Authors:

Abstract Name: Development of a specific primer to detect the PRSV gene in GMO papayas

Genetically modified organisms (GMOs) are a key agent in modern agriculture, as they improve the quality of crops by providing resistance to pests and diseases. A concrete example is the transgenic papaya, designed to resist papaya ringspot virus (PRSV), which is transmitted through aphids and can devastate entire plantations. To verify such traits in practice, modern biotechnology, supported by bioinformatics tools, makes it possible to design precise diagnostic methods, such as specific primers used in PCR, which facilitate the identification of genetic modifications in plants of agricultural importance. In this study, specific primers were developed to detect the coat-protein (cp) region of the PRSV gene in papaya using PCR. Thirty-five primer candidates were designed in Primer-BLAST and evaluated with OligoEvaluator; three primer pairs met all selection criteria (hairpin: pass; self-annealing: pass; dimers: very weak/none). Genomic DNA from known transgenic and organic papaya samples was extracted and tested by PCR, and primer performance was assessed by agarose gel electrophoresis. Papain and CPA-1 amplification were included as experimental controls and endogenous markers for papaya DNA. The cp-targeted primers yielded amplification rates of CP4 F/R: 6/8 (75%; 3 organic, 3 transgenic), CP6 F/R: 1/8 (12.5%; transgenic only), and CP7 F/R: 1/8 (12.5%; transgenic only); CP4 F/R showed the highest detection rate across both organic and transgenic samples and was prioritized as the lead primer. This project aims to establish a rapid, reproducible, and economically accessible PCR assay for detecting the PRSV transgene in papayas produced in Puerto Rico, thereby supporting quality control, agriculture, and labeling transparency.

Emily Lathrop

Discipline: Psychology

Authors:

- #1 Elizabeth Majka
- #2 Krista Landers
- #3 Ravleen Arora
- #4 Nathaniel Mesa
- #5 Haley Allenspach
- #6 Madeeha Sahar
- #7 Nathan York

Abstract Name: Investigating Correlates of Parental Well-Being: A Focus on Daily Hassles/Uplifts and Child-Centric Parenting

Previous research has found that daily hassles and uplifts are both associated with parental well-being (DeLongis et al., 1988). Among parents, child centric parenting (i.e., a mindset in which parents are motivated to maximize their child's well-being) is also positively related to well-being (Ashton-James et al., 2013). The goal of the current research was to replicate and extend previous research in parents specifically. More specifically, our aim was to investigate how each of these variables relate to one another, particularly child-centrism and the extent to which parents view their children as hassles/uplifts. To do so, parents (N = 1576) completed an online survey via the platform Prolific. They indicated the extent to which several life

domains (including their children) are hassles and uplifts, as well as their well-being (on a wide range of measures) and level of child-centrism. A series of Pearson correlations was used to test three categories of hypotheses, all of which were supported. First, daily hassles/uplifts were associated with well-being. For example, overall daily hassles was positively associated with overall happiness, $r(1586) = .60, p < .001$. Second, viewing children as hassles/uplifts was associated with well-being. For example, viewing children as uplifts was positively associated with overall happiness, $r(1586) = .34, p < .001$. Finally, child-centric parenting was positively associated with viewing children as uplifts, $r(1586) = .34, p < .001$, and negatively associated with viewing children as hassles, $r(1586) = -.06, p < .05$. These data are important, representing one of the first investigations into hassles/uplifts in parents and how viewing children as hassles/uplifts may relate to well-being and parenting styles (e.g., child-centrism). Future work may focus on whether a child-centric mindset impacts perception of daily hassles/uplifts in a causal manner.

Josh Laureta

Discipline: Biology

Authors:

#1 Shana Caro

Abstract Name: Impact of Stress on Evaluating Ambiguous Cues in Dominique Chickens

Complex decision making abilities such as the ability to weigh sensory evidence differently based on past memories or current context or be more or less confident have been traditionally restricted to humans. Such abilities are considered non-declarative metacognition: the top-down mediation of how sensory information is interpreted. While there have been some studies on non-declarative metacognition in intelligent species such as chimpanzees and dolphins, our study explores whether chickens are more cognitively complex than we give them credit for. We investigated cognition and decision-making in Dominique chickens (*Gallus gallus*), specifically assessing the extent to which chickens display non-declarative metacognition. We hypothesized that stress changes how chickens assess ambiguous cues. We measured ‘ambiguous cue interpretation’ through judgment bias tests, which capture optimism and pessimism through behavioral responses to ambiguous stimuli. We trained chicks to associate two visual cues with either a food reward or an aversive sound. After the training period, chicks evaluated an ambiguous cue in a “go/go” binary speed accuracy tradeoff task. These tasks were repeated under stressful conditions; stress was induced by playing the sound of wolves howling prior to the task, a known auditory stressor for chickens. Chicks were deemed pessimistic if they treated the ambiguous cue more like the “aversive” cue or optimistic if they treated it more like the “reward” cue. We extracted the latency, accuracy, and pathways of each chick using an AI video tracking software. Preliminary data suggests that chickens evaluate ambiguous cues optimistically under stress-free conditions and pessimistically under stressful conditions. In human psychology and neuroscience studies, that effect is considered meta-cognition. Our findings can also be applied to biomedical research in understanding stress effects on non-human and human cognition, as well as improving current animal welfare by creating stress-free environments and husbandry practices.

Makayla Lawrence

Discipline: Exercise Science and Nutrition

Authors:

#1 Jennifer Earl Boehm

#2 Spencer Night Frey

Abstract Name: Assessing the Accuracy of Commercially Available Sensor Derived Running Gait Impact Measurement

Running is one of the most common forms of exercise; however, the rates of running related injury are high. Biomechanical analysis of running gait mechanics provides vital data for quantitatively understanding musculoskeletal loading and preventing running related injuries. It is known that high impact loading is related to running related injury risk. Peak positive acceleration (PPA) is a frequently used estimator of joint loading and ground reaction forces during running. Leg and foot mounted inertial measurement units (IMUs) containing accelerometers represent a low-cost option for measuring acceleration. However, the validity of specific commercially available IMUs remains underexamined. This study aims to determine whether lace-mounted commercial grade RunScribe sensors accurately measure acceleration data when compared to research grade running accelerometers. Participants aged 18 – 80 years old with no medical concerns that may impair their ability to comfortably run for 10 – 15 minutes were recruited from the community and screened for pain or injury at the beginning of each data collection session. Sensors for RunScribe (commercial grade) and MyoMotion (research grade) systems were affixed to the lower extremities bilaterally and calibrated while the participant was introduced to the Borg RPE (Rate of Perceived Exertion) scale and asked to maintain an RPE of 10 – 14. Participants ran on a treadmill with their natural foot strike pattern; sensor recording began after several minutes of warm up. 1 minute of data was recorded per indoor trial, with RunScribe and MyoMotion sensors recording simultaneously. The PPA was calculated as the resultant vector of x, y, and z acceleration from both RunScribe and MyoMotion sensor data, and average RunScribe and average MyoMotion PPA was calculated for a 20 second window for each trial. Pearson product moment correlations will be calculated to evaluate a relationship between MyoMotion and RunScribe measured PPA ($p < 0.05$).

Elizabeth Lawrence

Discipline: Psychology

Authors:

#1 Jeffrey Eum

#2 Ansley Kunnath

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Abstract Name: Musical rhythm discrimination and speech-in-noise recognition in older adults: exploring the role of lexical stress sensitivity

INTRODUCTION Speech-in-noise (SIN) recognition, critical for functional independence, is commonly impaired in older adults, often coinciding with age-related hearing loss (ARHL). Although behavioral, epidemiological, and genetic evidence link musicality to hearing and speech outcomes, little is known about how individual differences in music perception abilities relate to SIN recognition in aging. Musical and speech rhythm (i.e. lexical stress) perception are both implicated in auditory processing, yet their relative contributions to SIN recognition remain underexplored. This study examines the role of lexical stress sensitivity as a mediator of the relationship between musical rhythm discrimination and SIN recognition. **METHODS** Adults ≥ 65 years with self-reported normal hearing ($N = 42$ completed) were recruited through the MyHearinG study at Vanderbilt University Medical Center. Assessments included SIN recognition (PRESTO; Tamati et al., 2014), musical rhythm discrimination (Swedish Musical Rhythm Discrimination Test; Ullén et al., 2014), lexical stress sensitivity (TOPsy; Nayak et al., 2022) and questionnaires on demographics and musical experience. Hearing sensitivity was measured using audiometry. Bivariate correlation and linear regression analyses were conducted for variables of musical rhythm discrimination, lexical stress sensitivity, and speech-in-noise (SIN) recognition, while controlling for age, sex, and hearing sensitivity in the better ear. **RESULTS** Musical rhythm and lexical stress, as well as musical rhythm and SIN recognition were found to be correlated and significantly associated, controlling for age, sex, and hearing

sensitivity in the better ear. Lexical stress sensitivity and SIN measures were not found to be associated. Subsequently, mediation did not reveal any indirect or direct effect of lexical stress on SIN recognition. SIGNIFICANCE This research can inform future approaches seeking to disentangle relationships between sensitivity to speech characteristics (e.g., lexical stress) and SIN recognition, contributing to strategies that reduce communication difficulties and social isolation in older adults.

Brianna Lawrence

Discipline: Health and Human Development

Authors:

#1 Youndeok Kim

#2 Jessica Geller

#3 Jisu Kim

#4 Eunsoo Park

Abstract Name: Examining the Relationship Between Health Behaviors and Academic Performance Among College Students: Exploring the Role of Social Determinants of Health Influencing this Relationship

(Background) College students navigate a critical developmental period characterized by increased autonomy and the establishment of lifelong health behaviors. During this transition, students experience substantial changes in sleep patterns, nutritional habits, physical activity, substance use, and mental health practices, influenced by new environments, social determinants, and academic pressures. Research demonstrates that health behaviors significantly impact cognitive function and academic performance. Inadequate sleep diminishes cognitive abilities, while regular physical activity enhances concentration and memory retention. Despite these established connections, few studies have comprehensively assessed multiple health behaviors simultaneously or explored how social determinants moderate relationships between health behaviors and academic outcomes. This study addresses this gap by examining multiple behaviors concurrently while investigating how social factors influence their relationship with academic success. (Aim/Purpose) This study examines the complex relationships between health behaviors, social determinants of health, and academic performance among college students, and how social factors moderate these relationships. (Approach) This study employs secondary analysis of cross-sectional data from the National College Health Assessment, a nationally representative survey conducted by the American College Health Association. Key variables include health behaviors (physical activity, nutrition, sleep, substance use including alcohol and cannabis, and mental health indicators), academic performance measures (self-reported GPA, perceived performance, class attendance, and academic difficulties), and social determinants. Statistical analyses will be conducted using IBM SPSS Statistics v28.0, analyses including descriptive statistics, correlation and regression analyses to assess behavior-performance relationships, and moderation analyses to examine how social determinants influence these relationships. (Expected Results) Expected findings will identify health behaviors most strongly associated with academic success and reveal how social factors moderate these relationships. Results will inform evidence-based approaches enhancing both academic achievement and lifelong health trajectories. supporting diverse student populations in a college.

London Lawrence

Discipline: Interdisciplinary

Authors:

#1 London Lawrence

#2 Kevin Fink

#3 Michael Bradley
#4 Tracy Morris

Abstract Name: The Effect of Place Attachment Predicting Coffee Shop Purchases and Store Loyalty in Oklahoma City

The purpose of this study was to determine a relationship between place attachment and brand loyalty, and how they collaborate to influence consumer expenditure at coffee shops in Oklahoma City, Oklahoma. Place attachment can be defined as a bond with a particular place or location. There are three commonly recognized aspects of place attachment: 1. place dependence, the functions or qualities of a particular place; 2. place identity, an individual's sense of self that is developed over time because of psychological investment into a setting; and 3. place affect, an individual's emotional connection with a particular place. A sampling frame of coffee shops in Oklahoma City was created using information from the VisitOKC website and a Google search based on City and State. Six coffee shops were randomly sampled with replacement, and QR codes leading to an online survey were posted at tables in participating shops. The survey included 25 questions that evaluated place attachment, brand loyalty, consumer expenditure, and participant demographics. Likert response (1 – strongly disagree to 5 - strongly agree) was used for participant response to place attachment and brand loyalty questions. An example expenditure question: "On average, approximately how much do you spend at this coffee shop per visit (nearest whole number)?" The planned data collection is from mid-December 2025 to mid-February 2026. The study is ongoing, and data will be analyzed once the survey response collection concludes in mid-February 2026. Understanding the effects of place attachment and brand loyalty on consumer expenditure may help local small businesses stay afloat by acknowledging and enhancing characteristics that encourage the development of place attachment.

Rylee Lawson

Discipline: Philosophy, Ethics, and Religious Studies

Authors:

Abstract Name: Boundless Debt; Rolling Apocalypse: Eschatology and Capitalist Money

A putative break occurred during the age of the Enlightenment, one where the west substituted reason and rationality for religion and the sacred. This is the heart of the "modernization thesis," popularly attributed to Max Weber and his analysis that saw modernity as being centrally about the disenchantment of the world. Following Jason Josephson-Storm, I utilize humanistic analysis informed by critical theory and historical research to problematize this thesis, setting sight on one of the most rational discourses bequeathed by this break: economics, specifically the study of money and finance. Employing a political theological lens, I ask if there exists an eschatology that is immanent in capitalist money. Critical finance theorists such as Hyman Minsky posit an inherent instability and tendency toward crisis within the system, but make no allusions to an end or existential threat. Others, such as Amin Samman and Stefano Sgambati focus on those subordinated by the demands of a debt-oriented system, seeing their plight as a "rolling apocalypse" that appears interminable. My analysis by contrast finds that there exists at least two forms of eschatology immanent in capitalist money. I posit that these emanate from the existence of two distinct categories of debt-derived money— long and short horizon monies. An end is only possible in the collapsing of these two spheres, or the extermination of difference, through either the settlement of all debts or radical redistribution by the state. I identify modern money's birth with the formation of the Bank of England in 1694, arguing that it coterminously forged these idiosyncratic types for the purposes of social reproduction. My intervention elucidates that our monetary system is suffused with notions of the sacred, against ascriptions of positivistic rationality. Further, identifying an immanent eschatology enables a realization of an end and thus potentially a reconfiguring of social reproduction.

Braylee Lawson

Discipline: Art History

Authors:

#1 Braylee Lawson

Abstract Name: Morag Myerscough: The Secrets to Blending Design and Community

This research explores the work of London-based designer Morag Myerscough, focusing on how her innovative use of color, geometric patterns and community collaboration transforms public spaces into the environments that foster belonging and social connection. Drawing on her up-bringing in a multigenerational household, Myerscough developed an appreciation for creativity, collaboration and inclusivity, which informed her design philosophy. This study analyzes her educational background at Saint Martins School of Art and her career trajectory emphasizing key projects such as The Power at Battersea Power Station and Flock of Seagulls Bag of Stolen Chips at the Folkestone Triennial. The methodology combines qualitative analysis of her public installations with a review of primary sources, including Myerscough's own statements, exhibition records, and media coverage, as well as secondary sources that contextualize her work within contemporary graphic and architectural design. Special attention is given to how community participation is integrated to her projects, including workshops, collaborative painting sessions, and local consultation, highlighting the social impact of her designs on urban environments. Findings indicate that Myerscough's work not only enhances the aesthetic value of public spaces but also strengthens social cohesion and promotes emotional well-being among community members. Her installations exemplify the interplay between individual creativity and collective experience, demonstrating how design can be a catalyst for connection, engagement, and joy. The research concludes that Myerscough's approach provides a model for socially engaged design, offering insights from the future designers seeking to balance artistic expression with community involvement. The study contributes to the understanding of contemporary graphic design as a tool for social impact and underscores the importance of designing public spaces that are both visually stimulating and socially inclusive.

Rebekah Lazar

Discipline: Sociology

Authors:

#1 Rebecca Kissane

Abstract Name: Constructing Meaning in Campus Protest Coverage: Role Conceptions and Framing in Student Journalism

As the Israel–Palestine conflict has become one of the most visible and divisive movements over the past several years, college newsrooms have emerged as critical sites for negotiating meaning, expression, and power. This study examines how college newspapers frame campus protests and explores potential explanations for those framings. Previous research has found that professional role conception affects how journalists approach their work, the resources they use, and their reporting goals. My study aims to investigate how frames reflect broader journalistic norms while revealing the unique pressures and responsibilities of reporting within educational institutions. This research draws on two sets of data to investigate undergraduate college newspaper coverage of Israel-Palestine in their communities. My first set of data will consist of semi-structured interviews with undergraduate college newspaper editors and reporters at liberal arts colleges across the U.S. I will use these data to explore their overall knowledge of the Israel-Palestine conflict and identify other factors influencing coverage. My second set of data will include

approximately 20 undergraduate student newspaper publications (e.g., articles and op-eds) on Israeli-Palestinian protests. I will conduct a content analysis to identify relevant frames in protest coverage. My coding schema will draw on prevalent frames within the protest paradigm and literature on media representations of the Israel-Palestine conflict more broadly. I anticipate that perceived state and campus environments will contribute to reporters' and editors' self-censorship, even if governments and colleges do not directly regulate college newspapers. I also expect that newspaper actors and publications will position campus administration as the voice of authority, but activist voices will still remain in coverage due to the influence of student networks. My multi-methods approach will allow me to detail connections between journalistic role conception and the use of frames.

Neva Le

Discipline: Business

Authors:

#1 John Geneva

Abstract Name: Cryptocurrency: A Legal and Tax Analysis

AbstractWhen it comes to taxing currency, it has been quite complex. Digital assets like Bitcoin and Ethereum are becoming more common assets to own and invest in. However, many taxpayers cannot comprehend how to report their cryptocurrency accounts and transactions to the Internal Revenue Service (IRS). There are other challenges as well with investing in cryptocurrency, such as staking, mining, and airdrops. The IRS has to rigorously update its regulations to keep up with this digital environment. This paper looks over various cases, such as the Jarrett case, where a taxpayer couple filed against the Internal Service Revenue for their disagreement on how it taxes on stakeholder rewards. Although it is now resolved, it exemplifies how legal proceeds can impact how future digital assets can be taxed. Moreover, the paper demonstrates struggles from the taxpayers' side with filing those taxes and the efforts from lawmakers to make more comprehensive and accommodating guidelines in this financial world.

Michelle Le

Discipline: Exercise Science and Nutrition

Authors:

#1 Amy Christensen

#2 Christian J. Pike

Abstract Name: Effects of Fast Mimicking Diet on Behavior and Alzheimer-Pathology in EFAD Mice with APOE3 versus APOE4 Genotypes

Alzheimer's disease (AD) is the most common type of dementia with age being the main primary risk factor. In addition, there are several other factors that contribute to the development of late-onset AD. For instance, biological sex is linked with women having higher prevalence and genetic variations in apolipoprotein E (APOE) gene is linked with allele 4 (APOE4) being at a higher risk than allele 3 (APOE3). Given these relationships and the potential effectiveness of dietary interventions against aging outcomes, we investigated whether fast mimicking diet (FMD) influences the AD-related behavioral and pathological features in young adult EFAD mice. Upon comparing AD-related pathology, we observe a statistically nonsignificant trend in female EFAD mice of higher plaque number with APOE4 being higher than APOE3 ($p = 0.06$). However, we observe no significant differences in the total number of thioflavin-identified plaques in the cortex between

FMD and control diet in males ($p = 0.58$) or females ($p = 0.92$). When assessing the size of plaque deposits, there is a nonsignificant trend for FMD groups to have a lower percentage of large plaques ($>100\ \mu\text{m}$ diameter) compared to the control, across both male ($p = 0.14$) and female ($p = 0.22$) mice. Next, we assessed the overall motor, exploratory and anxiety in open field maze and found a nonsignificant trend in the time spent in the center zone of the maze between APOE3 and APOE4 in male ($p = 0.07$) but not female mice. Overall, these initial results suggest that FMD has modest effects on AD-related pathology and behavior in young adult EFAD across biological sex and APOE genotype. These preliminary findings contrast with our recently observed protective effects of FMD in aged male EFAD mice, suggesting that FMD may be most effective in the context of aging and or late-stage of disease.

Hope Lea

Discipline: Engineering

Authors:

#1 Katherine Clark

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#4 Carolyn Richardson

#5 Tobiah Rosser

Tobiah Rosser

Carolyn Richardson

Abstract Name: A Myoelectric Prosthesis Utilizing A Convolutional Neural Network and Signal Processing

Commercially available myoelectric prostheses available to transradial amputees utilize electromyography (EMG) sensors to observe electrical signals from superficial muscle contractions and control robotic fingers; yet they often have several flaws, including adaptability and dexterity. The current devices require users to learn awkward muscle patterns, as the EMG placement and gesture recognition has not considered how humans would normally think about moving their hand. Additionally, the number of available gestures are more limited, as the devices are threshold-based and do not sample enough muscles. This work seeks to address these issues by creating a low-cost myoelectric prosthetic device, utilizing a 1-D ResNet Convolutional Neural Network (CNN). This is a machine learning model which can learn to recognize patterns in the electrical signals generated naturally by the user and translate them into 3-4 hand gestures, thus the device adapts to the user's muscles rather than vice versa. The CNN has been trained offline on labeled segments of EMG signals, which have been captured from the forearm as gestures such as open, close, and pinch are repeated, thus building a reference from which the network learns. The work has also included designing hardware which captures the desired signals and filters unwanted interference, utilizing a smoothing function to preprocess the signals, and preliminary results with the CNN have reached a classification accuracy of 97%. Future work includes ultimately embedding the neural network on a microcontroller and completion of the signal processing hardware designs, thereby completing the goal to create a system which will sense and recognize the user's intention and control an adaptable, multi-gesture robotic hand while maintaining user safety.

Eli Leach- Comas

Discipline: Biology

Authors:

Analicia Hayes

Abstract Name: Molecular characterization of Pepino mosaic virus and species identification of tomato fruits sold at local and international grocery stores in Maryland

Tomatoes (*Solanum lycopersicum* L.) are widely consumed in the United States and globally due to their nutritional and health benefits. U.S. tomato supply comes from both domestic production and imports—mainly from Mexico and Canada—resulting in diverse varieties that require molecular identification and characterization. Tomato crops, however, face significant abiotic and biotic threats. Among biotic stressors, pathogenic infections by Pepino mosaic virus (PepMV) and Tomato brown rugose fruit virus (ToBRFV) pose major challenges. PepMV, a member of the family *Alphaflexiviridae* and genus *Potexvirus*, causes fruit discoloration, cracking, and scarring, and frequently co-infects with ToBRFV, compounding damage and economic loss. Early detection, mutational analysis, and identification of highly susceptible tomato species are essential for developing effective management strategies. This study investigates the molecular characterization of PepMV co-infecting with ToBRFV in tomato fruits sold in Maryland. Symptomatic tomato fruits were collected from various grocery stores for RNA and DNA extraction using QIAGEN RLT buffer. Extracted RNA was converted to complementary DNA and subjected to reverse transcription polymerase chain reaction (RT-PCR) and Sanger sequencing for viral confirmation. DNA extracted from the same samples was quantified and amplified using the *rbcL* marker to accurately identify tomato species. RT-PCR detection revealed PepMV in 16 of 47 samples (34.04%) and ToBRFV in 46 of 47 samples (97.87%). Co-infection of both viruses occurred in 16 samples (34.04%). BLAST analysis showed PepMV isolates closely related to strains from Spain, France, Germany, and Florida, with identities ranging from 98.48–100%. Mutational analysis identified nucleotide variation at position 434 (A/G) and an amino acid change at position 130 (S/N). *rbcL* sequencing produced matches with 100% identity to multiple *Solanum* species, including *S. lycopersicum*, *S. sitiens*, *S. pennellii*, *S. arcanum*, *S. habrochaites*, *S. cheesmaniae*, *S. huaylasense*, *S. neorickii*, *S. pimpinellifolium*, and *S. corneliomuelleri*. Additional analyses are ongoing and final conclusions will be provided upon completion.

Eli Leach- Comas

Discipline: Biology

Authors:

Analicia Hayes

Abstract Name: Deployment of *rbcL* and *matK* barcodes for phylogeny and genetic diversity of *Capsicum* spp. in Maryland

Pepper (*Capsicum* spp.) of the family *Solanaceae* is cultivated worldwide for its nutritional, medicinal, culinary, and ornamental value. More than 38 species have been documented globally, yet limited information exists on the DNA barcoding and genetic diversity of peppers sold in grocery stores in Maryland. DNA barcoding, which relies on short standardized DNA regions, provides a powerful tool for species identification and diversity assessment, particularly when morphological traits are inadequate due to similarities among species. This study employs two markers—ribulose-1,5-bisphosphate carboxylase/oxygenase large subunit (*rbcL*) and maturase K (*matK*)—to barcode and evaluate genetic diversity within grocery-sourced *Capsicum* accessions. Using multiple markers is widely regarded as the most robust approach for phylogenetic analysis, genetic diversity assessment, and species discrimination. Thirty-six pepper accessions were collected from various stores, and DNA was extracted from seeds and fruit tissues. Extracted DNA was quantified via spectrophotometry, diluted, and amplified using PCR with *rbcL* and *matK* markers. Amplicons were Sanger sequenced and analyzed for mutations (insertions, deletions, transitions, and transversions), intra- and inter-species variation, BLAST matches, and phylogenetic relationships. Maximum Parsimony phylogeny grouped the accessions into eight clusters using *rbcL* and four using *matK*. Some peppers sold under the same commercial name clustered differently, indicating species-level discrepancies. For example, samples labeled as Sweet Snaps (AH-3, AH-4, AH-5) were distributed across groups A, B, and D, while Jalapeño samples AH-15 and VM-3F clustered separately. Anaheim samples

VM-1 and EP-4 grouped together but differed at the sub-group level. A point mutation at position 378 (A/G) in *rbcL* distinguished several accessions, while *matK* revealed transversions (A/T) and insertion–deletion events across the 36 samples. Although further analyses are ongoing, *rbcL* appears more effective than *matK* for species identification, phylogenetic resolution, and detecting genetic variability in grocery-sourced *C. annuum* accessions. Both markers revealed multiple pepper species marketed under single names.

Sawyer Leahy

Discipline: Geography/Geology

Authors:

#1 Joy Doll

Abstract Name: Climate-Induced Flooding and Healthcare Utilization in Nebraska: A Retrospective Analysis of Inpatient and Outpatient Encounters (2020-2023)

The purpose of this study was to examine the relationship between climate-induced flooding events and healthcare utilization in Nebraska. By analyzing inpatient and outpatient hospital encounter data alongside flood records, the study aimed to identify patterns in healthcare demand during and after flooding incidents. Flooding is among the most frequent and damaging natural disasters, with evidence linking climate change to increased flood severity. Flood events disrupt access to healthcare, intensify chronic illnesses, and increase infectious disease incidence. Vulnerable populations, including older adults and individuals with comorbidities, face disproportionate risks. Severe floods in Nebraska, including the March 2019 event, have had lasting impacts, highlighting the importance of examining healthcare utilization changes to guide resilience strategies. Healthcare utilization data (89,000 inpatient and 750,000 outpatient encounters) were obtained from the Nebraska Hospital Association (2020–2023). These were linked with county-level flood records from the National Oceanic and Atmospheric Administration (NOAA). Descriptive analytics, including PivotTables and PivotCharts, were used to identify demographic trends, leading diagnoses, and alignment between flooding events and emergency department visits. Diagnoses were grouped by clinical category, and facility-level utilization patterns were assessed statewide. Findings indicated alignment between flood events and increased healthcare utilization, particularly for conditions such as type 2 diabetes, respiratory infections, and gastrointestinal illnesses. Older adults and patients with chronic conditions accounted for a disproportionate share of admissions. Urban medical centers had the highest volumes, raising concerns about rural access disparities. While causation could not be definitively established due to limitations, results suggest a meaningful association between flooding and healthcare demand. These findings underscore the importance of equity-focused disaster planning, improved data granularity, and integration of social determinants of health metrics to enhance resilience against climate-driven health challenges.

Amiah Leal

Discipline: Linguistics and World Languages

Authors:

#1 Amiah Leal

#2 Emily Dore

#3 Charli Durand

#4 Claire Glaecer

#5 Emily Savant

#6 Elena Babatsouli

Abstract Name: Capturing dialectal and hierarchical representations for the evaluation of English developmental speech

Research on children's speech patterns during language development informs clinical and educational practices. Mainstream American English speech developmental norms used for clinical/research purposes in the country (Smit et al. 1990; 1993a, b) are outdated and do not reflect social and regional dialectal variation. Similarly, previous cross-linguistic works do not account for the effects of variant language input on children's speech acquisition. To address this gap, Babatsouli et al. (2025) first introduced methodological procedures that include a phonological assessment tool, a demographic survey, and a language input assessment procedure to investigate children's English speech production in the Louisiana family context. The phonological development test comprises 120 child and culturally appropriate words and is representative of English phonotactics. The linguistic input assessment comprised a reading and retelling task. The present work examines the phonotactic content of the speech elicitation test from a non-linear theoretical perspective (Bernhardt & Stemberger, 1998; Mohanan, 1992; Rice & Avery, 1995). Nonlinearity relies on the view that autonomous phonological units—segments, syllables, and prosodic words—have underlying hierarchical representations that are not directly observable but interact across multiple tiers, from features to the phrase level. Our results inform the frequency distributions of singleton segments, consonant clusters, as well as syllable and whole-word structures represented in the test materials. We report and compare our findings with previously used assessment tests in the literature and identify those features of the assessment test that uniquely capture segmental and structural complexity in the English-speaking children's developmental speech in the sociolinguistic context of Louisiana. Keywords: child; nonlinearity; phonological development; English; dialects; Louisiana

Colter Leasure

Discipline: Business

Authors:
#1 Sanjay Gupta

Abstract Name: An Examination of Retirement Plans Across Universities in the United States

This research examines faculty retirement plans across U.S. university systems in all 50 states. The study evaluates defined benefit (DB) and defined contribution (DC) plans, focusing on key data points such as contribution rates, vesting schedules, benefit formulas, and plan flexibility. By analyzing data collected from a diverse set of institutions, the research identifies trends in retirement offerings, including the prevalence of stable DB plans versus adaptable DC plans, and it assesses their implications for employee and employer obligations. Preliminary findings highlight a spectrum of retirement models, with some universities prioritizing predictable benefits through DB plans and others emphasizing flexibility via DC plans. The study explores how these variations impact faculty retention and satisfaction, offering insights into the strengths and limitations of different retirement structures. The goal is to provide a comprehensive comparison of retirement benefits across U.S. universities located in all 50 states, contributing to discussions on enhancing faculty retirement security and for policy recommendations for higher education.

Nicholas Leavitt

Discipline: Engineering

Authors:

Abstract Name: Developing a Simplified Predictive Model to Estimate Embodied Carbon of Steel Moment-Resisting Frame Building at Early Design Stage

Early stages of building design significantly influence a building's environmental impact, leading to more environmentally sustainable construction. Life cycle assessment (LCA) is a quantitative approach to evaluate the environmental impacts of a building through its production, construction, operation, and demolition. Despite LCA's potential for evaluating post-construction environmental impacts, it is not a common component of early design of buildings due to the fast nature of this stage and the challenges of performing a large number of LCAs for different design variations. Therefore, this study develops a predictive model connecting building design and geometry parameters to embodied carbon. The predictive model was derived from a database of 60 steel moment-resisting frame buildings of varying geometries and designs. The building's embodied carbon was estimated using Athena Impact Estimator software in terms of global warming potential (GWP). A statistical analysis was then performed to identify the building parameters associated with GWP. To address the possible limitations of Athena Impact Estimator, a subsequent sensitivity analysis was conducted among five of the buildings in the database by replacing a portion of the software's GWP data. These five buildings instead use GWP data from an environmental product declaration released by the Nucor corporation. Results suggest a strong correlation between embodied GWP and gross floor area and frame weight, with a coefficient of determination (R^2) of 97.8% over the entire building database. The results of the sensitivity analysis show an overall decrease in carbon when utilizing the data from Nucor. The predictive model can serve as a design aid for minimizing environmental impacts of steel-framed buildings, and support similar approaches for other structural systems.

Chloe LeBlanc

Discipline: Biology

Authors:

#1 Joshua Vu

#2 Jennifer Raabe

#3 Beth Stauffer

Abstract Name: Triggering Stringent Response in *Microcystis aeruginosa* by Nutrient Limitation with Implications for Oyster Filter Feeding

The Mississippi-Atchafalaya River system (MARS) transports enriched freshwater and cyanobacterium *Microcystis aeruginosa* to Louisiana estuaries during flooding events. Cyanobacterial blooms have become increasingly common in estuaries and represent a changing food supply for filter feeders like oysters. As *M. aeruginosa* blooms travel downstream, they are exposed to higher salinities and reduced nutrient concentrations. These stressful conditions may induce osmotic stress, trigger cell lysis, and release microcystins (MC). Nitrogen limitation and low salinity may trigger stringent response (SR), a stress-induced mechanism that upregulates production of extracellular polymeric substances (EPS) containing carbohydrates and proteins that protect the cell membrane, help form colonies, improve photosynthetic efficiency, reduce oxidative stress, and increase cell MC quotas. Previous studies have examined the effects of elevated salinity on MC production and failed to account for nutrient stressors. This pilot study tested whether nitrogen limitation and increased salinities stimulate SR in a toxic culture of *M. aeruginosa* with implications to observe the effects of colony size and EPS on *Crassostrea virginica* feeding. We measured particle size (μm), whole MC concentrations (particulate and dissolved), and photosynthetic efficiency (F_v/F_m) over 48 hours across varying nitrogen availability (100–0.01%), and salinity (0, 5, 10). Preliminary results indicated no significant differences ($p \geq 0.05$) in particle size between the control treatment (100% nitrate at salinity 0), the most nitrogen-limited (0.01% nitrogen) and salt-stressed (salinity of 5 and 10) treatments throughout the experiment (48 hours). Optical densities – a proxy for whole water MC concentrations – were slightly highest for cultures in the lowest nitrate (0.01%) and salinity (0) treatment (Mean $\pm$ SE = 0.326 ± 0.005 ; $H(6) = 11.7$, $p = 0.07$). These results suggest that the lack of SR in *M. aeruginosa* is potentially caused by low starting cell concentrations, and may represent density dependence for initiating SR in *M. aeruginosa*.

Mary LeBoeuf

Discipline: Art History

Authors:

#1 Mary LeBoeuf

Abstract Name: Period Pieces: Challenging Taboos Surrounding Menstruation in Contemporary Art

This research is a discussion of my virtual exhibition that challenges the shame and stigmatization surrounding menstruation by showing menstruation as a beautiful natural bodily cycle. The exhibition includes seventeen different contemporary artworks on the topic. These artworks do not hide the bloody side of menstruation, but blatantly confronts it, to show menstruation as a bold and empowering experience. The layout of my virtual exhibit in the shape of a uterus and ovaries creates an immersive space that leads the visitor into the realities of menstruation. Inside the exhibit there are vivid red walls, with deep burgundy floors, and a white ceiling. These colors, which are reminiscent of the interior of the human body and period blood, bring to life the shape of the museum, placing the visitors in the reality of menstruation, not purely as an abstract shameful fact, but as a daily lived experience. In the canal, central uterine space, and ovaries there are contemporary artworks that depict the physicality and realities of menstruation. Every piece I chose in this exhibit defies the negative rhetoric surrounding menstruation, showing that the hidden should be seen, the private should be public, and the shamed should be sacred. The exhibit as a whole emphasizes that menstruation is not this uncomplicated sanitized subject, but messy, painful, beautiful, and transformative.

Mary LeBoeuf

Discipline: Art History

Authors:

#1 Mary LeBoeuf

Abstract Name: Resilience and Adaptability: Hybridity of New Orleans Voodoo

This paper examines the hybridity of Voodoo in New Orleans, Louisiana in the contemporary period. By analyzing Voodoo, I will demonstrate the adaptability and resilience of the people who practice this religion under societal oppression, by appropriating local cultural practices. The introduction will examine the origins of Vodou in West Africa, as well as how enslaved Africans brought Vodou to Haiti, through the African transatlantic slave trade. Section two will analyse how Vodou practices were introduced by enslaved Africans and Haitian refugees in New Orleans. Where Voodoo was transformed by the Native Americans costumes and religious practices, in addition to being forcibly adapted to both the local Creole cultural traditions, and Catholicism, brought by French and Spanish colonizers. The third section will examine Voodoo in New Orleans in the contemporary time period, with an emphasis on its resilience and adaptability. The final section of the paper will provide formal and historical examination of three Voodoo inspired artworks that serve to demonstrate the rich multicultural significance of Voodoo in New Orleans. Therefore, this study will demonstrate the importance of Voodoo in New Orleans as a way for enslaved people and refugees to preserve their religious and cultural identity under strict colonial oppression and cruelty. This research into the cross-cultural resilience of New Orleans Voodoo ultimately aims to demonstrate how despite the forced cultural blending, adaptation, and resilience Voodoo has persisted as a huge part of New Orleans' artistic, spiritual, and communal culture.

Noor Lecanu

Discipline: Biology

Authors:

#1 Aline Medeiros

#2 David Luther

Abstract Name: Forest Restoration Proves Critical for Animal Biodiversity Recovery in The Amazon

The Amazon is the most biodiverse terrestrial landscapes on earth but is experiencing widespread degradation which threatens biodiversity and ecosystem function. Forest restoration is a great way to restore forests, biodiversity, ecological functions, and sequester carbon. While forest growth and restoration are quantified through remote sensing, fauna detection and responses are harder to quantify. We assessed the recovery of wildlife at the BDFFP in the Amazon after forest restoration almost 50 years ago. We deployed camera traps across the recovering BDFFP landscape in continuous forest, secondary forest, and forest fragments (100ha, 10ha, 1ha) to understand terrestrial bird and mammal recovery across the landscape. Camera images were processed using AI-assisted classification and expert verification to identify all birds and mammals. We compared the number of species and foraging guilds present in each recovering forest type to continuous forest sites. We detected 50 species of terrestrial birds and mammals, 36 in continuous forest, 33 in Secondary Forest, 36 in 100ha, 29 in 10ha, 20 in 1ha forest. Secondary forests 100ha and 10ha forests had relatively similar faunal communities to continuous forests, indicating greater recovery. For six species we have historical and modern abundance data and assessed how they changed in 40 years. Most species populations increased, indicating recovery with forest growth. Results capitalize on new and emerging technologies, such as AI, to assess and demonstrate biodiversity recovery from tropical forest restoration which could be critical to averting population declines in tropical animals. Thus, technology-informed management is essential for effective ecosystem and biodiversity recovery.

Sergio Ledesma

Discipline: Biology

Authors:

#1 Maria De Los Angeles Reyes

#2 Adela Mendez-Martinez

Abstract Name: Beyond the Surface: A Neurobiological Comparison of Human and Orca Brain

This study investigates the neural foundations of intelligence and social behavior in humans and orcas, two species known for complex cognition and advanced social structures. Drawing on previously published anatomical, behavioral, and neurological research, this systematic review compares how brain structure and function shape cognitive abilities and social dynamics across both species. Background literature shows that humans and orcas each possess specialized brain regions supporting communication, emotion, memory, and problem-solving, though their neural systems reflect distinct ecological and evolutionary pathways. Data for this review were taken from peer-reviewed studies examining major neural structures—including the cerebral cortex, paralimbic lobe, limbic system, and sensory-processing regions—along with documented examples of communication, cultural learning, and cooperative behavior. Special attention was given to neural features associated with high-level cognition, such as spindle neurons and regions involved in language, auditory processing, and social-emotional integration. Synthesized findings indicate that humans exhibit strong

cortical specialization for language, abstract reasoning, and symbolic thought, supported by an extensively developed prefrontal and association cortex. Orcas, by contrast, display an enlarged paralimbic lobe, advanced auditory networks, and neural adaptations enabling echolocation, complex social bonding, and culturally transmitted behaviors. Despite these differences, both species share neural markers of social complexity, including spindle neurons linked to empathy and sophisticated social cognition. Overall, the review demonstrates how distinct neural architectures can yield convergent forms of intelligence, offering insight into broader patterns of brain evolution. It concludes that integrating neuroscientific research with conservation strategies is essential for developing ethical, evidence-based approaches to protect cognitively advanced species such as orcas and to preserve the social and ecological systems that sustain them.

Amanda Lee

Discipline: Psychology

Authors:

#1 Zahra Khalaf

Kyla Guilford

Justin Green

Abstract Name: Exploring Male College Students Perceptions on Sexual Health and Decision-Making

Sexual health is a critical aspect of college students' well-being as young adults encounter new independence, relationships, and risk-taking opportunities. Yet male students remain underrepresented in sexual health research and programming, limiting understanding of their experiences and needs. This study explored how male undergraduates perceive and navigate sexual health while in college. Semi-structured interviews were conducted via Zoom with 12 male college students ages 19–22, all of whom identified as African American, though this was not a recruitment criterion. As such, the findings may reflect the unique perspectives of this demographic group. Interviews addressed sexual health knowledge, influences, prevention practices, and access to care. Audio recordings were transcribed and analyzed using thematic analysis to identify shared patterns in perceptions and decision-making. Four interconnected themes emerged. (1) Learning from Everywhere Except Experts: Most participants learned about sex through media, peers, and early exposure online, with formal education described as inconsistent or incomplete—especially regarding STI symptoms and partner communication. (2) Risk as a Negotiation: Condom use was often viewed as necessary only at the beginning of sexual relationships, with some participants admitting they relaxed precautions based on trust, routine, or pleasure. Encounters with STIs heightened awareness but also introduced shame and selective disclosure. (3) Social Pressures, Private Choices: Peer expectations around masculinity and sexual activity were influential, yet participants expressed personal responsibility and emotional self-regulation in deciding when and with whom to have sex. (4) Resources Exist, but Engagement Lags: Although campus reproductive health services were considered accessible and judgment-free, participants reported that not all men actively seek or use these supports unless they are already facing a problem. Together, these findings reveal a complex balance of confidence and uncertainty among male students navigating sexual health. Enhancing proactive, stigma-free education tailored to men may strengthen their ability to make informed, safer decisions.

Brennan Lee

Discipline: Chemistry

Authors:

#1 Wen Li

#2 Bozhi Tian

Abstract Name: Hydrogen Gas-Infused Bandage Device for Treating Bedsores Wounds and Heart Complications

Decubitus ulcers (bedsores) affect 2.5 million Americans annually, costing the US healthcare system upwards of \$11 billion. Current treatments like negative pressure therapy and oxygen gas therapy are bulky, hard to use, and demonstrate inconsistent clinical results. Recently, scientists have been investigating molecular hydrogen as a therapeutic agent that nullifies reactive oxygen species generation in ischemia-reperfusion (I/R) injury, the biochemical process behind conditions like bedsores and heart attacks. While the results are promising, current methods of hydrogen delivery, namely the consumption of hydrogenated water and the inhalation of hydrogen gas, target the entire body and experience leakage during administration, limiting their clinical feasibility. Our central research question is whether a hydrogel-integrated electrochemical device can generate, trap, and locally deliver hydrogen gas to effectively treat these injuries. To address this, we embed an electrochemical hydrogen gas generation device within a thin gel bandage, using the gellified water (hydrogel) within the bandage as a source for hydrogen. The hydrogel traps the generated gas, creating hydrogen bubbles that diffuse directly into the desired organ, treating these wounds and heart injuries in a precise and cost-effective way. We rigorously explore the biophysics of the hydrogen gas hydrogel, measuring its diffusion kinetics, gas storage, and generation capabilities. Furthermore, we validate the therapy across scales. Firstly, on a cellular level by defining its protective biochemical pathway in mouse heart cells, and later macroscopically by demonstrating reduced injury and accelerated healing in live rat hearts and mouse ulcer models. All in all, our work provides a novel approach in drug delivery and gas-based therapies to precisely and effectively treat I/R injury-derived illnesses, unlocking the potential for hydrogen-based therapies to be used for unexplored I/R injury illnesses such as frostbite, organ preservation, and stroke.

Eunmyung Lee

Discipline: Business

Authors:

#1 Eunmyung Lee

#2 Eunseong Lee

Eunseong Lee

Yutong Liu

Abstract Name: Algorithmic Isomorphism: Agentic AI and the Structural Decay of Strategic Variance in a Homogeneous Optimization Regime

Neo-institutional theory posits that organizations in uncertain environments tend to copy one another to survive—a phenomenon DiMaggio and Powell (1983) termed the “iron cage.” This study argues that the widespread deployment of standardized Agentic AI (e.g., enterprise agents built on shared foundational models) accelerates this process into a hyper-efficient “Algorithmic Isomorphism.” We posit that as firms delegate strategic micro-decisions to identical third-party models, they inadvertently import a shared “global optimization logic” that erodes idiosyncratic advantage, creating a “Strategic Monoculture.” Methodologically, the paper develops a comparative theoretical framework to characterize the industry-level impact of shared AI adoption. It contrasts two regimes: (1) a Human Regime, characterized by diverse decision-making driven by bounded rationality and local culture, and (2) an Algorithmic Regime, in which agents optimize a common objective function using overlapping training corpora. The analysis demonstrates that as dependence on standardized AI scales, the variance of strategic choices collapses toward uniformity, effectively commoditizing management at the margin. Theoretically, the paper formalizes a “Convergence Paradox,” predicting that while AI adoption increases firm-level operational efficiency, it compresses industry-level profit margins by eliminating the differentiation required to sustain competitive advantage. The findings imply that in an AI-driven economy, lasting success will not come from adopting

intelligence per se, but from designing and customizing the unique objective functions that intelligent systems are asked to optimize.

Eunmyung Lee

Discipline: Business

Authors:

#1 Eunmyung Lee

#2 Eunseong Lee

Eunseong Lee

Yutong Liu

Abstract Name: Title: The Coasean Collapse: Agentic AI and the Re-Optimization of Firm Boundaries in a Low-Transaction-Cost Economy

The Theory of the Firm rests on Coase's (1937) insight that organizations arise to economize on transaction costs: when the cost of coordinating production internally is lower than transacting in the market, firms expand; when the reverse holds, they contract. Building on Coasean and Williamsonian economics, this paper argues that the deployment of Agentic AI—autonomous contracting, monitoring, and coordination algorithms—is pushing core transaction costs toward a structurally lower regime, triggering a “Coasean Collapse” in the efficient scale and scope of the firm. We posit that the vertically integrated, managerially intensive corporation becomes progressively dominated by “AI-orchestrated swarms”: decentralized networks of specialist talent coordinated by algorithmic protocols rather than hierarchical authority. Methodologically, the paper develops a comparative economic framework that evaluates the total cost of executing a project under two organizational forms: (1) a traditional managerial hierarchy, subject to bureaucratic delay and supervision limits, and (2) an AI-mediated “flash organization,” modeled as a low-friction talent market with automated search, matching, and enforcement. By decomposing transaction costs into search, bargaining, and enforcement components, the analysis demonstrates how Agentic AI shifts the optimal boundary of the firm, drastically shrinking the region of activities for which internal employment contracts are cost-minimizing. Theoretically, the paper formalizes a “Dissolution Hypothesis,” predicting the rise of “headless brands”: entities with substantial output, brand presence, and asset control but negligible permanent staff. The results recast the corporation not as a timeless unit of analysis, but as a historically contingent solution to high transaction costs, now under structural pressure. The findings generate testable implications for employment, unionization, and antitrust policy, suggesting that regulatory frameworks built for a high-friction economy may be systematically misaligned with the emerging Coasean landscape.

Eunseong Lee

Discipline: Business

Authors:

#1 Eunseong Lee

#2 Eunmyung Lee

Yutong Liu

Eunmyung Lee

Abstract Name: Capacity-Constrained Attention: How Algorithmic Feeds Reshape Viral Marketing and Brand Equity

This paper develops a formal model of attention contagion on digital platforms where user attention is treated as a scarce, capacity-constrained resource. Departing from classical epidemiological models (SIR) often applied to marketing, we define the state of the system not at the user level, but at the level of limited "attention slots" over time. In our model, a user has a finite number of slots per period that can be empty, occupied by a focal meme, or filled by competing content. A platform ranking function—incorporating watch time, click-through rates, and diversity constraints—governs the probabilistic transition of content into these slots. Within this framework, we introduce the Attention Reproduction Number R_A : the expected number of additional attention slots generated by a single occupied slot. We derive how R_A and equilibrium outcomes shift depending on feed saturation and algorithmic policies. Our analysis yields three key findings for marketing strategy: (i) highly contagious but rapidly fatiguing "viral" content is often outperformed in cumulative attention by slower-burn narratives under diversity-oriented ranking algorithms; (ii) in saturated environments, increasing contagiousness yields sharply diminishing returns due to slot cannibalization; and (iii) algorithms maximizing short-term watch time systematically underprice long-term brand equity. We conclude by discussing implications for designing healthier attention ecosystems and robust brand strategies in algorithm-driven markets.

Eunseong Lee

Discipline: Business

Authors:

#1 Eunseong Lee

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Eunmyung Lee

Yutong Liu

Abstract Name: The Valuation Paradox: Structural Insolvency Signals in AI-Centric Firms Under GAAP Intangible Asset Recognition

The rapid proliferation of Generative Artificial Intelligence (GenAI) has exacerbated a fundamental disconnect between economic reality and statutory financial reporting. Under standard U.S. accounting rules (GAAP), internally generated intangible assets—such as the massive computing and development costs required to build Large Language Models (LLMs)—must be recorded as immediate costs rather than capitalized as long-term assets. This paper argues that this industrial-era reporting regime precipitates a “Valuation Paradox”: firms that rely heavily on proprietary AI models appear systematically asset-poor on their balance sheets, generating artificial distortions in standard performance and solvency indicators. Methodologically, the paper develops a comparative valuation model to capture the mechanical divergence between reported book value and true economic capital. By deriving a modified accounting identity that incorporates a measurable “Hidden Capital” factor, the study isolates the specific mechanisms that cause AI-heavy firms to exhibit symptoms of technical insolvency despite robust operating performance. The analysis demonstrates that as a firm’s investment in AI scales, the likelihood of false signals of financial distress approaches certainty under current constraints. Theoretically, the paper interrogates the viability of the accounting “Conservatism Principle” in the digital age. It posits that the systematic exclusion of AI training costs creates a massive informational blind spot, compelling investors to infer the value of hidden capital from noisy, incomplete disclosures. The findings suggest that traditional financial metrics are materially biased when applied to AI business models, calling for a recalibrated “Probabilistic Asset Recognition” framework that better aligns financial statements with the dynamic risk profile of the GenAI economy.

Hyunwoo Lee

Discipline: Health and Human Development

Authors:

#1 Hyunwoo Lee
#2 Taeheon Kim
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Taeheon Kim
Kyeongseo Park

Abstract Name: The Double-Edged Sword of AI: Its Impact on College Students' Mental and Physical Health

The rapid integration of artificial intelligence (AI) tools into college life has created both opportunities and challenges for student well-being. Academic AI platforms like ChatGPT can reduce workload and ease academic pressure, while AI-based fitness and wellness applications can promote healthier physical and emotional habits. This study aimed to explore impacts of AI on university students by evaluating its academic influences and its effects on general health. Mixed-methods research was administered to 48 college students in The United States, with 59% male, 41% female, and mostly sophomores, consisting of 12 questions and two open-ended prompts. The questionnaire included two distinct domains: (1) students' use of AI for physical activity support, motivation, and mental health management, and (2) academic reliance on AI and its association with stress reduction and academic confidence. Quantitative data were analyzed for correlations, and qualitative responses explored students' perceptions of benefits and concerns. Correlation analysis revealed a prominent result. Students who felt that AI fitness apps made exercise goals more manageable also showed stronger motivation to pursue those goals ($r = .79$). A moderate correlation emerged between relying on AI for homework and feeling anxious about completing assignments independently ($r = .50$), suggesting that greater dependence may relate to lower academic confidence. Students also reported increased awareness of their physical activity through AI apps were moderately more likely to feel that AI helps break fitness goals into achievable steps ($r = .58$). Qualitative comments reflected this tension, portraying AI as both helpful and a source of reliance. Overall, findings highlight AI's dual role: it can enhance students' health-related motivation while simultaneously contributing to academic overdependence. Future research should investigate how patterns of AI engagement evolve over time and develop evidence-based recommendations for fostering balanced, intentional, and developmentally supportive uses of AI within higher education contexts.

Terrence Lee

Discipline: Biology

Authors:

#1 Terrence Lee
#2 Lisa Wrischnik

Abstract Name: In situ hybridization of zebrafish embryos to study ER stress on neuronal development

In cells, the accumulation of misfolded or unfolded proteins activates the unfolded protein response (UPR), a stress pathway triggered by conditions such as heat shock or nutrient imbalance. UPR activation is implicated in human diseases, including several neurodegenerative disorders such as Alzheimer's and Parkinson's disease. Although the UPR protects cells by preventing excessive buildup of unfolded proteins in the endoplasmic reticulum, prolonged activation can trigger apoptosis, leading to neuronal loss. Because ER stress can induce cell death, it is considered a potential driver of neurodegeneration. The timing of translation re-initiation is critical, restarting too early can lead to apoptosis and waiting too long prevents the production of essential proteins. The proteins GADD34 and CReP are central to restarting translation. Studies show that inhibiting this process can protect neurons after stroke and prevent degeneration in models of Parkinson's Disease and Charcot-Marie-Tooth disease, showing this pathway plays important roles in both the central and peripheral nervous systems. The goal of this project is to use zebrafish to examine how mutations in GADD34

and CReP affect neuronal development or survival. Zebrafish embryos are ideal because they are transparent and share similarities with humans. We chose in situ hybridization to visualize the nervous system and detect changes in neuronal gene expression. Three zebrafish genes were cloned to target different neurons; *elavl3* (pan-neuronal), *isl1* (peripheral nervous system), and *neuroD* (developing neurons). We will stain wild-type, GADD34, and CReP mutants in parallel and increase sample numbers for statistical significance. We will then repeat the experiments with *isl1* and *neuroD* probes and later expose embryos to stress-inducing drugs to assess how stress influences neuronal development in these mutants.

Zachary Lee

Discipline: Chemistry

Authors:

#1 Harold Sun

#2 Idris Adebanjo

Abstract Name: Water Soluble Binders in Lithium Ion Batteries

The current standard of binding agents in lithium-ion batteries is a mixture of polyvinylidene fluoride (PVDF) dissolved in N-methyl-2-pyrrolidone (NMP) which is thermally and chemically resistant and is highly adept at adhering electrode material together. However, NMP is highly toxic and a known teratogen, which poses severe health risks as the disposal and general handling of batteries is uncontrollable to a certain extent. Therefore, it is pertinent to identify and test alternatives, ideally ones that are water soluble, to this industry standard to mitigate the health risk while preventing cycling performance loss of the batteries. To achieve this, several ratios of water-soluble polymers were created and used in place of the industry standard. Water was chosen as the solvent due to its abundance and cost effectiveness. The primary polymers explored are: Carboxymethyl Cellulose (CMC), Styrene-Butadiene Rubber (SBR), and Polyacrylic Acid (PAA). Graphite anode powder was used as the standard electrode largely due to cost, with various ratios and mixtures of the aforementioned polymers being applied in the standard binding process to ascertain both general malleability and adhering properties as well as electrochemical prowess. For each test group, at least two batteries were created, and cycled 100 times in a manner that would simulate real world uses. These were then plotted with a clear goal of at least 90% retention. Standalone PAA was the best performer, and increased attention will be given in the future as research continues, however some literature also points to a combination of CMC/SBR being highly adept at maintaining the volumetric expansion of silicon electrodes as it undergoes lithiation. Therefore, both should be explored in more detail.

Erika Lee

Discipline: Exercise Science and Nutrition

Authors:

#1 Ellie Rauk

Reilly Hubin

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Abstract Name: Impact of Dynamic Stretching on Functional Movement and Range of Motion

Stretching prior to activity is known to increase flexibility and range of motion, and an insufficient warm-up elevates the risk of injury (Opatowicz et al., 2022). Much of the existing research on stretching has focused on static stretching, which over the past 25 years has been shown to decrease performance, prompting a shift

toward emphasizing dynamic stretching (Konrad et al., 2023). Current literature primarily supports dynamic stretching for enhancing athletic performance; however, far less attention has been given to its effects on essential functional movement patterns used in everyday life. The purpose of this study is to examine whether dynamic stretching influences range of motion and functional movement. Functional training and the Functional Movement Screen (FMS) were used to assess movement quality and participants' ability to perform tasks without pain. Middle-aged male and female adults volunteered for the study, which used a one-sample experimental design. Participants completed both a structured ten-minute dynamic stretching warm-up, and during a separate trial remained static before undergoing FMS testing and range-of-motion (ROM) measurements which served as the dependent variables. The order of trials performed was randomized. A paired-sample t-test will be used to determine whether ROM measurements differed significantly between pre- and post-dynamic stretching, with alpha set at $p \leq 0.05$. A Chi-squared analysis will be used to determine whether FMS scores differed significantly. We anticipate the results will indicate whether there is a significant improvement in both ROM and FMS scores. These findings may contribute to the growing evidence supporting dynamic stretching and clarify whether it should be incorporated into adults' daily routines to enhance mobility and reduce injury risk. Overall, FMS served as a valuable tool for identifying changes in mobility and movement quality following dynamic stretching, reinforcing its potential role in effective warm-up practices. Data collection is in progress. IRB #544498

Christine Lee

Discipline: Computer Science

Authors:

#1 Chenhao Tan

#2 Julia Mendelsohn

#3 Lexing Xie

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#5 Mourad Heddaya

#6 Julia Margie

Abstract Name: BallotBot: Designing AI Systems to Support Informed and Justified Voter Decisions

Background: Ballot measures often contain technical legal language that limits public understanding and participation. This study asks whether large language models (LLMs) can enhance voter comprehension and reasoning when evaluating complex measures, contributing to research on AI-assisted civic engagement. Methods: A randomized online experiment was conducted with 149 Arizona voters reviewing Proposition 310, a real 2022 ballot measure. Participants were assigned to one of three conditions: (1) a static LLM-generated summary, (2) a structured civic information source modeled on Ballotpedia, or (3) an interactive chatbot ("BallotBot") using retrieval-augmented generation to answer voter questions. After reading, participants voted (Yes/No/Abstain), rated their confidence and understanding, and completed comprehension and open-ended reasoning tasks. Analyses measured factual accuracy, reasoning depth, engagement time, and vote distributions. Results: Participants using BallotBot spent the most time engaging with the materials (median = 9.8 min), significantly more than Ballotpedia (7.6 min) or the LLM Summary (5.3 min; $p \leq 0.001$). Chatbot users generated longer and more detailed responses (median = 88 words vs. 47; $p = 0.011$) and identified a greater proportion of factual drawbacks (0.46 vs. 0.31; $p = 0.043$). Voting patterns differed by condition: 58% of LLM Summary participants voted Yes, compared with 40% for Ballotpedia and 36% for Chatbot users ($\chi^2(2) = 6.08$, $p = 0.048$). Confidence and comprehension quiz scores did not vary significantly across groups. Conclusions: Interactive AI systems can deepen civic reasoning and engagement without altering confidence levels. BallotBot encouraged participants to consider more nuanced pros and cons and produced greater awareness of potential drawbacks. These results demonstrate how AI-driven dialogue tools can support informed, reflective democratic participation and contribute to the broader effort to design trustworthy civic technologies.

Discipline: Interdisciplinary

Authors:

#1 Nikolay Filipov

#2 Brice Hudson

#3 Trevor Kalinowski

#4 Donald Harn

#5 Thomas Norberg

Abstract Name: The Effects on Selected Motor, Cognition Behavior, and Brain Pathology in Mice with Gulf War Illness Treated with the Immunotherapeutic LNFPIII and an Inulin Diet

During the 1990-1991 Gulf War, United States veterans were exposed to harmful toxicants that are believed to cause Gulf War Illness (GWI), a chronic multi-symptom illness, in about 30% of the veterans. This study looked at the effects of GWI chemical exposure on male and female mice in two preclinical models, when treated with Lacto-N-Fucopentaose III (LNFPIII) and an inulin diet, as potential GWI therapeutics. In one of the models (DFP model), mice were treated over 15 days as follows: pyridostigmine bromide (PB) and DEET were administered for 14 days, corticosterone (CORT) was added to the drinking water from days 7–14, and on day 15, diisopropylfluorophosphate (DFP) was given to complete the GWI induction. In the PB/PM model, mice received daily injections of PB and permethrin (PM) for 10 days. Control mice from both models received appropriate vehicle treatments. Eight months later, delayed intervention with the immunoprophylactic LNFPIII or dextran control and/or inulin diet or isocaloric control began. Behavioral testing started 1 month after intervention initiation. 3 months following the start of intervention, the mice were sacrificed for histological analyses of the brain. Up to date, data from three behavioral tests were analyzed: the gait test which analyzes motor function, nest building test which analyzes a natural behavior perturbed in models of psychiatric illness, and the novel object recognition test (NORT) which analyzes recognition memory. Additionally, glial activity was analyzed through immunohistochemistry using antibodies against IBA-1 and GFAP, for microglia and astrocytes, respectively. The NORT was analyzed in the DFP males, while the gait was assessed in the DFP males and females. Both models and sexes were analyzed for the nesting test. Results suggest LNFPIII with an inulin diet may restore recognition memory and moderate nesting hyperactivity in GWI, while glial activity is still being analyzed.

Kalista Leggitt

Discipline: Philosophy, Ethics, and Religious Studies

Authors:

Abstract Name: Nested Pediatric Ethicality in Medical Decision Making

Children depend on others to exercise their rights, which can create an ethical conflict between the parent and adolescent when it comes to medical decision making. This tension, when the adolescent and parent come to opposing decisions, can be defined as Adolescent Consent Dissonance (ACD). This relates back to childism—the prejudice where it's assumed that adults are superior—which can manifest in various ways including dismissing an adolescent's values and needs, and ignoring their capability as an autonomous, ethical agent. Supporting ethical agency and autonomy is a key part of acknowledging adolescence as a developmental stage from childhood to adulthood, and it needs to be promoted by healthcare professionals in coordination with the adolescents' family. My novel contribution is to offer a structured way to approach this responsibility by adapting the Patient Activation Measure (PAM) to pediatric medical care. Previously utilized for adult chronic disease management, PAM provides guidelines—recognizing one's role in health, understanding

individual needs, taking action and maintaining it—parallel to how adolescents learn to navigate their own ethical agency. In applying this tool as a framework to pediatric medical care, PAM can help practically assess an adolescent’s readiness, capability, and confidence to participate in medical decision making on an individualized basis. This assessment can then help us guide and support how the adolescent moves through their development as they gain the ability to express their ethical agency. Through acknowledgement of this issue, and by bringing PAM into this context, we gain a clearer way to recognize and support adolescents’ ethical agency in cases of ACD, and fulfill our moral obligation to support them as they transition into champions of their own informed decision making.

Leyna Lehenbauer

Discipline: Art History

Authors:

Abstract Name: Art and Ownership: Cultural Claims in Museum Display

Does an artwork’s display reveal various claims about its purpose, who it belongs to, where it came from, and how it is valued? An examination of three displays within the British Museum, the Parthenon Sculptures, Benin Bronzes, and Lamassu from outside the throne room of Ashurnasirpal II, will explore this question while considering arguments regarding national versus universal museums, modes of acquisition, the classification of an object as art, and decontextualization. These three cases were selected due to their varying places of origin, treatment, methods of acquisition, and perceived connections to British culture. Utilizing comparative formal analysis of the three museum installations, this paper will examine how museums react to criteria that work to determine the validity of cultural claims discussed by scholars such as Carolyn Dean, Karin Edvardsson Björnberg, and Salam Al Quntar. Drawing more attention towards the broader effects these issues have on the governments, people, and cultures to which the works belong will allow for better policies and international agreements to be created regarding the display, protection, and return of stolen art.

Leyna Lehenbauer

Discipline: Art History

Authors:

Abstract Name: Tangible Memories: Ishiuchi Miyako’s Methods for Documenting Objects

Ishiuchi Miyako’s series *Mother’s*, *Hiroshima*, and *Frida* demonstrate her poetic way of illustrating personal history by invoking visceral memory through the tactility of objects. She purposefully selects items that have a connection to the body, creating an intimate viewing experience. *Mother’s* contains items that belong to her deceased mother, and each photograph shows Ishiuchi’s careful aesthetic decision process, especially regarding color and compositional setting. Grief, motherhood, and femininity are central themes throughout the series. In *Hiroshima*, the use of color contextualizes the objecthood of the personal items worn when the atomic bomb was dropped in Hiroshima, intensifying themes of loss and grief. *Frida* reflects an object’s transition from private to public through never-before-seen items that belonged to Frida Kahlo and conveys themes of loss and womanhood. Ishiuchi connects personal and collective histories by engaging with these archival collections. This paper examines these three series by Ishiuchi, considering her methods for capturing memory and expressing empathy through the photo documentation of personal belongings.

Julia Lehman

Discipline: English and Literature

Authors:

#1 Julia Lehman

Abstract Name: Aughrim, Out of Reach: A Cultural Linguistic Analysis of James Joyce's "The Dead"

In the early twentieth century, Irish cultural identity was in crisis. After hundreds of years of oppression under English colonization and the devastating famine of the previous century, Irish cultural identity had been reduced significantly. However, there was a political push to reclaim this identity through independence from England. James Joyce, famed Irish author, lived through this era and personally struggled with his Irish identity. His short story "The Dead" follows Gabriel Conroy as he attends his family's holiday party and draws upon this cultural and political shift, as well as his own experiences, to explore the conflict existing in Irish cultural expression during this era. This research will address the contrast between literacy and orality which resulted in themes of cultural alienation and disillusionment found in "The Dead." Gabriel Conroy represents the qualities of literate culture: internalized, subordinative, and liberal in his thought. He is contrasted with his distinctly Irish community that has the qualities of oral culture: externalised, additive, and conservative in theirs. Conroy appeals to his surroundings by mimicking orality, but he internally condescends and belittles such actions. His self-conscious conflict mirrors the issues of Irish Independence. Gabriel Conroy, in his literacy, appears as an English colonizer and oppressor, yet he is Irish, so he is also a betrayer. His internal cultural expression contrasts with his external cultural expression to comment on the conflict in Irish identity. The narrative of "The Dead" is driven by cultural historical themes that are conveyed in the linguistic contrast between the literate and oral expression of the characters.

Sebastian Lema

Discipline: Sociology

Authors:

#1 Sebastian Lema

#2 Rodrigo Serrão

#3 Rita Kagaju

Abstract Name: Navigating Identity and Belonging. A Comparative Study of Domestic Latina/o/e and International Latin American Students at a Predominantly White Institution

This study explores the experiences of undergraduate international students from Latin America compared to domestic Latina/o/e students at a predominantly white institution (PWI), examining issues of colorism, racism, and belonging. Using qualitative interviews with 55 students over three years, participants were categorized into three groups based on their skin tone identification and international status (white identifying, non-white identifying, and international). Each participant completed demographic information and participated in 1-2 hour interviews focusing on their experiences with race, racism, colorism, mestizaje, and perceptions of belonging at a PWI. Interview data was transcribed and analyzed using Dedoose Qualitative Research Software, followed by the creation of analytical snapshots for each participant group to provide a comprehensive view of the dataset. Our findings revealed that while international Latinx students initially feel more welcomed at PWIs than their domestic counterparts, both groups report similar challenges with inclusion overall. International students experienced higher rates of microaggressions and developed different but effective support systems to navigate campus life. The recurring negative experiences of international students in the classroom stemmed from a lack of cultural awareness within the student body and limited opportunities for meaningful cross-cultural interaction on campus. This research addresses critical

gaps in current literature on international Latinx students' experiences at PWIs and provides insights into how different Latinx student populations navigate belonging.

Hannah Lemon

Discipline: Biology

Authors:

#1 Dr. Bridget Jacques-Fricke

Abstract Name: Investigating the Role of ASTN1 in Neural Crest Cell Specification and Migration

Neural crest cells are multipotent stem cells that originate from the dorsal neural tube, the precursor to the vertebrate brain and spinal cord. These cells migrate extensively during embryonic development and differentiate into a wide variety of tissues, including craniofacial cartilage and bones, the cardiac outflow tract, and much of the peripheral nervous system. While several genes that regulate the processes of neural crest cell specification and migration have been identified, many remain unknown. Astrotactin-1 (ASTN1), a cell adhesion protein encoded by the ASTN1 gene, is commonly found in rapidly migrating cell types in the central nervous system. Previous research has identified ASTN1 expression in early embryonic stages, but whether it plays an active role in neural crest development has not previously been determined. This study investigates whether ASTN1 is required for the proper specification and/or migration of neural crest cells. To test this, chick embryos in early developmental stages were unilaterally electroporated with a morpholino – an antisense nucleotide sequence that binds to mRNA and blocks translation – to prevent ASTN1 expression in one half of each embryo. In situ hybridization was subsequently used to stain neural crest cells for visualization, and light microscopy was utilized to analyze any differences in specification or migration patterns between the electroporated and non-electroporated sides of each embryo. Preliminary results indicate that ASTN1 likely plays a role in neural crest cell specification. However, its involvement in migration remains unclear, primarily due to a limited number of replicates. Additional studies are needed to provide further evidence for the role of ASTN1 in neural crest cell specification and to determine its role in migration. Understanding the molecular mechanisms that govern neural crest cell specification and migration will help create new therapeutic targets to treat a variety of congenital neural crest birth defects and disorders.

Emma Lemperes

Discipline: Exercise Science and Nutrition

Authors:

#1 Stephanie Otto

Abstract Name: THE EFFECT OF POSITIVE AFFIRMATIONS ON COLLEGE ATHLETE'S 40 YARD DASH TIME

A self affirmation was defined by Steel (1988) as an act that manifests one's adequacy and affirms one's sense of global self-integrity (Howell, 2016). These statements are a method of lowering distress and restoring self integrity (Shin et al., 2021). Affirmations have become a widely used psychological tool, yet little research has been conducted to see if they correlate to significant differences in athletic populations (Howell, 2016). This study aims to explore whether the use of self affirmation has an effect on 40 yard sprint times among collegiate athletes. Participants with sprint experience who are free from injury will be recruited for this study. Participants will undergo an experimental and control trial on different days and the order of trials will be randomized. Each participant will complete a baseline 40 yard dash and completion time will be measured

using handheld timers. During the experimental trial, participants will say three self affirmations out loud to themselves, and repeat them for 60 seconds prior to the sprint. The control trial will follow the same procedures without the self affirmations task. Once all data has been collected, a repeated measures ANOVA analysis ($p < 0.05$) will be conducted using the sprinting times from each of the trials. We expect to see that the trial where participants engage in affirmative behavior will have a faster sprint time than the trial without affirmations. We hope that the results of this study will produce evidence to support the claim that self affirmation is a psychological tool that can be used by athletes to improve their sprinting performance. Future research may ask questions about how self affirmations may impact different types of performance, such as strength. IRB: 542865

Matthew Lenzmeier

Discipline: Engineering

Authors:

#1 Ramses Martinez

#2 J. Alfredo Ocegueda

Abstract Name: Wearable Piezoelectric Bone-Conduction Systems for Spatial Directionality and Awareness

Workers in occupational environments such as construction sites must remain continuously aware of nearby hazards while increasingly relying on connected devices for real-time safety information. Conventional technologies—phones, smartwatches, and in-ear headphones—can visually distract users or occlude environmental sound, undermining situational awareness. Bone-conduction headphones provide an attractive alternative by delivering audio through the skull while leaving the ear canal open. However, realizing effective spatialized audio over bone conduction is challenging due to limited low-frequency response and inter-channel crosstalk, and current systems remain far less developed than in-ear solutions. To address these limitations, we developed a wearable bone-conduction headset based on piezoelectric actuators that delivers spatialized safety and navigation cues while preserving environmental audibility. The system integrates with standard occupational PPE, including safety helmets, to minimize interference with existing workflows. Worker position and head orientation are tracked in real time and mapped to a spatial audio engine, which renders directional alerts and guidance. We systematically investigated strategies to mitigate bone-conduction constraints, including actuator placement, frequency-dependent signal filtering, and spatial sound design techniques tailored to bone-conducted cues. We evaluated the system in a virtual reality industrial fire scenario implemented in Unreal Engine, where participants navigated evacuation routes under time pressure. Performance metrics included evacuation time, path efficiency, hazard avoidance, and subjective measures of comfort, distraction, and perceived situational awareness. Results showed that spatialized bone-conduction guidance improved evacuation performance and hazard localization relative to non-spatial or no-audio conditions, while maintaining access to ambient environmental sounds. These findings demonstrate the potential of piezoelectric bone-conduction systems as a wearable, low-intrusion platform for spatial directionality, safety awareness, and emergency navigation in high-risk occupational settings.

Rebecah Leonard

Discipline: Interdisciplinary

Authors:

#1 Rebecah Leonard

Abstract Name: Examining Job Training Programs for Neurodivergent Young Adults: A Community-Engaged

Approach

The unemployment rate for neurodivergent individuals is estimated to be 30 to 40%, roughly eight times the rate of individuals without disabilities. Little is known about how school- and community-based job training programs designed to address this gap translate into real employment opportunities or whether the skills that are taught align with the types of jobs neurodivergent young adults ultimately obtain. To address this issue, an interdisciplinary team of undergraduate students from Siena University's Nonprofit Excellence and Transformation (NExT) Fellowship partnered with Bring on the Spectrum (BOTS), an organization that supports neurodivergent individuals with opportunities to reach their best quality of life. We have already gathered insights from 6 program professionals in job training programs in the Capital Region of New York to identify funding limitations for enrollment, age restrictions, and the skills-based trainings that the programs provide. In the next stage of this research, we will reach out to three distinct groups of caretakers, including parents who are looking for transition programs, people currently in these programs, and people whose children who have recently completed a transition program to understand the challenges that parents face throughout this process. Participants will share their perspectives on whether the training reflects market needs, whether families feel supported in identifying these programs, and what factors contribute to successful or unsuccessful employment outcomes for their children. This approach allows us to gather firsthand insight into the structure, effectiveness, and the perceived value of existing programs and will help our partner, BOTS, to advance their current support efforts. By centering a community engaged approach, this research will also provide evidence-based insights that will support BOTS and these transition programs in the Capital Region to collaborate more effectively or provide suggestions to them as they develop new programs that offer more robust pathways to employment.

Olivia LePage

Discipline: Psychology

Authors:

#1 Faika Nanjani

Rhea Chatterjee

Aditri Balaji

Abstract Name: The Effect of Volunteers and Brain Games in Preventing Cognitive Decline

This study sought to understand the effects of non-pharmaceutical interventions, specifically mental exercises and engagement with art, on the cognitive function of nursing home residents with early stages of dementia or mild cognitive decline. Nursing home residents were recruited by distribution of information regarding the Brain Exercise Initiative's activities within nursing homes in Richmond, after which residents could choose to participate in monthly activities with mentally stimulating tasks. Residents were guided through packets each containing three sections: a trivia section where residents were tasked with re-writing the question and coming up with an answer to general trivia, a timed math section with simple arithmetic problems, and a reading section where residents were tasked to read a non-fiction passage out loud. Tasks were designed by the national Brain Exercise Initiative organization and inspired by research from neuroscientist Dr. Ryuta Kawashima, which demonstrated that consistent reading and math exercises could result in significant improvement on cognitive function tests for individuals with Alzheimer's. Data has thus far been collected from participants for over a year to measure their performance on each section of the activity tests as a way to measure cognitive function overall. Results will be measured by comparing each participant's task scores over the course of each month to determine whether or not there was significant improvement in performance. Future research will seek to determine the significance of intervention strategies on cognitive function in participants and understand how additional mentally stimulating activities, such as art activities, can impact cognitive decline.

Discipline: Psychology

Authors:

Abstract Name: Barbie: An Analysis of Diversity in the World Icon

This study examines the growth of diversity in the Barbie Fashionista Line due to increased media attention towards representation and how these developments have affected Barbie's main audience, young girls. Dolls play a crucial role in developmental psychology as children can explore relationships and dreams through active role-play. By incorporating more diversity into Mattel's most budget-friendly Barbie line, more children are able to feel represented, and all children can be exposed to and respond to diversity as they will in school and throughout life. There are three main areas of diversity that were implemented starting in 2015: racial, body, and disability. While there are many statistics on doll sales, few studies have previously investigated how children are responding to the increased diversity. Using correlation to the increased diversity in media and the role of dolls in development, an analysis of the importance of diversity in dolls was carried out. The results show positive benefits of doll diversity in allowing more children to feel represented by the world beauty icon and her slogan of empowerment. It also showed a unique role in allowing all children to learn to develop relationships of diversity using their dolls. Children can model relationships based on what they see in media or in life, but they are also able to incite imagination and create their own ending, which helps stimulate the brain areas of learning, memory, and executive functioning. These skills can then be brought to real life when children interact with those who have different physical characteristics. Overall, with Barbies in the hands of more than 90% of young girls, it is vital that diversity be displayed to increase knowledge and communication among children of all races, bodies, and disabilities and to foster a population of empathy and empowerment.

Austin Lerch

Discipline: Biochemistry

Authors:

#1 Orlean Alam

#2 Megan Eilers

#3 Alexis Folz

#4 Austin Lerch

#5 Alyssa McGlade

#6 Sudeep Bhattacharyay

Alyssa McGlade

Orlean Alam

Abstract Name: Modeling Ligand Hardness to Predict Binding Affinity in Protein Kinases

Protein kinases are essential regulators of cellular signaling pathways and are major therapeutic targets due to their central roles in cell growth, survival, angiogenesis, and stress response. They are high-priority drug targets in oncology, inflammatory conditions, and other diseases driven by dysregulated kinase signaling. These enzymes share a common adenosine triphosphate-binding pocket but differ in surrounding motifs. Thus, the challenge in designing selective inhibitors of these enzymes lies in the identification of key residues both in the pocket that binds adenosine triphosphate and its surrounding. One way to study the active site is to probe its interactions with known ligand molecules and rationalize the binding using the molecular hardness of the ligands. Thus, the present study has examined five clinically relevant kinases: cyclin dependent kinase 2, epidermal growth factor receptor kinase, mitogen-activated protein kinase 14, Src kinase, and vascular

endothelial growth factor receptor 2. The study utilized an informatics database to analyze over 50 ligands per enzyme, calculating molecular hardness and predicting binding affinities. The relationships between the molecular hardness and binding affinities were studied in detail. Together, these computational docking studies highlight the interplay of hardness in ligand–kinase interactions and provide insight that may aid rational design of selective kinase inhibitors for immense therapeutic potential

jack leser

Discipline: Computer Science

Authors:

#1 Jack Leser

#2 Baharul Islam

Baharul Islam

Abstract Name: SignGPT: Real-Time ASL Keyword Spotting with CTC and Lightweight LLM Contextual Completion

We present SignGPT, a real-time American Sign Language (ASL) keyword-to-English rendering pipeline designed for CPU-only laptops. A holistic tracker extracts hand and upper-body landmarks and hand crops at 30 fps. Crops are encoded by a compact visual backbone and fused with landmarks, then decoded by a BiLSTM/GRU temporal head trained with Connectionist Temporal Classification (CTC) to recognize a 15-keyword vocabulary without frame-level alignments. The recognized 2–5 keyword sequence conditions a lightweight language model that performs constrained contextual completion and returns the top 3 English candidates consistent with the tokens and an optional task prompt (domain, style, register). We outlined an evaluation protocol combining per-keyword precision/recall/F1, sequence accuracy after CTC collapse, and sentence-level quality with human preference judgments. On a held-out set, SignGPT attains 97.0% sentence-level accuracy with LLM guidance versus 73.5% without underscoring the value of contextual completion. Ongoing work extends SignGPT with a cross-LLM evaluation, comparing small on-device and hosted models under identical prompts for accuracy, keyword coverage, style control, and latency. We will report interim results from this student-led study in the final poster/paper.

Heaven Lesher

Discipline: Chemistry

Authors:

#1 Gabriela Becerra

#2 Grecia (Ximena) Garcia-Soto

#3 Kanayah Thomas

Abstract Name: Quantifying the Amount of Sodium Chloride and Water Hardness Found in Parks on Milwaukee's Kinnickinnic River

The purpose of this investigation was to determine the amount of salinity and water hardness found in the Milwaukee rivers. River samples were collected and analyzed from the Kinnickinnic River from the following three locations: Zablocki, Wilson, and Jackson Park. Data collected demonstrated a change in the amount of sodium chloride (231-561 ppm) and water hardness (305-441 ppm) found in the rivers over the 4-week period (6/3-24/2025).

Zacharie Letter

Discipline: Biology

Authors:
Madison Axton

Abstract Name: Testing the Bioremediation Potential of Oyster Mushrooms on Cigarette Butts

Discarded cigarette filters remain one of the most ubiquitous forms of plastic waste in our world today, with an estimated 1.2 million tonnes of filters ending up as litter in the environment each year. These filters are designed to trap toxic compounds like tar, nicotine, heavy metals, and more before they reach the lungs of the smoker. Once these filters find their way into water and soil systems, these toxins leach into the environment while the filter itself resists biodegradation and contributes to microplastic pollution. Multiple studies have shown macrofungi, especially white rot fungi in the genus *Pleurotus*, to be effective at remediating a variety of such pollutants. A 2014 study by Updyke demonstrated the ability of *Pleurotus* to grow on a substrate of used cigarette filters. While this study focused on the financial feasibility of this process, it did not address concerns of the edibility of mushrooms produced in this way. This study aims to determine whether *Pleurotus* mushrooms grown on a substrate of used cigarette filters are suitable for human consumption. A baseline chemical content of used cigarette filters will be determined via High Performance Liquid Chromatography (HPLC). After the fruiting stage is complete and mushrooms are harvested, the spent substrates will be analyzed via HPLC and the results will be compared to the baseline to determine if any degradation of the chemicals within has taken place as the fungus fed on the filters. Mushrooms grown on test substrates will be compared to those of the used filter baseline as well as mushrooms grown on a traditional substrate to compare the presence of toxins in each. A graphical representation of the data will be created.

Tom Lev

Discipline: Anthropology and Archaeology

Authors:

Abstract Name: Atomic Priests, Glowing Cats, and Cursed Monoliths: The Story of Nuclear Semiotics

Humans have harnessed the power of myth and symbolism to transmit information through generations and cultural changes. Specifically, a concentrated effort has been made to mark dangerous nuclear waste sites to prevent future generations from digging them up, an action that would be deadly for humans and the environment. How can we avoid dumping responsibility on future societies? The Human Interference Task Force was assembled in 1984 to bring cultural studies, psychology, politics, agriculture, economics, and other fields together to engineer a solution to this problem. The glue that would connect the different fields was semiotics, an interdisciplinary field of research under linguistics, which deals with how to convey messages successfully. This solution would need to last at least 10,000 years - a, quite literally, monumental task. I will cover notable processes, symbols, signs, and conventions that were agreed upon in past efforts (the "nuclear priesthood" recommended by the task force), current solutions that are being applied, and solutions that were not seen as viable, such as "Ray Cats" – genetically engineering cats to glow in a radioactive environment, thus creating a myth that may be passed on (Trauth, Hora, & Guzowski, 1993). I will reference literary works by Frank Herbert ("Dune") to explore the question of "What makes a good myth that lasts millennia?", as well as other sci-fi works ("Foundation" by Isaac Asimov, and "Aspic's Mystery" by Arsen Darnay) that directly depict "atomic priesthoods" and their downfall. Stories, symbols, and myths are some of the more

resilient methods of cultural transmission; it is worth exploring their influence on culture as it adapts and advances, their role, and their potential as a solution - or hindrance - to long-term cultural transmission.

Talia Leva

Discipline: Gender, Ethnicity, Diversity, or Cultural Studies

Authors:

Abstract Name: Claiming Space in Dance Through Creative Autonomy

This paper presentation discusses how incorporating more autonomy and creative freedom in dance training can create an entirely new sense of individual identity and artistic confidence that change the way dancers approach their training and their own lives in general. This can be especially beneficial for dancers that plan to take their careers into a professional space. I will start by exploring how autonomy and the idea of “taking up space” is a much bigger and essential part of the culture when dance is formed from a place of survival and embedded in community. Contrasting that, I will then examine classical ballet culture in studio settings and the ways young girls and boys are trained to conform to specific ideals of dance in order to pose the question: is this training hurting these dancers’ chance at a professional career just as much as it may be helping them? To expand on this the idea of taking up space as a dancer is then investigated. What does taking up space mean, and how can having creative autonomy expand dancers’ ideas of what performance looks like and feels like? Several examples across different dance cultures will be compared to make a point that dance styles that include more autonomy, such as Jazz Funk and Krump, lead to dancers being able to take up more space in their careers. A variety of multi-media sources from case studies to a documentary film will be analyzed, qualitatively comparing findings across different dance cultures, in an attempt to prove my point that creative freedom in dance training leads to not only successful careers, but a stronger sense of self that dancers can take into their own personal lives.

Joseph Levy

Discipline: Gender, Ethnicity, Diversity, or Cultural Studies

Authors:

Abstract Name: Unpacking Modern Day Lynching: Engaging in Understanding Racial Trauma

With historical context in mind, researching modern-day lynching is essential because it reveals how past racial violence continues to shape present-day ambiguities and psychological realities for Black Americans. As systemic racism and racial division persist into the 21st century, the study of Post Traumatic Slave Syndrome (PTSS) creates a critical bridge between historical acts of terror such as lynching and contemporary mental and physical health disparities. PTSS offers a theoretical lens through which I can examine how the psychological wounds of slavery, segregation, and racial terror continue to surface in measurable ways, such as increased rates of depression, hypertension, anxiety disorders, and internalized stress responses. By observing behavioral patterns and distinct psychological characteristics, I gain an objective framework for understanding how history remains embedded in the present. Through analyzing case files and patient records from individuals who identify as living with PTSS, I can identify recurring patterns that guide the psychological dimensions of this study. Additionally, community discussions and student-led workshops deepen this work by fostering collaborative learning and allowing participants to confront the ongoing implications of historical trauma. Data consistently reveals themes of anxiety, social distrust, and cognitive dissonance powerful indicators of how deeply historical wounds continue to echo

across generations. Together, these findings underscore the urgent need to confront historical injustices, not only to promote awareness but also to foster healing and cultivate a community capable of advocating for justice, resilience, and meaningful social change. Incorporating measurable mental-health outcomes such as stress indicators, coping mechanisms, and community support networks will strengthen the empirical foundation of this work. Building sustainable pathways for education, dialogue, and advocacy, this research can serve as a long-term model for addressing racial trauma and promoting collective healing across generations. These efforts will inspire continued community growth and deepen understanding and resilience for future generations.

Kelsey Lewis

Discipline: Chemistry

Authors:

#1 Kelsey Lewis

#2 Emmalou Schmittzehe-Skarbek

Abstract Name: Investigation of the Impact of HPLC Mobile Phase pH on the Quantification of Nicotine in E-Liquids Containing Freebase Nicotine versus Those Containing Nicotine Salts

It is becoming common practice for smokers to utilize e-cigarettes as an aid for smoking cessation, and this practice is also widely encouraged by medical practitioners. This is concerning because many studies show significant inconsistencies in the amount of nicotine reported on e-liquid product labels and the amount of nicotine detected in the e-liquids. If users rely on the labeled nicotine content to help control their nicotine intake, they can be misled and potentially unintentionally increase their exposure to nicotine when that is not desired. Often the nicotine content in e-liquids is quantified using high-performance liquid chromatography (HPLC), but when utilizing HPLC to analyze an ionizable compound such as nicotine it is important to note that the ionized and unionized forms will have different retention times. Thus, without careful control of experimental parameters the quantification of nicotine could be incorrectly determined if it is assumed to be only in one form. This project aims to investigate differences in the quantification of nicotine using HPLC in samples containing freebase nicotine versus ones containing monoprotonated nicotine to determine optimal conditions to study the nicotine content in e-liquids with different forms of nicotine.

Nikyla Lewis

Discipline: Psychology

Authors:

#1 Erica Russell

Erica Russell

Abstract Name: "Can I Live" Black Woman in Urgency Culture, Mattering and Self Medicating

Black women's patterns of self-medicating have received little scholarly attention, despite growing evidence that their lived experiences and coping strategies are often shaped by urgency culture and limited opportunities to reflect on one's sense of mattering or self-value. The reinforcement of stereotypes such as the strong Black woman stereotype combined with a culture of urgency create conditions in which Black women are expected to suppress their own needs to quickly respond to the demands of others, leaving little time for rest, emotional processing, or self-care. Russell (2024) seeks to extend the conceptualization by framing mattering as a mindset rooted in self-compassion and awareness of the human labor infrastructures. Yet, no

research has examined how Black women's sense of mattering is shaped or hindered by urgency culture that results in the chronic feelings of being overwhelmed can lead to self medicating. Although data collection is ongoing, emerging themes from both the future IRB process and data collected observations, this heavily reflects the core of my academic interest. This study examines the emotional, cultural, and structural barriers that limit Black women's access to healthier and more sustainable coping strategies. We will tackle how factors such as internalized expectations, lack of accessible resources, and cultural stigmas surrounding mental health influence in these coping behaviors. Through hands-on qualitative research, including interviews and reflective analysis, the study will gain insights into personal lived experiences of Black woman who navigate these pressures daily. This study looks to contribute to a broader discussions on mental health and sociocultural being that highlights how urgency culture influences Black women's coping strategies and their evolving sense of mattering.

Grant Lewis

Discipline: Engineering

Authors:

#1 Grant Lewis

#2 Farhang Daneshmand

#3 Pinlei Chen

Abstract Name: Accuracy Validation of a Consumer-Grade Structured-Light 3D Scanner

This project examines the applicability of a consumer-grade structured-light 3D Scanner (i.e., Shining 3D EinStar) in the automotive reverse engineering of a 1984 Dodge D150 Truck frame to accept the subframe suspension off a 2022 Dodge Challenger SRT. Precise models of all frames were necessary to design a set of adaptation brackets that permanently connect the suspension to the main frame, while preserving proper suspension and drivetrain geometry. All procedures were performed in a standard workshop environment with basic scanning aids like infrared dots and scanning spray. Each component was scanned three times. Afterward, each scan was aligned, cleaned, and converted into a mesh file using ExStar. The digital geometry was then replaced in ExModel, and the components were assembled in SolidWorks using STEP files. The average of three scans for each component was used to ensure measurement repeatability and accuracy. The digital models were aligned in SolidWorks to ensure proper centering of the subframe, ride height, and drivetrain geometry before designing brackets. A series of fitment brackets was designed based on measurements from the aligned assembly, then 3D printed using standard PLA filament. In three separate experiments, involving a total of ten brackets, each 3D-printed bracket fit precisely, securely bolted into position without interference or visible deformation, thereby confirming geometric accuracy prior to load-bearing designs. Physical measurements indicated an average deviation of 0.41 mm across 69 trials. Employing two verification methods ensured both redundancy and confidence in the results. This study demonstrates that a consumer-grade 3D scanner can achieve sub-millimeter accuracy suitable for structural automotive reverse engineering, providing an affordable, repeatable solution for engineers. These critically assessed findings confirm that this workflow can deliver fabrication-ready dimensions under typical shop conditions, enabling a streamlined process for complete retrofits at a fraction of the cost of traditional reverse engineering.

Aniyah Lewis

Discipline: Biology

Authors:

#1 Saima Shafique

Abstract Name: *Agrobacterium*-Mediated Transformation with Chitinase and Glucanase genes against *Aspergillus flavus* in Georgia Peanuts

The State of Georgia is known to produce approximately 50% of the national peanut supply, contributing to making the United States the third-largest peanut producer in the world, after India and China. *Aspergillus flavus* produces aflatoxin (AFB1), which is among the most carcinogenic naturally occurring compounds known to pose significant health risks to humans. This study aims to develop genetically modified (GM) peanut lines through *Agrobacterium tumefaciens*-mediated transformation, introducing pathogenesis-related (PR) protein genes that encode β -1,3-glucanase and chitinase enzymes, which are known to degrade fungal cell walls and enhance resistance to AFB1. Embryogenesis was performed by culturing sterilized peanut embryos on Murashige and Skoog (MS) medium. For callus formation, embryos were co-cultivated with *A. tumefaciens*. Transformed embryos were cultured on MS media containing 3 mg/L of 2,4-D for callus induction, followed by shoot and root regeneration on media supplemented with 1 mg/L Benzyladenine (BA) and 1 mg/L Indole-3-Butyric Acid (IBA), respectively. Untreated samples served as the control, and experiments were conducted in replicates. Transgenic peanuts were used in a colorimetric assay to confirm chitinase gene expression, and a GUS assay was performed to detect glucanase. Embryogenesis was successful at a rate of 98%. Successful callus induction and regeneration of shoots and roots that survived antibiotic selection indicated potential transgene integration. Data from the colorimetric assay revealed the presence of chitinase, while the GUS assay was positive for glucanase expression in the GM peanut seedlings. Our results to date indicate that transformed peanuts expressing PR proteins may reduce infection by *A. flavus* and the production of AFB1. Our findings could contribute to developing peanut varieties with improved resistance against *A. flavus*, improve crop safety, and lessen economic losses for peanut growers in Georgia.

Natalie Lewis

Discipline: Art History

Authors:

#1 Alice Christ

#2 Sophia Farmer

Abstract Name: Conflicting Functions: The USSR Impact on the Provenance, Conservation, and Display of Two Orthodox Russian Icons

Numerous Western institutions acquired Russian icons following the 1917 Russian Revolution through a deliberate dissemination of Orthodox devotional objects staged by the newly-formed Soviet Union. The practices of the Antikvariat and the Central State Restoration Workshops to fund the newly established government through the sale of seized Russian icons warped their initial role and audience. The process of monetizing these objects obscured the provenance of Russian icons beyond the boundaries of the country. The University of Kentucky acquired two Russian icons within the twentieth-century, both of which feature clear signs of retouching prior to their entry into the University's collection. This paper poses the two icons to explore contemporary conservation ethics and modes of display when applied to previously restored Russian icons. It examines how the two objects at the University of Kentucky compare to similarly attributed objects in their native country and setting in the restored legitimacy of the Orthodox Church to further existing discourse on what level of structural and visual impairment warrants additional conservation work despite previous, likely historically significant, interventions. It also seeks to address the dichotomy between the religious past of the icon and the secular contemporary application of the Russian icon as art.

Natalie Lewis

Discipline: Chemistry

Authors:

#1 Anne-Frances Miller

Abstract Name: Comparison of Traditional and Modern Mordanting in Natural Dyeing: Quantitative analysis of metal ion incorporation and contribution to resulting color

Many traditional practices in fiber folklore call for iron, tin, or copper pots in the natural dyeing process. The purpose of the following investigation is to determine the impact of the folk tradition of various metal cooking vessels in comparison to modern mordants through X-Ray Fluorescence Spectroscopy (XRF) and CMYK values of dye samples. A total of 13 silk samples were cleaned, treated with the prescribed mordants, and dyed with Osage wood chips. Four silk samples were treated with no mordant, iron mordant (Ferrous Ammonium Sulfate), and alum mordant (Potassium Aluminum Disulfate). Then, the samples were divided into individual dye pots of glass, iron, aluminum, and copper with dye. Finally, the rinsed samples were scanned with XRF to determine the quantity of metallic ions present in relation to the visible distinctions. The results of the XRF provided significant evidence of iron in non-mordanted and alum-mordanted silk samples, however, the iron mordant contributed significantly more than the iron pot when compared. The CMYK values and visual evidence support the spectra observed. The impact of the copper pot was largely insignificant, with only small quantities of the element found in silk samples exposed to copper. Similarly, the samples and CMYK values reflect the insignificant impact of copper on the intensity of the Osage dye. The XRF did not effectively capture the impact of the aluminum from the mordant or pot due to the low atomic number and corresponding low energy fluoresced (~1.5 keV). There is a visible distinction between the aluminum pot and mordant contribution, but there are no quantitative spectra to support such findings.

Therefore, it can be concluded that the iron cooking vessel did impact the natural dyeing process, whereas the copper vessel did not. To determine the impact of aluminum through spectra, a different quantitative process is necessary.

Rebecca Lewis

Discipline: Visual Arts

Authors:

#1 Rebecca Lewis

Abstract Name: Understanding Appalachian Dialect Through Visual Identity and Editorial Design

When thinking about connections and divisions within Appalachia, I began researching how regional colloquialisms could be used to ease cultural gaps. The topic of understanding Appalachian dialect was inspired by my childhood in West Virginia. Growing up in the area, you hear a unique dialect that is completely foreign to outsiders. Appalachian culture is rich with unique language, and not all people today understand it. This led to the question, how can a book teach non-Appalachians how to understand and incorporate Appalachian colloquialisms into their daily lives? Using primary sources from documentaries, websites, and direct quotes from my own family members, the contents of the book began to take form. Presenting the phrase with its definition, possible origins, and a quote helps educate and inform readers on how to use it. Keeping rhythm and pacing in mind, additional quotes were included from primary sources alongside images of Appalachian people. The book's design mirrors the tradition and style of family photo albums serving to connect generations of people. Helping people understand one another and appreciate culture can help bridge the separation created by cultural differences. I learned how excited people get over sharing their culture through information gathering. Non-natives who viewed the book gained an understanding of the colloquialisms, and those already familiar found appreciation in the celebration of their culture.

Makenzie Lewis

Discipline: Interdisciplinary

Authors:

#1 Felicity Turner

Abstract Name: Marred Existence: Race, Gender, and Law in the Afterlives of Billie Holiday and Whitney Houston

This project is a preliminary examination to determine how the intersection of race and gender mediates the politics of public existence within the philosophical and legal domains of twentieth-century American society. The lives and afterlives of entertainers Billie Holiday and Whitney Houston make plain a convergence of ontology and law, as it stands subject to the complexities of intersectional politics. Supplementing existing scholarship on these women, this study will make use of archival materials, philosophical theory, and court records to articulate the relationship between the two figures and the complex politics of public existence. The results seek to restore their humanity in the broader historical narrative by situating it within, and beyond, the discourses of race, gender, and law. Their individual beings are made more whole by an ontological vantage point. Inevitably, the politics of existence assert themselves in any inquiry into the implications and applications of American laws, particularly those concerning figures such as Holiday and Houston.

Brianna Leyva

Discipline: Health and Human Development

Authors:

#1 Lauren Hartstein

Abstract Name: Impact of Light Exposure on 5-6 Year Olds' Circadian Rhythms and Sleep Health

Sleep is a critical component of children's health, influencing their emotional and behavioral development. Both sleep quality and duration are shaped in part by circadian timing, which is regulated by the body's internal clock. Light exposure plays a pivotal role in regulating the circadian clock. Evening light exposure and disruptions to sleep can lead to negative effects on children's health. Despite this, there is a gap in research regarding interventions that could promote early bedtimes and healthy sleep behaviors in younger children. The object of this study is to examine sleep timing, light exposure, and sleep quality in a community sample of children aged 5-6 years old before and after an intervention aimed at reducing evening light exposure. We hypothesize that adjustment to home lighting environment and blue light-blocking glasses will result in earlier dim light melatonin onset (DLMO), earlier sleep onset, and that the interventions will be perceived as feasible and acceptable by the parents and children. Data will be analyzed from the children's actigraphy watches, sleep journals, and salivary melatonin. Parents will complete post-intervention assessments and qualitative interviews to assess the feasibility and acceptability of each intervention. Results from the analyses will indicate whether the two intervention strategies can improve children's sleep health by advancing children's sleep and circadian timing. This study will contribute to further research in understanding how light can affect sleep and circadian timing in younger children. It will highlight the importance of developing effective circadian interventions to support healthy sleep patterns in children.

Ge'velle-Marie Lezama

Discipline: Psychology

Authors:

#1 Robert Melara

#2 Sophia barrett

Abstract Name: Diet Quality, Mental Health, and Chronic Disease Risk Among College Students

College students experience significant mental health challenges, with rising rates of depression, anxiety, and loneliness across U.S. campuses. Diet quality, particularly fruit and vegetable intake, has been linked to emotional well-being, yet few large-scale studies examine these relationships using nationally representative college samples. This study investigates whether daily fruit and vegetable consumption is associated with mental health outcomes among U.S. college students. Data were drawn from the Healthy Minds Study (HMS) 2023–2024 cycle, a nationwide survey of college students. After filtering for complete cases, the analytic sample included N= 3,092 students. The primary predictor was fruit and vegetable intake (1–4 servings/day). Outcomes included depression symptoms, anxiety symptoms, and loneliness. Covariates included age, race/ethnicity (SOC), gender identity, first-generation status, and parent education level. To address the research question: Is higher fruit and vegetable intake associated with lower depression, anxiety, and loneliness among college students? we conducted unweighted linear regression models for each mental health outcome. Across all models, higher fruit and vegetable intake was significantly associated with better mental health. Fruit/vegetable intake predicted students that eat more fruits and vegetables tended to feel less

depressed, less anxious, and less lonely. Lower depression scores ($\beta = -0.96$, $p < .001$), lower anxiety scores ($\beta = -0.60$, $p < .001$), and lower loneliness scores ($\beta = -0.31$, $p < .001$). Effect sizes were small but consistent across outcomes, demonstrating a clear pattern: students who consumed more fruits and vegetables reported fewer mental health symptoms. These associations remained significant after adjusting for demographic and socioeconomic covariates. Findings highlight fruit and vegetable intake as a meaningful correlate of mental well-being during emerging adulthood. Integrating accessible, culturally relevant fruit and vegetable options on college campuses may support student mental health and inform future intervention development.

Ai Li

Discipline: Psychology

Authors:

#1 Ai Li

#2 Kasey Creswell

Abstract Name: Perceived vs. Objective Social Connection as Predictors of Alcohol-Related Problems in Heavy-Drinking Young Adults: A Prospective Investigation

Alcohol use disorder (AUD) is a leading cause of preventable harm in the United States, and young adults who drink heavily are particularly vulnerable to these harms. Social (dis)connection is a key risk factor for problematic alcohol use, but prior studies have relied on small, nonclinical samples; examined only one facet of social connection; and rarely employed prospective designs that assess change in alcohol problems over time. The present study addresses these gaps by testing whether deficits in perceived social support and actual social connections prospectively predict alcohol-related problems in heavy-drinking young adults. This project leverages data from 393 heavy-drinking young adults (aged 21–29) who participated in an NIH-funded longitudinal study and completed assessments at baseline and 12-month follow-up (90% retention). Perceived social support and objective social network characteristics were measured using the Interpersonal Support Evaluation List-12 (ISEL-12) and the Support Network Inventory (SNI), respectively. Alcohol-related problems were assessed with the Alcohol Use Disorders Identification Test (AUDIT). Multiple regression models will test cross-sectional and prospective associations, controlling for baseline alcohol problems and demographic factors, and will compare the unique contribution of perceived versus objective social connection in predicting later alcohol-related problems. We expect that both lower perceived support and smaller, less diverse networks will predict worsening alcohol-related problems over time, with perceived support emerging as the stronger predictor. Findings will clarify the nature and strength of interpersonal risk factors for alcohol misuse in young adults and inform the development of more targeted and effective AUD prevention and intervention strategies.

Ethan Li

Discipline: Biology

Authors:

#1 Artur Czajkowski

#2 Zach Raymond

#3 Tyler Coale

#4 Jonathan Zehr

#5 Mohammed Kaplan

Abstract Name: Structural Integration of a New Eukaryotic Organelle (Nitroplast) and its Remodeling During the Day

Biological nitrogen (N₂) fixation, the reduction of atmospheric N₂ gas to biologically available ammonia, is a key source of N₂ for terrestrial and aquatic ecosystems, and was long considered restricted to prokaryotes. However, this dogma was changed with the recent discovery of the N₂-fixing organelle, the nitroplast, in the marine alga *Braarudosphaera bigelowii*. The nitroplast was originated as a cyanobacterium that underwent endosymbiosis, and while its cellular location and dynamics in cell fission were described by soft x-ray tomography, the structural features of the nitroplast and its relationship to other organelles remain unknown. The function of the nitroplast is dependent on multiple exchanges between the nitroplast itself and the cell, including proteins and metabolites. Here, we use focused ion beam scanning electron microscopy (FIB-SEM) and cryo-electron tomography (Cryo-ET) at various magnification scales to decipher the nitroplast ultrastructure at macromolecular resolution within the cellular milieu. Unlike other known organelles, the nitroplast envelope consists of four distinct membrane layers and is surrounded by two additional layers derived from the host that presumably mediate exchanges with the cytoplasm. During the period of nitrogen fixation in the day, the nitroplast undergoes major structural remodeling including the loss of the host-derived membrane and the influx of “spiky” membrane vesicles into the cellular cytoplasm. Additionally, unique membrane-bound features that we describe as “hat-like structures” proliferate on the nitroplast lamellae during the night cycle. These results provide an unprecedented insight into the fascinating cellular and structural biology of the nitroplast, facilitating its harnessing for various applications in the future as well as allowing a deeper understanding of the process of endosymbiosis evolution.

Aiden Li

Discipline: History

Authors:

Abstract Name: Challenging Asian Caricature: Anti-Yellowface Activism and Representational Politics in 1970s Hollywood

The research investigates the radical evolution of anti-yellowface activism in Hollywood, tracing its transformation from the 1970s to the 1980s amidst the film industry's persistent use of yellowface. Following a rising demand for Asian imagery, filmmakers reinforced established racial sentiment by relying on yellowface to portray Asian characters while simultaneously restricting opportunities for Asian American performers. Yellowface also reinforced racial hierarchies and controlled Asian American visibility. I argue that anti-yellowface protests initially emerged in the 1970s as a reactionary response to offensive racial caricature. Public demonstrations, court injunctions, and scathing reviews developed against films that had already been created, with the objective to simply reject and demonstrate disapproval for pre-existing yellowface. In turn, 1970s activism can be categorized as defensive and reactive. However, by the 1980s, I contend that the anti-yellowface movement evolved to center around proactive efforts. In response to failed reactionary activism, a recentered focus emphasized identity formation, cultural reinforcement, and Asian-led representation in media spaces. It underscored the prevention of yellowface's inaccurate portrayals by first establishing a more “authentic” Asia. Instead of rejecting Hollywood and treating yellowface and its stereotypes as a symptom, the 1980s sought to confront the roots of misrepresentation and reshape Hollywood, constructing an accurate depiction before any false ones from yellowface could be made. This study draws on photographs, protest statements, internal documents of Asian organizations, Asian activist publications, newspapers, and film analysis to trace how Asian American activists navigated both public protests and internal community discourse. By reconstructing these campaigns, this research documents a pivotal moment in Asian American cultural history and situates Hollywood within larger debates over race and representation. Ultimately, I assert that this transformation highlights a broader commentary on Asian adaptation to cultural portrayals.

Marlyn Li

Discipline: Biology

Authors:

#1 Dena Goldblatt

#2 Kyla Hamling

#3 Paige Leary

#4 Harsh Panchal

#5 David Schoppik

Abstract Name: Identifying Genes that Instruct Wiring Specificity for Functional Channels of the Vestibulo-Ocular Reflex

Behavioral dysfunction in neurodevelopmental disorders can arise from improper circuit assembly. Understanding how neural circuits are classically organized and assembled can provide insight into aberrant mechanisms of disease, but these processes remain unresolved for vestibular reflex circuits. The gaze stabilization reflex uses a simple and highly conserved 3-neuron circuit to maintain a stable visual percept after head/body destabilization. In the vertical axis, nose-up/nose-down destabilization is transformed into compensatory eye rotations (eyes-down/eyes-up). Previous work identified common spatial and temporal topography to nose-up and nose-down channels that span the sensory periphery inputs to ocular motor neuron outputs, suggesting that a common spatial and/or temporal factor could organize a complete oligosynaptic circuit. To test this hypothesis, we performed transcriptomic profiling of the central relay node: the central vestibular projection neurons. We used fluorescent in situ hybridization to investigate candidate genes that may be commonly restricted to nose-up (dorsal, early-born) or nose-down (ventral, late-born) central and motor neurons. Two axon guidance molecules, *sema3aa* and *sema3ab*, were restricted to ventral nose-down central and motor neurons. To test whether *sema3aa/ab* may shape nose-down circuit formation, we measured eye tilt behavior in mutant lines and indeed found selective deficits in nose-down/eyes-up behavior. We are now screening additional spatially restricted genes, such as *nav2a* and *nrp1b*, for behavioral changes. In the future, we will work to establish where (i.e., specific circuit node) and how *sema3aa/ab* act to disrupt nose-down circuit formation. Our findings speak to molecular mechanisms that could coordinate functional oligosynaptic circuit assembly and, by extension, how specific molecule disruptions may contribute to behavioral dysfunction in vestibular diseases.

Ruining Li

Discipline: Business

Authors:

#1 Ruining Li

Abstract Name: Optimizing Pricing and Trade-In Compensation in High-Tech Industry Under Strategic Consumer Behavior

This study develops an analytical model to examine how firms in the high-tech sector should optimize product pricing and trade-in compensation simultaneously when designing device take-back programs. High-tech products depreciate rapidly, and consumers often behave strategically. They tend to delay purchases or trade-ins until discounts, new model releases, or improved incentives appear. These behaviors influence both demand timing and the return quality of used devices, complicating firms' pricing and recycling decisions. By embedding consumers' purchasing and recycling valuations (i.e., the valuation gap), depreciation dynamics, salvage value of product, and strategic consumer behavior into the decision model, we analyzed the firm's optimal pricing strategy and trade-in programs. A survey was distributed to Elon University students to

collect data on their purchasing and recycling behaviors and support empirical calibration. We also compare the firm's optimal decisions and profit when facing strategic versus myopic consumers. Results show that when the consumer's valuation gap narrows, a portion of consumers participates in recycling, and higher recycling compensation increases return volume. This is profitable only when the salvage value of product is sufficiently high or depreciation is slow. Under these conditions, the optimal strategy shifts toward higher recycling incentives paired with moderate product pricing. With strategic consumers, depreciation creates uncertainty about future valuations, causing more buyers to delay purchases. This reduces optimal stocking quantities and pushes the firm toward lower prices and carefully calibrated recycling incentives. Across all conditions, coordinated decisions on pricing, recycling compensation, and stocking outperform optimizing each variable independently. The results highlight how firms can design profitable take-back programs while supporting circularity in high-tech supply chains.

Mahan Liaqat

Discipline: Interdisciplinary

Authors:

#1 Mahan Liaqat

Abstract Name: A Network Analysis of Pedagogy in 177 International Conference of the Learning Sciences Papers 1996–2025

The learning Sciences (LS) has continuously redefined how teaching and learning are understood, yet the evolution of its core pedagogical and theoretical foundations has not been systematically documented. This study analyzes 177 papers from the International Conference of the Learning Sciences (ICLS), spanning the early years (1996–2008), middle years (2010–2018), and recent years (2020–2025), to see how pedagogical theories and practices have evolved. After qualitative coding across 52 categories and 631 coded segments, network analysis of correlations at $p < .05$ was applied to identify patterns and clusters within each era. Understanding these thematic shifts is crucial for identifying contemporary research priorities and addressing intellectual gaps concerning the field's dominant paradigms. Findings show that the early years established foundational paradigms centered on cognitive and constructivist theories such as conceptual change, model-based reasoning, and collaborative learning alongside constructionist and apprenticeship-based practices. The middle years demonstrated diversification, introducing critical, identity-oriented, and social-cultural perspectives while maintaining constructivist and experiential pedagogies. In the most recent years, network mapping revealed an integration phase, characterized by a strong socio-collaborative core linking social constructivism, critical pedagogy, and learner agency. Supporting clusters emphasized structured teacher guidance, systemic and ecological models of learning, and renewed attention to hands-on, project-based engagement. This study investigated a maturing discipline that increasingly views learning as social, contextual, and transformative. By mapping this intellectual evolution, the project provides a clearer understanding of how the Learning Sciences have shifted from studying individual cognition toward building collective, inclusive, and agency-driven educational models.

Deneé Lichtenberg

Discipline: Engineering

Authors:

#1 Md Roxy Islam

#2 Amanda Bernard

#3 Pritha Sarkar

#4 Kathia Perez
#5 Kausik Mukhopadhyay

Abstract Name: Influence of Size and Shape Selectivity of Silver Nanoparticles Embedded in Functionalized Clays for Determining Antimicrobial Efficacy and Biocompatibility

The global economic impact of wound care is growing rapidly, with a significant thrust on microbial infections. As a result, substantial efforts are underway to develop cost-effective antimicrobial wound dressings that can limit microbial penetration and reduce the risk of life-threatening infections. Clays are among the most promising candidates for biomedical applications due to their non-toxicity, porosity, low cost, and biocompatibility. Our effort adopts an innovative approach to developing organo-functionalized, infection-resistant, biocompatible membranes embedded with silver nanoparticles that offer antimicrobial efficacy. While clay serves as the host material, betaine acts as a binder to facilitate membrane formation, and the shape-selective silver nanoparticles provide sustained antibacterial activity. The effects of silver nanoparticle shape and size selectivity on the antimicrobial activity of membranes reveal structure-property relationships that influence the development of silver nanoparticle-clay systems, including mechanical durability, flexibility, fluid permeability, and pathogen activity, across different shapes, including spherical, cubic, and rod-shaped structures. We are evaluating WST-1 cell viability assays on clay membranes, which can be used as wearable, implantable devices where direct or indirect contact with cells or biological fluids may occur. The WST-1 biocompatibility results are significant because they: (1) verify that these membranes can be integrated into biorelevant applications, (2) help rule out potential toxicity arising from the fabrication steps and betaine, and (3) strengthen the broader case for clay materials as safe, sustainable, and multifunctional components in emerging biomedical applications. The overarching goal of unique membrane systems is to treat various burns, skin conditions, and complex open wounds.

Kaylee Liebeck

Discipline: Biology

Authors:

#1 Melinda Yang
#2 Allison Libby
#3 Cami Murphy
Allison Libby

Abstract Name: Annotation of the Pten and Foxo Genes in Drosophila Species

We investigated evolutionary change in two genes involved in the Drosophila insulin signaling pathway: Pten, a tumor suppressor that counteracts PI3K as a negative regulator of insulin signaling, and foxo, a transcription factor linking insulin signaling to the regulation of metabolic processes. To do this, we annotated Pten in *D. rhopaloa*, a species closely related to *D. melanogaster*, as well as the more distantly related species, *D. albomicans*. We also annotated the foxo gene in *D. guanche*. Orthologous regions to *D. melanogaster*'s Pten and foxo genes in the genomes of *D. rhopaloa* and *D. albomicans* (Pten) and *D. guanche* (foxo), provided by the GEP, were identified using NCBI BLAST. We then used the GEP Genome Browser's gene prediction models and RNA-Seq data, particularly splice junctions, to identify the coordinates of each Pten and foxo coding exon in our target species. We found that Pten isoforms in *D. rhopaloa* showed higher similarity to those of *D. melanogaster*, differing only by minor insertions or deletions, than did the isoforms in *D. albomicans*, which exhibited larger structural differences. The higher similarity between the more closely related species suggests that Pten evolution was not influenced by selection. We also found that the foxo-PH isoform present in *D. melanogaster* was absent in *D. guanche*, while the other isoforms showed high similarity across the first half of the gene. Collectively, our annotations will be used in the GEP Pathways Project, a nationwide collaborative research program to develop accurate gene models for genes in the insulin

signaling pathway across the *Drosophila* genus to compare evolutionary changes across these genes to their role within a signaling pathway.

Olivia Lien

Discipline: History

Authors:

#1 Rachel Neiwert

Abstract Name: Welcoming the Dear Neighbor?: The Legacies of Desegregation and Integration Efforts in St. Paul Public Schools

In 1971, the St. Paul Human Rights Commission filed a lawsuit against St. Paul Public Schools (SPPS), the school district serving Minnesota's capital city, for failing to provide equal educational opportunities for all children. SPPS ultimately negotiated the dismissal of the suit by developing a desegregation-integration plan. My research sought to understand how SPPS researched and developed their plan, its implementation across already existing schools and newly established learning centers, and the overall effectiveness of their desegregation and integration efforts before and after being sued. The SPPS desegregation-integration plan was spearheaded by the St. Paul Superintendent George P. Young, who was white. Close reading and analysis of his statements, speeches, and letters in the SPPS archives, held at the Gale Family Library at the Minnesota History Center, reveal that Young was the St. Paul Superintendent from 1969 to 1985. Young demonstrated a commitment to desegregating and integrating SPPS, but in creating a system that allowed for voluntary integration, he also allowed for voluntary resegregation. Before this lawsuit, SPPS had already begun open enrollment in 1965, but this measure eventually exacerbated segregation through "White flight" as White parents began to move their families away, and with that move came the gradual loss of funding for desegregation and integration programs. In 1971, St. Paul voted against a 32 million dollar bond to finance school facility improvement, specifically the building of specialized educational centers; a serious blow to Young's desegregation and integration efforts. Analysis of historical records from the time reveals that efforts in desegregation and integration, such as the learning system model, open enrollment, and magnet schools, required continued attention and funding, resources that SPPS was slowly losing or failing to attain in the first place.

Chandler Lilley

Discipline: History

Authors:

Abstract Name: An Unflinching Step to the End: An Analysis of Virginia Governor James L. Kemper's Veto of the 1874 Petersburg Charter

This research seeks to address the question regarding Virginia Governor James Lawson Kemper's controversial veto of Senate Bill 5 in 1874. The story begins with the Virginia Conservatives of the 1870s, who represented a group of individuals, mostly Confederate veterans, who fought the Radical Republicans for control of Virginia's government. Their impact has been rather understated, and their leaders have been rebranded as hopeless "Lost Cause" advocates. Among this group was James Lawson Kemper, who served as Governor from 1874-78. During the third month of his administration, he faced a crisis. The white citizens of Petersburg had rewritten their city charter to effectively neutralize the black vote. Governor Kemper chose to strike the bill down, showing his commitment to all Virginians and his denial to give in to pressure. His act

proved that the Virginia Conservatives were not as racist or suppressive as they may have seemed. This research investigates the context of Kemper's decision, placing it within the larger period of Virginia Conservatism. It was conducted using a collection of primary and secondary sources, which were synthesized to create the full picture of Kemper's veto decision. The research concludes that Kemper's veto was prompted by his commitment to be "every inch the Governor" of all Virginians, black and white. This work is significant because the historical body of knowledge has yet to have a study focusing exclusively on this topic and its impact on Virginia Conservatism in the late 19th century.

Heewone Lim

Discipline: Communications

Authors:

Abstract Name: Quiet In the Library: The U.S. Information Service and Korean Student Resistance

Student activism has long been a driving force in South Korean political movements. This project explores the intersection between Korean student protests, American foreign policy, and media framing, specifically examining how Korean perceptions of U.S. involvement in the Gwangju Uprising led to the occupation of the U.S. Information Services (USIS) library in Seoul in 1985. While the United States positioned itself as a global advocate for democracy, its "quiet diplomacy" approach toward South Korea's military regime contradicted that narrative, fostering resentment among the most politically active demographic: university students. Drawing on archival materials, U.S. and Korean media coverage, and secondary analyses, this research investigates two central questions: How did South Korean student activism challenge American political influence and public diplomacy in Korea? And how did media framing shape public understanding of these events in the U.S.? This thesis aims to fill a gap in scholarship by integrating Korean domestic activism with American media and diplomatic responses. By examining competing narratives surrounding USIS, it seeks to reveal how information politics and student protest intersected during a pivotal decade of democratization, with implications for understanding international perceptions, media power, and grassroots mobilization.

Josue Lima II

Discipline: Interdisciplinary

Authors:

#1 Ashley Gray

Abstract Name: Clock In, Burn Out: The Heart Risks of Job Stress

Burnout, a state of emotional, physical, and mental exhaustion from occupational stress, is linked to cardiovascular disease (CVD) and related risk factors. In the U.S. Virgin Islands (USVI), diabetes, hypertension, and hypercholesterolemia are prevalent and are a leading cause of death in the territory, yet the connection between burnout and these conditions remains unclear. The aims of the study were to examine rates of occupational burnout amongst residents in the island of St. Thomas, USVI and examine whether occupational burnout is related to CVD risk factors among St. Thomas residents. A cross-sectional survey of 120, St. Thomas residents in July 2025 was conducted. Participants completed a modified Maslach Burnout Inventory and reported on demographics and CVD risk factors. The median age was 39, with 51% female, 80% Black, and 19% Hispanic, representing a range of occupations. It was identified that 64% of participants met criteria for burnout, especially young adults (78%) and women (70%). Burnout was not significantly

associated with diabetes, hypertension, or hypercholesterolemia. These findings highlight a high prevalence of burnout in St. Thomas and the need for workplace and community-based interventions.

Nayeli Limon

Discipline: Architecture, Construction Management, and Interior Design

Authors:

Abstract Name: “Advancing Men’s Mental, Physical Health, and Wellbeing Through Supportive Environments.”

Since the 1960s, historical and contemporary research has consistently shown disproportionately high rates of violent suicide among men, particularly those who are Latino, Native, or from low-income communities. These outcomes are closely tied to rigid cultural expectations surrounding masculinity, which often discourage vulnerability, emotional expression, and help-seeking behaviors. As a result, many men internalize psychological distress, delay or avoid accessing mental health resources, and experience compounded physical and emotional challenges. This project investigates how intentional architectural design can address these disparities by creating a wellness environment tailored to men’s physical, mental, and social needs. The proposed facility integrates inclusive fitness, rehabilitation, and recovery zones that strengthen the body while supporting discipline, confidence, and resilience. Although accessible to all genders, the layout incorporates private and semi-private spaces that respond to men’s comfort levels, reducing fear of judgment and encouraging consistent engagement. Beyond physical wellness, the design promotes mental and social health through educational spaces where men can develop everyday life skills, such as communication, cooking, sewing, and emotional literacy, which are rarely emphasized in male-centered environments. Group rooms and communal lounges foster peer support, allowing men to share experiences, normalize vulnerability, and cultivate healthier coping strategies within a connected community. By bridging physical activity, mental health education, and community-building elements, this project demonstrates how the built environment can actively reduce stigma, empower men to seek support, and reshape cultural narratives surrounding masculinity. The study highlights architecture’s potential to serve not only as a backdrop for healing but as a direct contributor to long-term well-being for at-risk male populations.

Edgar Lin

Discipline: Mathematics

Authors:

#1 Rayan Ibrahim

Abstract Name: 2-Neighbor Bootstrap Percolation in Graphs

The r -Neighbor Bootstrap Percolation process is defined on a graph. The process begins with an initial set of infected vertices. In each subsequent round, an uninfected vertex becomes infected if it is adjacent to at least r previously infected vertices. We refer to r as the percolation threshold. If an initially infected set of vertices begins a process in which every vertex of the graph eventually becomes infected, then we say that this set of vertices percolates. A graph is r -bootstrap good, or r -BG if it contains a percolating set of size r . We will explore sufficient and necessary conditions for a graph to be 2-BG. That is, we will show that certain structural qualities force a graph to be 2-BG, and we will show that 2-BG graphs must have certain characteristics.

Shirley Lin

Discipline: Economics

Authors:

Abstract Name: Two Thresholds, One Deal: How Post-Brexit Merger Control Shapes UK–EU M&A Financing

In less than a decade, UK–EU mergers and acquisitions (M&A) have shifted from a straightforward, single-review system to a more complex and uncertain one. Before Brexit, the European Commission alone reviewed large UK–EU deals. After Brexit, both the UK’s Competition and Markets Authority (CMA) and the European Commission (EC) can review the same cross-border agreement, often with different rules, timelines, and information requirements. Over this shift to dual review, UK-related foreign direct investment projects fell from 2,265 in 2016–17 to 1,555 in 2023–24, suggesting that Brexit may be reshaping how firms plan and structure cross-border deals (European Central Bank 2021, p. 60). This raises a central question for scholars and policymakers: What explains firms’ choice between cash, shares, or hybrid consideration in UK–EU M&A after Brexit? To answer this, the project uses descriptive statistics and a short-window event study on deal-level data from Orbis M&A and Bloomberg Terminal, combined with CMA and EC merger decisions for UK–EU technology deals. This approach links different types of regulatory exposure to firms’ financing choices, whether deals are completed or collapse, and short-run share price volatility. Building on Chung et al. (2023), who find that stricter competition rules tend to lower acquirers’ share prices around merger announcements, the project examines short-term share price changes around deal and regulatory announcements as a simple signal of investor uncertainty. Key independent variables are regulatory exposure (no review, single EU or CMA review, or dual review) and timing relative to Brexit. Outcomes are financing structure, deal completion, and short-window volatility. The project tests whether dual-review deals, which face greater uncertainty, rely more on cash or cash-heavy hybrids, even though internal rules and misjudgments limit firms’ ability to adapt, and whether post-Brexit oversight encourages more conservative deal structures and dampens investor confidence in UK–EU capital markets over the medium term.

Melissa Linder

Discipline: Exercise Science and Nutrition

Authors:

#1 David J. Szymanski

Abstract Name: Relationship Between Body Composition, Grip Strength, and Countermovement Jump Ground Reaction Forces to Hitting Metrics in Division I Collegiate Baseball Players

Strength, power, and body composition (BC) underpin high-velocity movements and are integral to success in baseball. In hitting, the ability to generate bat and ball exit velocities are believed to relate to these physical attributes. Performance assessments, such as bioelectrical impedance analysis (BIA), grip dynamometry, and countermovement jump (CMJ) force-plate testing provide quantitative insight into qualities that influence baseball performance and are foundational across anaerobic power sports. This study examined the relationships between BC, grip strength, and CMJ ground reaction forces (GRFs) with key hitting metrics (bat velocity and ball exit velocity) measured both in the laboratory and field settings. Twenty-four Division I (DI) collegiate baseball hitters volunteered during the offseason. BIA, using the InBody 770, assessed BC; a

Jamar hand dynamometer assessed dominant and non-dominant grip strength; and akimbo CMJs performed from Hawk Dynamics force plates assessed GRFs from the highest jump. Bat and ball exit velocities were measured on the field using a Blast Motion sensor and Trackman system, and in the laboratory using Qualisys motion capture system and Jugs radar gun. Pearson product-moment correlations ($p < 0.05$) were computed to evaluate relationships among BC, grip strength, CMJ GRFs, and hitting velocities. Results indicated multiple statistically significant relationships between BC, grip strength, CMJ GRF measures, and both mean and best bat and ball exit velocities in DI baseball players. These data support the relevance of measuring these performance variables to determine a player's baseline strengths and weaknesses, potential return-to-play if injured, or a player's training program. Strength and conditioning coaches may use these results to help design offseason training programs attempting to improve BC, such as lean body mass; grip strength; and CMJ GRFs including jump momentum, braking forces, propulsive forces, net impulses, and peak power to improve bat and ball exit velocities in collegiate DI hitters.

Reegan Lindholm

Discipline: Exercise Science and Nutrition

Authors:

Olivia Duncan

Carolee Hanks

Abstract Name: The Effects of Music on Time Perception and Rate of Perceived Exertion during Exercise

Many individuals believe that listening to music while exercising increases enjoyment and makes the perception of time seem faster. Wu et al, (2022) found that listening to high-tempo music helped participants' performance increase both physically and mentally. Current literature has focused on music tempo and fatigue perception, while much less is known about music and time perception during physical activity. The purpose of this study was to determine whether music affects perception of time and Rate of Perceived Exertion (RPE) while exercising on a stationary bike. College-age students from a small liberal arts college were recruited and a one-sample experimental design was used. Participants will be asked to provide a sample of music they consider positively and negatively stimulating before the commencement of the study. Participants will be free to pedal at an RPM of their choice during each trial. During each trial, heart rate (HR), Revolutions per Minute (RPM), and RPE will be measured at various intervals. Music conditions included positively stimulating music, negatively stimulating music, and no music. Immediately following each trial, participants will report how long they think they were on the stationary bike. The independent variable is music type and the dependent variables include HR, RPM, RPE, and perceived time during the exercise trial. Repeated Measures ANOVA ($p < .05$) will be used to determine significant differences between trials. Results may indicate that when individuals are listening to music they consider stimulating, they will perceive a bout of exercise to be shorter and less difficult. Future research might look at how music impacts time perception during daily living tasks. Data collection is in progress. IRB #546675.

Benjamin Lindquist

Discipline: Chemistry

Authors:

#1 Todd Eckroat

Abstract Name: Progress Towards the Synthesis of Hyrtinadines C and D

Hyrtinadines C and D are bisindole alkaloids isolated from the marine sponge genus *Hyrtios* that, despite showing some antimicrobial and antifungal properties, have little reported biological activity. Additionally, no practical means or published synthetic pathways exist for acquiring hyrtinadines C and D. The goal of our research is to develop a novel synthetic pathway for producing the molecules to allow further investigation of biological activities. We hypothesize that the structures should serve well as acetylcholinesterase and butyrylcholinesterase inhibitors, as recent literature reports indole-containing compounds bind favorably to the active sites of the enzymes. Preliminary molecular docking calculations support this, with results indicating favorable hydrogen-bonding and pi-pi stacking interactions between the indoles of the hyrtinadines and the aromatic amino acids located in the enzymes' active sites. Development of a synthetic pathway began with retrosynthetic analysis of the hyrtinadines' structures. We believe the most viable route requires formation of a stereospecific linkage between benzyloxycarbonylglycine-oxazolidinone, a protected glycine with an oxazolidinone chiral auxiliary, and an N-protected bisindole derivative. Recent work has focused on synthesizing the bisindole derivative, beginning with the reaction of 5-benzyloxyindole with oxalyl chloride and methanol to add methyl 2-oxoacetate to the indole's 3 position. Subsequent protection of the indole nitrogen with tosyl, triisopropylsilyl, carboxybenzyl, and benzyl groups has been attempted; only the carboxybenzyl group failed to afford the desired product. Hydrolysis of the methyl ester substituent was attempted via reflux with NaOH, and only the benzyl protecting group withstood the reaction conditions and afforded the desired indolyl-2-oxoacetic acid. Current work to complete the formation of the bisindole is investigating a Pd-coupling reaction between N-protected 5-benzyloxyindole-3-carboxaldehyde and the aforementioned indolyl-2-oxoacetic acid. The full results of these synthetic studies will be presented.

Kaitlyn Line

Discipline: Social Work and Human Services

Authors:

#1 Dorothy Wallis

Abstract Name: Exploring Access to Services Among Individuals with Substance Misuse in the Bear River Region

In 2024, over 97,000 people in the United States died from a drug overdose. Although this represents a continued decline from the record-high rates of 2021, progress has not been felt equally across the U.S. The Centers for Disease Control and Prevention anticipate that Utah's overdose death rates will increase by five percent from 2023, making it one of only five states that see an increase between 2023 and 2024. The disease model of addiction acknowledges that addiction is a chronic but treatable medical condition. Functional brain imaging demonstrates that substance use disorders [SUDs] have the potential to change the brain, reinforcing the need to treat addiction similarly to other chronic medical conditions like hypertension or diabetes. This scientific reframing has helped to reduce some stigma within healthcare and mental health settings by shifting perceptions of addiction away from a moral failing toward a medical condition. Despite this progress, stigma remains widespread in the broader community, impacting the availability and access to treatment options. One study found that 79% of respondents view people with SUD as untrustworthy, 74% perceive them as dangerous, and 64% believe that these individuals are deserving of blame. When people face greater marginalization and stigma, they are less likely to seek treatment and rely on their social networks for support. Given Utah's rising overdose rates, it is vital to better understand the lives and needs of people with substance misuse in the Bear River region. This qualitative study conducted interviews with individuals currently experiencing substance misuse or participating in recovery to explore their experiences meeting basic needs, accessing services, and navigating stigma. Findings will inform service providers and policymakers in developing more responsive interventions tailored to the unique needs of this community.

Kyahra Lingatong

Discipline: Exercise Science and Nutrition

Authors:

#1 Kyahra Lingatong

#2 Carylli Agrabio

#3 Karina Diaz Rios

Carylli Agrabio

Abstract Name: Accuracy of the information in Instagram video posts about food product reviewing at point-of-purchase settings.

Social media has become a significant source of health and nutrition information. Food product reviews at the point-of-purchase are commonly depicted. However, the content quality of these posts are difficult to discern by the lay user. This can lead to exposure to misinformation that can negatively impact food-related attitudes, choices, and behavior. The purpose of the study is to determine the accuracy of the claims in food product review video posts from Instagram accounts using content analysis and social media assessment guidelines. A content analysis of food product review videos was conducted. A list of Instagram accounts with 25,000 or more followers was identified via FeedSpot. Accounts were included if they had one post reviewing a food product in a point-of-purchase location (e.g., grocery store) within 6 months. Hashtags and keywords (e.g., #groceryhaul, #grocerytips, #budgetshopping) were used to identify video posts that met the inclusion criteria. Preliminary coding was done independently by two trained analysts to create a codebook. Concepts and ideas represented through visuals, dialogue, and captions were identified. Codebook refinement was done through reflective discussion. Full videos were analyzed for code contextualization and to identify components from the Assessment Flowchart for Credibility of Health Information in Social Media (Kington et al, 2021) and the Social Media Evaluation Checklist (Squires et al, 2023). Fifty videos, one from each Instagram account, that met the inclusion criteria were preliminarily coded. The resulting codebook consists of 329 total codes. An analytical sample of videos will be obtained through Meta Content Library API. Video content will undergo content analysis and be assessed for credibility. Social media platforms are highly accessible sources of information. Characterizing the extent to which nutrition information is accurate in these settings can help identify interventions to improve the information environment in these platforms to foster health-promoting food-related attitudes and behaviors.

Jordan Lipner

Discipline: Political Science

Authors:

#1 Jordan Lipner

Abstract Name: Partisan Divides in Environmental Spending Attitudes: A Two-Level Hierarchical Linear Analysis, 1973-2022

Public attitudes toward environmental spending have become increasingly divided along party lines, with sharp shifts over the past five decades. This thesis updates and expands on Johnson and Schwadel's 2019 study by applying a two-level hierarchical linear model to General Social Survey data updated to include data from 2015-2022, capturing how political affiliation, education, race, and economic context interact with broader political and economic contexts to shape environmental attitudes over time. The results show that political affiliation remains the strongest and most reactive predictor of environmental spending attitudes. Republican respondents are significantly more likely to oppose environmental spending, especially under Democratic presidencies. In contrast, Democratic support remains relatively stable across changing political contexts. Education and Age also emerged as significant factors: individuals with more education and younger respondents are more likely to support environmental spending. Race had mixed statistical

significance. Income, sex, and unemployment are not significant predictors on their own, but interactions indicate that attitudes may shift based on context. This study reinforces the central role of partisan identity in shaping environmental views and demonstrates how political and economic context can activate or dampen that divide. By incorporating new interaction terms and updated data, the model offers a clearer understanding of how these dynamics have evolved over time. The findings underscore the challenges of building bipartisan support for environmental policy and point to the importance of messaging that considers political context and reactive partisan patterns.

Rhonda Lippert

Discipline: Art History

Authors:

Abstract Name: Threads of History: Textiles in Pre- and Post-Colonial Peru

This research focuses on textile production as an art form in Wari and Inca societies, examining the textile-making process and its cultural significance. The study contributes to academic research on the role of both genders in textile creation and the use of textiles in rituals to reinforce social status. This examination demonstrates that, although aesthetically different and used in various rituals, the Wari and the Inca Unku tunics served as symbols of political power, social status, religious beliefs, and imperial control. This study begins with a brief discussion of the Wari and Inca's political, social, and cultural systems and gender roles to provide a historical context for textile production. Following, the discussion of textile materials, dying techniques, the weaving process, and social purposes in the lives of the respective societies will be presented. The examination of the use of textiles in burial practices further demonstrates their role in reinforcing social status and gender roles. This comparative study is based on art-historical and historical studies, as well as on iconographical examination of the Wari tunic and the Inca Unku tunics.

Genesis Liriano

Discipline: Interdisciplinary

Authors:

Abstract Name: Shaping Inclusive Cities: Exploring Cultural Equity in Urban Planning

City plans guide the development of infrastructure and public services in an area, but there is a growing emphasis on cultural planning. According to scholars like Kovacs (2011) and Ashley et al. (2021), cultural plans are a framework for improving community and economic development by integrating the arts and a neighborhood's values in the planning system. This shift reflects a broader understanding of how culture plays a vital role in the growth of an environment through building place identity, fostering social cohesion and supporting financial revitalization. This project examines about 90 cultural plans from cities nationwide to gain insight into how they engage with social justice themes such as equity and diversity in the planning process to shape more inclusive and representative landscapes. We began by analyzing existing plans, searching for terms indicative of cultural consideration such as gentrification and traditions, to explore how existing cultural development plans address questions surrounding crime, race and belonging. We aim to assess how municipalities define and prioritize communities in order to uncover the benefits and limitations of using cultural planning as a tool for equity and inclusion. By identifying what is emphasized and what is overlooked, this study highlights opportunities to strengthen cultural plans so they better reflect the diverse needs and voices of communities.

Laney Littlejohn

Discipline: Biology

Authors:

#1 Laney Littlejohn

#2 Annie Witzky

Abstract Name: Elongation Factor-P mediated translation of AmpG is required for meropenem resistance in *E. Coli*.

Antibiotic resistance occurs when bacteria survive in the presence of antibiotics. Two classes of antibiotic-resistant pathogens have been on high alert for the CDC: carbapenem-resistant Enterobacterales (CRE) and extended-spectrum beta-lactamase-producing Enterobacterales (ESBL-E). These pathogens are resistant to beta-lactam drugs that target bacterial cell wall biosynthesis. Elongation Factor-P (EF-P) is a translation factor that facilitates polyproline synthesis. When EF-P is absent, many bacteria become hypersensitive to antibiotics. While it is established that EF-P plays a role in resistance in many bacterial species, it's unclear if EF-P plays a similar role in resistant pathogens such as CRE and ESBL-E. Here, we aimed to characterize the role of EF-P in antibiotic resistant *Escherichia coli*. Loss of EF-P resulted in hypersensitivity to carbapenem and penicillin antibiotics. Carbapenem hypersensitivity in Δefp cells was maintained when the bacteria expressed carbapenem resistance gene NDM1. To better understand the mechanism behind EF-P dependent resistance, EF-P dependent genes involved in cell wall biosynthesis were identified from previous ribosomal profiling studies. AmpG is an EF-P dependent gene utilized by bacteria to synthesize the cell wall. In this study, WT ampG and ampG without the encoded polyproline motif (ampGPAF) were cloned and expressed in Wild Type and Δefp *E. coli*. When the polyproline motif was abolished, WT and Δefp displayed comparable meropenem resistance, indicating the Δefp antibiotic hypersensitivity phenotype originates from the inability to synthesize AmpG. The hypersensitivity phenotype observed in the absence of EF-P is caused by the bacteria's inability to synthesize AmpG, a necessity for cell wall biosynthesis.

Zoe Littlejohn

Discipline: Psychology

Authors:

#1 Zoe Littlejohn

Hannah Byrne

Colin Hourigan

Abstract Name: Identity at Work--Help or Hindrance?: How Disability Identification Shapes Cognitive Interference in the Workplace

Historically, neurodivergence has been stigmatized as a deficit, with accommodations being seen as a setback rather than being beneficial. (Solovieva & Walls, 2013). This deficit view has created difficulties for neurodivergent employees. Challenges have been created from this stigmatized view. Some examples include stigma, disclosure concerns, as well as reduced work performance (Moloney et al., 2019; Kulkarni, 2022). Researchers have begun reaching for a shift toward viewing neurodivergence as a difference rather than a weakness/deficit, emphasizing its strengths and its flexibility in workplace design (Sheppard-Jones et al., 2021; Petty et al., 2023). However, few studies have proven whether positive stigma reframing actually improves work outcomes. The study examines whether reframing neurodivergence in the workplace affects

productivity. I hypothesize that positively reframing the stigma of neurodivergence will lead to increased workplace productivity. Participants will complete an online survey where they choose one of three options describing neurodivergence: positive, negative, or neutral. After reading the question, participants will answer questions that measure the perceived advantage of neurodivergence, anticipated stigma, and affected productivity while doing a task in the workplace. T-tests will be used to compare productivity between participants who were shown a positive stigma reframing compared to those that were negative, and those who had no effect. Correlations between anticipated stigma and affected productivity will also be examined. The study will give evidence as to whether positive descriptions of neurodivergence can improve workplace productivity.

Leo Liu

Discipline: Chemistry

Authors:

#1 Padma Gopalan

#2 Sheng Wang

Abstract Name: Synthesis of Polyimine Covalent Adaptable Networks Through Imine Metathesis Chemistry

Polymers, commonly known as plastics or resins, are classified as thermosets, thermoplastics, or elastomers. Thermosets possess excellent mechanical strength and thermal stability but cannot be reprocessed or recycled once cured. Thermoplastics, by contrast, can be reshaped and recycled but lack the durability required for many high-performance applications. In recent years, Covalent Adaptable Networks (CANs) have emerged as a promising class of materials that combine the strengths of both systems. CANs behave like thermosets under service conditions yet undergo reversible bond exchange, enabling reprocessing and repair. However, many reported synthesis routes rely on hazardous, expensive, moisture-sensitive chemicals or complex procedures, limiting their practicality and broader adoption. Our project aims to develop a more accessible and versatile method for synthesizing polyimine CANs by leveraging formamide-functionalized methacrylate (FEMA) as a monomer platform. This approach has not been explored previously and offers a safer, more cost-effective route that broadens monomer compatibility and simplifies fabrication. We successfully synthesized FEMA-based CANs through a straightforward free-radical polymerization and crosslinking process and are now investigating how different monomer combinations influence network formation and dynamic behavior. To characterize the materials, we use analytical techniques including nuclear magnetic resonance (NMR) spectroscopy to confirm chemical structure, Fourier-transform infrared (FTIR) spectroscopy to monitor imine bond formation, and differential scanning calorimetry (DSC) to assess thermal transitions. Mechanical performance and reprocessability are evaluated using a Carver press and subsequent mechanical testing, such as indentation and sonication. These analyses allow us to determine how formulation choices affect recyclability, thermal stability, and mechanical properties. This work contributes to the development of next-generation reprocessable thermosets by demonstrating a practical, scalable pathway for synthesizing polyimine CANs. By lowering cost and safety barriers, this method may expand the accessibility of CAN research and enable broader industrial and academic exploration of dynamic polymer networks.

Lydia Liu

Discipline: Psychology

Authors:

#1 Lisa Chung

#2 Jared Keeley

Abstract Name: Cultural Adaptation of CBT for Hwabyung versus GAD

Culturally-bound syndromes, such as hwabyung—, a Korean syndrome that includes symptoms like heat sensations, heart palpitations, and fatigue that come from a sense of social injustice—pose a particular problem for clinicians applying evidence-based treatments like Cognitive Behavioral Therapy (CBT), which are often standardized for DSM-5 disorders such as Generalized Anxiety Disorder (GAD). Although the symptoms of anxiety and distress may overlap between conditions such as GAD and hwabyung, their individual conceptualizations and core features are very different. This raises uncertainty in how treatments are selected and applied. There is also a factor of cultural differences and cultural heuristics that play into the understanding and ability to appropriately diagnose psychological disorders. Clinicians may change how they treat uncommon disorders such as Hwabyung in comparison to western mental disorders due to unfamiliarity. This study examines clinician treatment decisions in response to symptom profiles for GAD and hwabyung. The central goal is to ascertain whether and how clinicians apply CBT for a culturally-bound syndrome compared with a similar DSM-5 disorder. In order to investigate this, 98 clinicians were recruited from state licensing boards (psychologists, licensed professional counselors, marriage and family therapists and licensed clinical social workers) via email and given two case vignettes of clients meeting criteria for GAD and hwabyung, respectively. Thirty-eight (38.78%) clinicians used CBT as part of their treatment plan for Hwabyung, and 56 (57.14%) clinicians used CBT as part of their treatment plan for GAD. It is hypothesized that clinicians are more likely to culturally adapt their approach for Hwabyung than GAD in their application of CBT. This hypothesis will be evaluated by qualitative analysis of the content of clinicians' treatment plans. Implications of these findings for training and best practice will be discussed.

Lucia Liu

Discipline: Biology

Authors:

#1 Rachel Verdi

#2 Corinne Richards-Zawacki

Abstract Name: Effects of Agricultural Land-Use on Amphibian Immune Defenses Against the Skin Pathogen *Batrachochytrium dendrobatidis*

Chytridiomycosis, an infectious skin disease caused by the fungal pathogen *Batrachochytrium dendrobatidis* (Bd), has driven catastrophic amphibian population declines across the globe. More than 500 species have been affected, and even in habitats lacking other obvious environmental stressors, Bd can still cause severe mortality and local extinction. Amphibians rely on a vital innate immune defense—antimicrobial peptides (AMPs)—secreted to their skin to inhibit the growth of pathogens such as Bd. Yet, with the expansion of agricultural activities, the chemical composition of freshwater habitats has been profoundly altered by fertilizer and pesticide runoff, which introduces nitrogen, phosphorus, and heavy metals and changes water pH, conductivity, and total dissolved solids. These shifts may impose chronic physiological stress that can potentially suppress immune function, including AMP production. This study investigates how agricultural land use affects the quantity and antifungal effectiveness of AMPs in green frogs (*Lithobates clamitans*) across a 0–60% agricultural land-use gradient in northwestern Pennsylvania. During field sampling at sixteen ponds, approximately 220 frogs were collected, and environmental parameters and individual morphometrics were recorded. Skin secretions were induced using norepinephrine injections and collected through water baths. In the laboratory, peptides are enriched via Sep-Pak C18 solid-phase extraction and quantified using the Pierce Micro BCA Protein Assay. Future analyses will include growth inhibition assays to assess AMP effectiveness against Bd and Matrix-Assisted Laser Desorption/Ionization (MALDI) mass spectrometry to compare molecular profiles across agricultural sites. We hypothesize that agricultural land use reduces AMP secretion and weakens Bd inhibition capacity. By integrating biochemical, ecological, and pathogen-level

analyses, this research will clarify how anthropogenic stress influences amphibian immune defenses and inform habitat management strategies to mitigate disease risk in human-altered landscapes.

Elizabeth Liu

NY - Adelphi University

Discipline: Education

Authors:

#1 Elizabeth Liu

#2 Mónica Morales-Hernández

Abstract Name: The Impact of Generative AI on Student Learning in College-Level Mathematics: How AI Can Be Effectively Incorporated into the Learning Process

This research investigates the impact of generative artificial intelligence (AI) tools on student engagement, perceived learning, and math anxiety in college-level mathematics courses. The study addresses the question: How can generative AI be effectively incorporated into the mathematical learning process to enhance student learning experience? Building upon existing literature on math anxiety, AI-assisted learning, student engagement, and prompt engineering, this project contributes to the growing body of research exploring how emerging technologies, such as artificial intelligence, reshape traditional mathematics education. The study hypothesizes that thoughtful integration of generative AI can support student confidence and conceptual understanding, provided that its use is guided by structured learning frameworks. Employing a mixed-methods, survey-based approach, data will be collected from undergraduate students who have experience in college math courses. Surveys will be conducted to assess participants' engagement, anxiety levels, and attitudes toward AI use. Responses will then be qualitatively coded and statistically analyzed to identify patterns, correlations, and predictors of AI reliance and perceived academic outcomes. The anticipated findings are expected to provide insight into how AI may have long-term learning benefits when used collaboratively, supported by a foundational understanding of prompt engineering. The research aims to produce a structured study guide that empowers students and educators to incorporate AI thoughtfully into mathematics instruction. Ultimately, this project seeks to balance innovation with pedagogical integrity, offering evidence-based recommendations for the responsible adoption of AI in mathematics education learning environments.

Ying Liu

Discipline: Nursing and Public Health

Authors:

#1 Ying Liu

#2 Heidi Lindroth

#3 Amelia Barwise

Abstract Name: To compare environmental pattern of nursing care to patient activity patterns over a 24-hour period in a critically ill patient in intensive care unit

Delirium is an acute brain dysfunction occurring in 50% of intensive care units (ICU) patients. Delirium survivors are twice as likely to develop dementia. The parent study prospectively recruited aging adults (≥ 50 yo) admitted to the ICU for ≥ 24 -hour. The study team collected continuous video data and delirium assessments four times daily. This secondary analysis analyzed the type, timing, and duration of documented

patient activities. Each nursing and patient activity was coded minute by minute in two-hour increments across three time periods: morning, afternoon, and night. We summarized observed activities using descriptive statistics and examined the relationship between type of activity (nurse, patient) and time of day. The 53-year-old white, non-Hispanic, female was a high school graduate and admitted with diabetic ketoacidosis. The patient had severe, hyperactive delirium. The nurse spent time conducting each activity: assessment (214 minutes), medication administration (82 minutes), and non-patient related tasks (74 minutes). The patient spent time engaged in these activities: speaking with visitors (12 minutes), restlessness and agitation (71 minutes), and resting (178 minutes). These activities did not vary greatly between the afternoon, night, and morning time periods. From the data, we see that the nursing workload is high, and most activities are tasks that do not directly involve the patient. The patient activities highlight the characteristics of delirium, restlessness and agitation, and how they may limit the ability to meaningfully interact with others. Future research can further examine these time periods in additional patients to expand on these findings.

Xuan Liu

Discipline: Computer Science

Authors:

#1 Mahfuza Farooque

Abstract Name: DetermiLogic: A Reliable Pipeline for Translating Natural Language into Formal Logic

DetermiLogic is a natural-language-to-logic translation pipeline designed to make formal reasoning more reliable and reproducible. Many large language models (LLMs) can convert written requirements into logical formulas, but their outputs are often inconsistent and difficult to verify. Our project addresses this challenge by developing a structured pipeline that combines LLM-based translation with symbolic verification tools, allowing each step to be checked, replayed, and validated for accuracy. As undergraduate researchers, we contributed to the design and implementation of all three stages of the DetermiLogic system: (1) translating natural-language requirements into propositional logic ($NL \rightarrow PL$), (2) validating the translation by converting the logic back into natural language ($PL \rightarrow NL$), and (3) compiling the formulas into conjunctive normal form ($PL \rightarrow CNF$) for automated reasoning. We fine-tuned the models used in these stages, built the logging components, and implemented deterministic decoding settings to ensure that the system produces identical outputs for identical inputs—an essential property for reproducible formal reasoning. To evaluate the pipeline, we tested it on the SatBench dataset of 2,100 natural-language specifications. The final system achieved 94.46% correctness on SAT/UNSAT solver judgments, meaning that the logical formulas generated by the pipeline align with the ground-truth solver outcomes. The median similarity score between the original requirement and its round-trip translation (87.73%) indicates that the logic also preserves the text's meaning. Together, these results demonstrate that combining deterministic LLM behavior with automated validation steps can make natural-language interfaces significantly more transparent and trustworthy. This work highlights a promising direction for building reliable AI tools that support software verification, safety-critical reasoning, and educational applications that require accurate logical translation.

Hangjay Liu

WI - University of Wisconsin-Madison

Discipline: Biology

Authors:

#1 Hazel Bloomquist

#2 Rachel Erickson

Abstract Name: The Gut Brain Connection: Exploring how microbiome diversity influences anxiety and health in young adults

The rate of anxiety and depression have nearly doubled among young adults compared to teenagers, making it increasingly important to understand the factors that contribute to this growing mental health problem. One factor that has emerged as a crucial factor in influencing the development of physical and mental health is microbiome diversity through the gut-brain axis. This study explores the relationship between the gut microbiome and mental health (specifically anxiety) in young adults. We aim to answer the question how gut microbiome diversity affects the anxiety level in young adults, a population increasingly affected by stress challenges. Previous research suggests that certain bacteria groups help decrease risk and severity of anxiety. Data were compiled from a study examining the HAMA 14 (Hamilton Anxiety Rating Scale) score across three different treatment groups, and comparing the relative abundance of various beneficial gut bacteria in these groups to determine the correlation between differences in microbial diversity and anxiety levels. This research hypothesizes that higher gut microbiome diversity is associated with lower anxiety levels in young adults. The one-way ANOVA test revealed a P value (< 0.001) with the significant level of 0.01, there was a statistically significant change in anxiety scores attributable to the treatment. But due to the limitation of a one way ANOVA test, the analysis does not directly associate the change in anxiety level with the microbiome diversity. This highlights the need for further research to explore the biological influences on mental health to better understand the gut-brain axis and solve the ongoing issue.

Kendall Liverpool

Discipline: Film/Photography Studies

Authors:

#1 Kendal Liverpool

Abstract Name: Death or Liberty: A Legacy Stretched Through Time

While attending my second African American Studies class at Virginia Commonwealth, I was introduced to the story of Gabriel's Rebellion, a story about a slave rebellion that took place in Henrico County in the year 1800. This rebellion, however, was prevented due to a thunderstorm that made their plans near impossible to carry out and it was resolved that it would be carried out the next day. However, was all it took for betrayal to spread through the air. Two slaves cracked out of fear and informed their masters of the plan. And so, after so much time and effort, the plot died with twenty-six of its conspirators, including Gabriel. After hearing about this story, I knew I needed to expand my knowledge on it. The original plan for this project was to make a standard forty minute documentary but I realized how many times this story had been told in every format. This new film is not meant to serve as a retelling of the events of the rebellion or its immediate aftermath. It instead focuses on the ripples sent over time that can still be felt by people two-hundred and twenty-five years later. Gabriel's final act stretches out through all of Virginia and leaves a mark from the punitive laws his conspiracy triggered, to the memorials held to honor his tenacity and bravery in the face of insurmountable adversity. The second piece is what this film is about, the legacy Gabriel left behind through his actions, and how it continues to affect the African diaspora of Virginia. After spending weeks researching, attending a memorial service and a play, Gabriel's legacy and the strength he left behind. That is the story I plan to tell.

Anastasia Lobanova

Discipline: Economics

Authors:
#1 Samrat Kunwar

Abstract Name: The Role of Income Inequality and Personal Characteristics in Charitable Donations

Charitable giving remains a major component of civic life in the United States; however, it is still unclear which variables might turn out to be deciding factor in the donation behavior. This study examines how regional income inequality and individual-level factors such as income, educational level, age, happiness, church attendance, and ideology affect charitable donations. The model uses 2014 data from the General Social Survey combined with the state-level U.S. Gini coefficients from the Census Bureau. A log-linear regression model estimated using Ordinary Least Squares was used to test three hypotheses: (1) individuals who live in more unequal neighborhoods contribute a larger part of their income; (2) charitable giving has a nonlinear relationship with income; and (3) conservatives contribute more than liberals. The empirical analysis supports the last two hypotheses; however, the relationship between income inequality and charitable donations is found to be negative. An increase in the Gini coefficient of 0.01 is associated with a 6.82% decrease in expected share of income donated to charity. The results are promising in terms of shaping nonprofit fundraising strategies and policy action meant to encourage charitable contributions across various demographic segments.

Muzammil Lodi

Discipline: Computer Science

Authors:
#1 Musaddiq Lodi

Abstract Name: Fine-Tuning Foundation Models for Cell Type Annotation of Mus Musculus Cancer Data

With the wealth of scRNA-seq data that has been produced, it is necessary to create methods to label the types of cells in these datasets to understand their functions. Foundation models are an important tool in analyzing biological datasets, as they are trained on large amounts of data for a variety of analytical tasks. One such task is annotating the cell types of a given dataset. Foundation models trained on diseased single-cell data can play a key role in identifying healthy and malignant cell types. Through the identification of these biomarkers, we can better understand the influence a drug may have had, or what impacts a disease can cause. However, applying general foundation models to disease datasets can lead to imperfect classification due to the heterogeneity of the data. Mus musculus cancer datasets are abundant, but the labeling and clustering may not be fully processed, and there is a lack of foundation models trained on mouse cancer data. This complicates the analysis for researchers who may not have the computational knowledge required to train or fine-tune a model accurate enough to glean statistically valid insights. This project has two central aims: (1) train foundation models and evaluate their cell type annotation performance on Mus musculus cancer data, and (2) construct a consensus cell type annotation package. Fine-tuning will be done by taking the last-layer embeddings, averaging them, and using methods such as k-nearest neighbors or logistic regression to map them to annotations. We will then create a ranked-choice voting system, as seen in CHAI (Lodi et al. Brief Bioinform. 2024), and compare it to popV (Ergen et al. Nat Genet. 2024). By combining fine-tuned models, we expect improved annotation accuracy and reduced burden on researchers analyzing mouse cancer scRNA-seq data.

Lauren Loeffert

Discipline: Chemistry

Authors:

#1 Shubhankar Kundu

#2 Victoria Brunetti

#3 Haitao Liu

#4 Li Zhang

#5 Joseph Hudson

#6 George S. Hussey

Abstract Name: PVPA-30 Coated Titanium Substrates as a Means of Bone Marrow Protein Deposition and Stability

Titanium (Ti) is widely utilized in implantation technology due to its strength, biocompatibility, and anti-corrosive properties. Our research involves covalently attaching human recombinant bone marrow protein (hBMP-2) to the surface of polymer-coated Ti discs with the potential for use in the context of bone marrow transplantation in spinal surgeries. We synthesized a co-polymer named PVPA-30 which consists of thirty percent vinylphosphonic acid and seventy percent acrylic acid. PVPA-30 is reported to be biocompatible, biodegradable, and a good model for calcium chelation. Ti discs were dip-coated with PVPA-30 and baked to stabilize the polymer on the surface of the titanium before being exposed to PBS buffer over varying amounts of time. Covalent attachment of hBMP-2 to the polymer-coated Ti discs was performed via 1-ethyl-3-(3-dimethylaminopropyl)carbodiimide and N-hydroxysuccinimide (EDC-NHS) coupling. Surface activation and hBMP-2 attachment were analyzed via video contact angle (VCA) measurement, Fourier Transformed Infrared Spectroscopy (FTIR), and X-ray Photoelectron Spectroscopy. Currently, we are developing different chemical environments of the polymer-coated Titanium surface in order to maximize hBMP-2 protein deposition to further support cell attachment. Moving forward, we plan to perform immunohistochemistry (IHC) assays to quantify the amount of protein attached to the surface. Assessment of hBMP-2 activity by cellular study is actively being pursued in collaboration with UPMC with the goal of extending the study to animal surgical replacement models.

Kalina Logan

Discipline: Biology

Authors:

#1 Dayna Averitt

#2 Bitali Islam

Abstract Name: Upregulation of TMEM45B in a Rat Model of Stress-Exacerbated Orofacial Pain

Orofacial pain is a type of pain originating from the face, neck, and head, and is 2-4x higher in females. The reason behind the sex differences is not completely understood yet. Previously, our lab performed RNA sequencing and identified pain-related genes that are differentially expressed in males and females in stress-exacerbated orofacial pain. Transmembrane protein 45B (Tmem45b) is a pain gene that was found to be upregulated in stressed females compared to males. We also confirmed higher expression of Tmem45b cDNA in females compared to males in the Sal+FST (stress only) group. Transient Receptor Potential Vanilloid 1 (TRPV1) is expressed in a subpopulation of nociceptive sensory neurons of TG. To understand the role of the TMEM45B protein in pain nociception, we investigated the expression of TMEM45B and TRPV1 in the trigeminal ganglia (TG) of male and female rats using immunohistochemistry (IHC). Our preliminary data showed that there was less co-expression of TMEM45B and TRPV1, and TMEM45B was found to be expressed in larger ($>40\mu\text{m}$) neurons. To investigate the expression of TMEM45B in larger neuron cells, we will perform IHC with TMEM45B and NF200 (a marker for large, myelinated A- β fiber neurons). We hypothesized that the expression of TMEM45B is higher in females than in males. We created stressed rat

mode by subjecting the male and female rats to the forced swim test (FST) for three consecutive days. We fixed the rats by perfusion fixation and extracted the TG. TGs were sectioned into 30µm sections using a Leica cryostat, mounted onto glass slides. IHC will be performed on sectioned tissue using rabbit anti-P2rx3, guinea pig anti-TRPV1, or chicken anti-NF200 primary antibodies, and goat anti-guinea pig 568, goat anti-rabbit 488, and goat anti-chicken 568 secondary antibodies.

Santiago Londoño

Discipline: Economics

Authors:

#1 Santiago Londoño

#2 Emanuel Vasquez

#3 Sofía Rangel

#4 Valentina Naranjo

#5 Simon Yarce

#6 Eleonora Davalos

Abstract Name: Shared Parental Leave Accelerates Women's Reintegration into the Labor Market

Maternity leave has been widely studied regarding its negative effects on women's labor market participation and the wage penalizations they face around it. Then, paternity leave has been proposed as an alternative to promote shared responsibility. However, little is known about its effect on women's labor market participation. Therefore, this paper estimates the impact of extending paternity leave and implementing shared parental leave on women's reintegration into the labor market. Using administrative records from the Social Security system in Colombia, we analyze data on the number of women and men reporting parental leave before and after the 2021 policy change. We estimate difference-in-difference models with time and place-specific effects for months and cities. We find that after the shared parental leave policy was implemented, men increased in 40 percent the number of months on parental leave taken compared to women, accelerating women's reintegration into the labor market.

Charnell Long

Discipline:

Authors:

#1 JoAnna Ali

JoAnna Ali

Abstract Name: From Classroom to Research Lab: Reimagining Teacher Education

Undergraduate research experiences (UREs) have increasingly been recognized as a high-impact educational practice that deepens students' disciplinary understanding, professional identity, and academic engagement. Within teacher education, UREs offer distinctive opportunities for pre-service teachers (PSTs) to bridge theory and practice, develop critical inquiry skills, and position themselves as producers of knowledge rather than mere consumers. A growing body of research highlights how participation in undergraduate research enhances pre-service teachers' research identities, pedagogical capacities, and reflective practices. Engagement in research helps students reconceptualize research as accessible, valuable, and directly relevant to K–12 teaching. Rather than viewing research as laboratory-based or detached from classroom life, PSTs who engage in inquiry-based projects learn to interpret data, communicate findings effectively, and see

themselves as contributors to educational improvement. Despite the established benefits of undergraduate research participation, few studies have systematically examined how research engagement influences pre-service teachers' development within HBCU contexts, particularly within colleges of education. In this presentation, we will present our preliminary data from a study comparing the experiences of pre-service teachers with and without undergraduate research experience. Using the Larrivee tool (2008) for assessing reflective practice, we surveyed ~100 pre-service teachers and then subsequently conducted two focus group interviews (UREs and non-UREs) to determine the impact of undergraduate research experiences on reflective practice. By examining differences in their confidence, teaching orientation, research identity, and professional self-concept, our research seeks to clarify the role that undergraduate research plays in preparing critically reflective teachers. The comparative design helps illuminate whether and how undergraduate research serves as a pathway to deeper reflective practice among HBCU pre-service teachers.

Elizabeth Lopez

Discipline: Biology

Authors:

#1 Andrea Perreault

Abstract Name: Comparative Analysis of Histone Modifications and Chromatin Accessibility Across Leukemia Subtypes

Leukemia is the most common form of cancer in children, though it affects individuals across all age groups. As a blood-based cancer, malignant cells circulate throughout the body, instead of being confined to a localized tumor site. This increases the likelihood of metastasis and frequent relapse, making it particularly challenging to understand or treat. Acute leukemias are characterized by the rapid proliferation of different types of immature blood cells within the bone marrow. These immature cells lack many of the essential structures and functions of mature blood cells, resulting in a more aggressive, faster disease progression compared to chronic leukemias. This project will focus on acute leukemia subtypes, including T-cell acute lymphoblastic leukemia (T-ALL), acute myeloid leukemia (AML), and acute megakaryoblastic leukemia (AMKL). A computational analysis will be performed using publicly available chromatin profiling sequencing (ATAC-seq) data to compare the chromatin features of patients across different leukemia subtypes and healthy hematopoietic stem cells. Incorporating both cell line and patient-derived data in the analysis will provide a more accurate understanding of whether differences are consistent and may be attributed to disease-specific changes rather than natural genetic variation. ChIP-seq data will be used to analyze differential histone modifications, including H3K27ac, associated with the activation of genes and H3K27me3, linked to gene repression. Analysis of ATAC-seq data will be used to identify differential regions of chromatin accessibility, providing insight into which areas are more transcriptionally active or inactive. By integrating ChIP-seq and ATAC-seq data, this project aims to conduct an analysis of chromatin features to understand how genes are regulated differently in disease states compared to healthy individuals. Additionally, improving the understanding of the epigenetic landscape specific to each acute subtype will support future research efforts in identifying and expanding subtype-specific therapeutic targets.

Jhonathan Lopez

Discipline: History

Authors:

#1 Daniel Morales

#2 Gabriela Leon-Perez

Abstract Name: The Latino Virginia Oral History Project: Documenting Migration Experiences and their Integration in Virginia Among Colombians and Venezuelans in Virginia

The United States has witnessed a significant expansion of the Latino population throughout the country. Virginia has become a key location for understanding Latino migration and integration, given the rapid growth of this population and the diversity of national origins represented across the state. Despite this growth, the experiences of Latinos in emerging destinations, especially Colombians and Venezuelans, remain understudied. Given this gap in scholarly research, the present study seeks to answer the following questions: How have Colombians and Venezuelans in Virginia experienced migration and integration? How can documenting their stories contribute to a more accurate representation of Latino communities in the state? This study is part of a larger project that seeks to enrich Virginia's archival history by documenting and preserving the migration journeys and integration processes of Latinos across the state. The Latino Virginia Project collects oral histories with Latino adults aged 18 or older who have lived in Virginia for at least one year. Interviews include questions about migration experiences, identity formation, community integration, and social or economic challenges. Oral histories are audio-recorded and transcribed in their original language, and all materials are being archived in the Latino Virginia Digital Archive to support future research, preservation, and community engagement. For the purpose of this study, we will focus on 15 participants from Colombia and Venezuela, or whose parents immigrated from those countries. Possible findings from these interviews may include common patterns of cultural adaptation, challenges related to language or employment, and the role of community networks in supporting integration while building new lives in Virginia. These insights will help illustrate the diverse realities of Colombians' and Venezuelans' integration and contribute to a more inclusive historical record.

Isabel Lopez

Discipline: Anthropology and Archaeology

Authors:
#1 Isabel Lopez

Abstract Name: Soy de aquí, como el coquí: The re-indigenization movement within the Caribbean diaspora

Over the last two decades, claims of Indigeneity among the Caribbean diaspora have sparked academic discussions on authenticity and who can rightfully claim Indigenous identity. However, scholars are reluctant to specify the criteria that constitute Indigeneity, leaving the elements of Indigenous Taíno identity unexplored. While previous research recognizes the importance of questioning dominant non-Indigenous pedagogy and centering marginalized perspectives within academia, limited attention has been paid to challenging conventional historical narratives regarding the Taínos. Researchers have overly focused on blood quantum among self-identified Taínos, despite Indigenous communities valuing other criteria such as family history, cultural differences from the majority population, previous experiences of colonization, and connections to ancestral lands to justify their Indigeneity. Interviews with Caribbean-Americans who self-identify as Taíno focus on reclaiming Indigenous identity and the revival of Taíno culture. Thematic analysis of these interviews will identify common metrics used to justify claims of Indigeneity among the participants' responses. This research may reveal collective historical memory and spiritual ties to the ancestral islands as key criteria of Neo-Taíno identity. Ultimately, the findings aim to amplify Taíno voices in academic conversations and dispel the myth of Taíno extinction.

Jacqueline Lopez

Discipline: Political Science

Authors:

Abstract Name: Narratives of Fear: Xenophobia, Media, and Immigration Anxiety

The United States is not just shaped by its history, but by the strong influence of immigrants who helped it grow. Yet today, immigration has curiously evolved into one of America's prominent fears. What was once a matter of policy has advanced into a growing societal tension. With the rise of politicized media and xenophobic themes in our political climate, the fear of illegal immigration continues to surge among the American population. Prior research demonstrates that race significantly influences how individuals interpret immigration policy and form attitudes toward immigrant communities. Building on this work, I will analyze the effect that partisan media has on xenophobic rhetoric to help explain the intensified fear of illegal immigration. Using the dataset from the Chapman Survey of American Fears, I employ a design of quantitative research to examine how politically fueled media sources reinforce negative perceptions of immigrants and thus contribute to the growing fear of illegal immigration. The findings aim to highlight the overall role of the media in our nation's anxiety about immigration and ultimately reveal how distorted patterns of representation continue to perpetuate inequality in American society. To uphold ethical impartiality, we must address the disparities that affect immigrants in order to truly achieve equality in our state.

Vanessa Lopez

Discipline: English and Literature

Authors:

Abstract Name: Let the Students Design: Building an AI Critical Literacy Course with and For Students

Note: The lead faculty mentor is proposing these presentations before students conduct research (Jan-May), due to the loss of funding in July 2026. Four student presenters and three faculty members in an English Department plan to attend NCUR. We propose a round-table or two presentations with two student presenters each. The students will show how collaborative, student-centered research and design can foster critical thinking, technological fluency, and equitable access to AI education while offering a model for integrating AI critical literacy into general education writing programs. The rapid spread of AI across communication and composing technologies has made it harder for faculty and students to maintain integrity and autonomy as writers. In response, faculty mentors and undergraduate researchers are collaborating to develop AI critical literacy. Student researchers will help formalize a relevant, accessible, evidence-based course and address our guiding question: How can collaboration between student research assistants and faculty mentors inform the design of an ethical AI critical literacy course that engages students while addressing evolving debates about machine learning and authorship? This project is grounded in work on digital ethics, critical information literacy, and student-centered curriculum design, particularly in HSIs where first-generation and Hispanic students often lack equitable access to emerging technologies. Students will present selections from their mixed-methods approach that incorporate the following: surveys and focus groups, analysis of existing AI literacy curricula, experimental piloting of assignments, and their evaluation of AI outputs for bias, accuracy, and rhetorical appropriateness. The presentations will demonstrate how student-centered design can foster critical thinking, technological fluency, and equitable access to AI education. Expected results include a modular course proposal with units on ethics, authorship, and algorithmic bias; a digital portfolio of adaptable materials; and recommendations for inclusive pedagogies that foreground student voices in course design.

Pricilla Lopez Serrano

Discipline: Biology

Authors:

#1 Betsy Martinez-Vaz

Abstract Name: Microbes vs. Explosives: Bacterial Degradation of Nitroguanidine

Insensitive munitions (IM), such as nitroguanidine (NQ), NTO, and DNAN, are modern explosives designed to be safer for military personnel, but they still pose significant environmental hazards. These compounds can leach into surrounding soil and water, threatening ecosystems and public health. This project explores how microbes found in wastewater sludge might offer a sustainable bioremediation strategy to help clean up explosive contamination. The central question guiding this research is: Can sludge-derived microbial communities degrade nitroguanidine, an IMX-101 component? While previous studies have explored microbial degradation of traditional explosives, much less is known about microbial metabolism of newer insensitive munitions. This work aims to fill this gap by identifying and characterizing environmental microbes capable of degrading these emerging pollutants. To investigate this, we performed enrichment cultures with municipal sludge samples and NQ-based media, followed by microbial isolation, HPLC analyses, Gram staining, DNA extraction, and 16S rRNA gene sequencing for bacterial identification. We also monitored bacterial growth through OD600 measurements and visualized microbial DNA using agarose gel electrophoresis. Preliminary results suggest that certain isolates, including *Pseudomonas putida* and other unclassified strains, may possess the ability to break down NQ. Ongoing analysis is focused on genomic annotation using RAST and assessing whether these microbes express enzymes relevant to nitro-compound degradation pathways. Our findings suggest that native microbial communities could play a role in mitigating contamination from military sites, highlighting the potential for low-cost, community-informed bioremediation approaches. This work not only contributes to the scientific understanding of bacterial degradation of insensitive munitions but also addresses broader questions of environmental justice and the long-term impact of military-industrial activities on marginalized communities.

Jazlyn Lopez Silva

Discipline: Physics and Astronomy

Authors:

#1 Jazlyn Lopez Silva

#2 David Hassouna

#3 Daeha Joung

Abstract Name: 3D-Printed Freestanding PEDOT:PSS for Soft, Stretchable Electrochemical Sensors

Semiconducting Poly(3,4-ethylenedioxythiophene):polystyrene sulfonate (PEDOT:PSS) has been widely employed in flexible electrodes and organic electrochemical transistors for biomedical sensing due to its high electrical conductivity, favorable electrochemical behavior, optical transparency, and biocompatibility. However, conventional fabrication methods—such as spray coating, spin coating, and dip coating—offer limited design flexibility, complicate device integration, and often yield short operational lifetimes. Direct ink writing (DIW) 3D printing provides a compelling alternative, enabling microscale patterning, complex 3D geometries, and integration with other printable materials to form heterogeneous soft-electronic architectures. These 3D microstructures allow precise control over surface area, alignment-induced anisotropic conductivity, and mechanically reconfigurable device geometries that retain performance under deformation. Despite these advantages, most PEDOT:PSS structures remain limited to simple 2D layouts, and few studies

explore DIW printing of PEDOT:PSS as the 3D active electrochemical sensing material. In this work, we introduce 3D freestanding, highly flexible PEDOT:PSS structures for soft, multifunctional electro-chemical platforms. By pre-repolymerizing sorbitol before blending with PEDOT:PSS and employing a rapid solvent-drying process, we achieved freestanding printed structures with exceptional mechanical compliance—100–150% stretchability—without additional thermal curing. Using an AC electrochemical measurement approach, we induce shallow, reversible ionic diffusion and continuous regeneration of oxidized PEDOT, substantially extending device lifetime and suppressing irreversible hysteresis. The tissue-like mechanical properties of these printed structures enable tactile sensing in which electrical conductivity, ionic transport, and viscoelastic behavior are tightly coupled. This platform provides a data-driven framework for the systematic design and optimization of soft electrochemical sensors, opening new pathways for wearable technologies, lab-on-a-chip systems, and implantable medical sensing platforms.

Katherine Lopez Valdez

Discipline: Interdisciplinary

Authors:

#1 Traci Roberts-Camps

Abstract Name: The Complexity of a Mother's Life: An analysis of Claudia Llosa's film, *Distancia de Rescate*.

This research will examine the theme of a mother's fear and desires and the techniques of sound and use of nature in Claudia Llosa's film *Distancia de Rescate*, 2021. Located in a rural town of Argentina, Llosa includes the country's personal attributes that play a part in the story's narrative, expanding on the themes of fear and desire. In my presentation, I talk about the complexities that come with being a mother. Examining specific scenes of the two mothers, Amanda and Carola, I explore the growing relationship that begins to develop between them and their two children, Nina and David. Llosa highlights this new riveting relationship between Amanda and Carola, and it becomes known to the audience that something deeper is happening beyond the surface. I build upon prior analysis of this film, from scholar Andrea Meador Smith's "Monstrous Desire in Samanta Schweblin's and Claudia Llosa's *Distancia de rescate*". In the analysis by Smith, she writes, "Amanda's memories, however, repeatedly return to her fascination with Carla and her constant preoccupation with Nina's safety" (Smith 110). I identify the monstrous desires and unprecedented dangers that follow this mother's children, and I identify how a mother's own personal desires play a role in the safety of her children. Furthermore, I seek to analyze how the mothers in the film are in a constant state of measuring their children's rescue distance to be there to save them from death. This will be a PowerPoint presentation presented in Spanish.

Gabriella Loredó Marquez

Discipline: Psychology

Authors:

#1 Meghan Gangel

#2 Cielo Karen Vera

#3 Corinthia Elorza-Reyes

#4 Creed Bone

#5 Bella Fresquez-Clifton

Abstract Name: Familism is not always protective: Family Weight Stigma, Familism, and Body

Dissatisfaction for Latine Youth

Body dissatisfaction is a rising cause of concern as bodies become larger and culturally, we continue to wage war on obesity. Although Latine youth suffer from the higher rates of obesity, previous work demonstrates that Latine youth are protected from body dissatisfaction by higher rates of familism. Specifically, values of family connectedness increase the likelihood of that Latine youth do not internalize thin ideals and feel encouraged about their bodies. However, what happens if families are the source of body dissatisfaction for Latine youth? For example, when Latine youth receive body related messages from siblings, they were more likely to internalize thin ideals and report more depressive symptoms. Although Latine intervention studies show positive effects of family support on weight loss, these studies do not examine the negative effects of familism on weight stigma and body dissatisfaction. The current study examines the effect of family-based weight stigma on body dissatisfaction and identifies if familism is a moderator. Using a mixed-method approach, this study will examine family sources of weight stigma, familism, and body dissatisfaction, controlling for obesity and gender. Latine adults aged 18-25 will be recruited from a regional university and Latine community programs to participate in a laboratory visit, which will include adiposity measurements, and self-reported surveys of body dissatisfaction, family sources of weight stigma (open- and closed- ended responses), and familism. We hypothesize that if Latine youth have high rates of familism, increasing family related weight stigma will predict increased body dissatisfaction. Understanding the role of familism and increased risk of family-based weight stigma for Latine youth will help inform interventions tailored to reduce obesity while not increasing body dissatisfaction.

Enzo Lorenz

Discipline: Biology

Authors:

#1 Sofia Cuello

Abstract Name: Targeting Metabolic Reprogramming in Drug-Resistant Breast Cancer Using Shikonin

Drug resistance in breast cancer (BC) remains a major challenge, and many resistant cancer cells rely on the Warburg effect—where glycolysis is favored over oxidative phosphorylation (OXPHOS) even when oxygen is available. This metabolic pattern supports rapid cell growth but also creates weaknesses that can be exploited therapeutically. In this study, we examined whether shikonin can disrupt this glycolytic dependence and push drug-resistant BC cells toward mitochondrial respiration. We tested their effects in MCF-7 (ER+/PR+), MDA-MB-231 (triple-negative, highly drug-resistant), and non-cancerous MCF-10A epithelial cells by measuring cell viability, oxidative stress, oxygen consumption, and metastatic potential. Shikonin significantly reduced viability in both MCF-7 and MDA-MB-231 cells, while having minimal effects on MCF-10A cells. Treated cancer cells also showed increased oxygen consumption, indicating a shift toward OXPHOS. This metabolic change was strongest in the MDA-MB-231 line, making them more sensitive to disruptions in mitochondrial function. Increased mitochondrial activity led to higher levels of oxidative stress, pushing these cells beyond their survival limits and triggering apoptosis. ROS levels remained lower in MCF-7 cells, likely due to their naturally higher dependence on OXPHOS. To better understand the metabolic changes driving these outcomes, we propose using real-time reverse transcription PCR to measure transcriptional changes across major categories of metabolism-related genes. These include genes that regulate mitochondrial biogenesis and electron transport chain function, key enzymes that control glycolysis, transporters that influence glucose uptake and lactate handling, transcription factors involved in hypoxia-driven metabolic regulation, and antioxidant pathways that respond to elevated ROS during increased mitochondrial respiration. Analyzing changes in these gene groups will clarify whether the compounds promote coordinated metabolic reprogramming toward OXPHOS. Overall, this study demonstrates the potential of targeting cancer metabolism to overcome drug resistance and highlights how shifting cells away from the Warburg phenotype may enhance therapeutic effectiveness.

Kali Lotankar

Discipline: Law and Legal Studies

Authors:

#1 Brandon Blankenship

Abstract Name: IS ARTIFICIAL INTELLIGENCE EFFECTIVE IN TESTING THE EXPLAINABILITY OF COURT ORDERS?

This study examines whether artificial intelligence (AI) can effectively explain court orders in ways comparable to human jurists, a question that has become increasingly important as AI systems gain prominence in legal analysis and judicial support. Building on research in explainable artificial intelligence, legal interpretation, and judicial communication, the paper develops a comparative framework that evaluates AI-generated explanations alongside those authored by judges, attorneys, legal professionals, and law students. The analysis focuses on four core AI capacities—legal interpretation, compliance with legal standards, neutrality, and level of detail—and three jurist attributes—legal expertise, interpretation of legal language, and communication skills. These variables are assessed against established measures of judicial explainability, including clarity, depth of legal analysis, identification of gaps, and consistency across cases. Using a mixed-methods design, the study employs structured evaluations from panels of legal experts and advanced law students to score AI- and jurist-generated explanations of standardized court orders. Quantitative ratings and qualitative commentary are analyzed to determine the relative strengths and weaknesses of each explanatory mode. Findings from this research aim to clarify whether AI can match jurists' reasoning quality or is better understood as a complementary tool that enhances judicial transparency, supports legal accuracy, and identifies gaps in legal decision-making. This comparison not only highlights AI's current capabilities but also identifies areas requiring further refinement before judicial integration. Insights from this research may inform the design of future legal technologies aimed at improving public understanding of court processes. By empirically assessing how AI and human jurists perform across key explainability dimensions, the study contributes to ongoing debates about the appropriate integration of AI in judicial processes and the evolving standards for transparent, comprehensible, and fair legal communication.

Hannah Loub

Discipline: Gender, Ethnicity, Diversity, or Cultural Studies

Authors:

#1 Brian Lagotte

Abstract Name: "Temporary Roadblocks": Exploring how Individuals with Disabilities Navigate Social Inclusion in the UK

The research project will address how individuals with disabilities in the UK navigate social inclusion amidst systemic biases and policies that could pose a barrier to their full integration into society. Societal perceptions of disability can have profound effects on policy and the stigmatization of individuals with disabilities, leading these individuals to adapt necessary strategies to preserve agency while working towards individual goals and desired outcomes. Current literature discusses barriers individuals with disabilities face, including limited employment and socialization opportunities; the project will therefore explore the strategies individuals with disabilities employ to navigate these barriers. The project will apply the social model of disability to explore how systemic barriers and mindsets impede upon the daily lives of individuals with disabilities. A group of three individuals with a physical disability and three individuals with a cognitive disability will answer a series of open-ended questions to gain first-hand accounts of the individuals' perspectives and experiences. The responses will then be thematically coded and analyzed using the social

model of disability to uncover the barriers individuals with disabilities face and the strategies individuals use to navigate these barriers. Findings may highlight common barriers to social inclusion as well as the similar strategies individuals with disabilities use to overcome these barriers and maintain agency. The project will shed light on the lived experiences of individuals with disabilities, therefore informing policymakers on the future of disability policy and encouraging shifting mindsets regarding disability.

Rebecca Lovasco

Discipline: Psychology

Authors:

#1 Casey E. Baldwin

#2 Marty G. Woldorff

Abstract Name: Reward-Based Neurocognitive Biases in Probabilistic Reinforcement Learning and Unconscious Visual Perception

Conscious perception allows people to subjectively experience their surroundings, but it is unclear what stimuli will be consciously perceived and by what mechanisms. Because rewarding stimuli often capture attention, probabilistic reinforcement learning—which allows people to incrementally learn which stimuli are likely to be rewarding—may offer a mechanism through which the visual system prioritizes such inputs for conscious perception. The present study tested whether reinforcement learning shapes conscious perception by enhancing neural responses to probabilistically rewarding stimuli. Twenty-one college-aged participants completed ten iterations of combined ‘learning+perception’ study blocks while electroencephalography (EEG) was recorded. During learning blocks, participants identified which stimulus type (face or house) was probabilistically more likely to yield a reward. During perception blocks, participants localized a briefly presented, perceptually masked face or house stimulus and rated how clearly they saw it (perceptual ratings). The findings showed that participants successfully learned which stimulus type was likely to be rewarding. Importantly, during the perception block, previously rewarding stimuli elicited enhanced event-related potential (ERP) responses that have been previously associated with conscious visual perception, namely a greater occipito-parietal visual awareness negativity (VAN; ~200-300 ms) and a greater centroparietal late positivity (LP; > 400 ms), compared to stimuli that were not previously rewarding. However, subjective perceptual ratings did not differ between rewarding and non-rewarding stimuli. These collective findings suggest that neural processing was enhanced for the rewarding stimuli but that this enhancement did not translate into changes in reported awareness. This study provides initial evidence that reinforcement learning can influence the neural correlates often associated with conscious perception, offering a potential mechanism by which the visual system prioritizes inputs for conscious perception based on reward history.

Chad Lovenguth

Discipline: Mathematics

Authors:

#1 Alatheia Jensen

Abstract Name: Comparing Machine Learning and Game-Theoretic Strategies in No Limit Texas Hold ’Em

This research compares the outcomes of playing a No Limit Texas Hold ’Em poker variant using machine learning algorithms with outcomes obtained from classical probability and game theory. Currently, there are few publicly available findings on machine learning–based poker strategies because of their complexity, and

many high-performing results are proprietary or sold commercially. To explore this gap, we built a custom game environment in Python and collected large-scale data from thousands of simulated games. The environment records detailed game states and outcomes in a tab-separated table, which is then used to train and evaluate machine learning models. Our study compares results obtained from these machine learning approaches to strategies in game theory, including approximations of Nash equilibria in simplified game states. We evaluate overall strategy performance by analyzing metrics such as win rates and expected returns. In addition, we examine whether machine learning algorithms exhibit game-theoretic behaviors, including bluffing and value betting. The expected results of this project include identifying scenarios in which certain strategies outperform others and determining the extent to which machine learning models align with or diverge from game-theoretic predictions. Ultimately, this research aims to help readers better understand how game theory can inform decision-making in poker and to provide insight into choosing effective strategies for their own gameplay.

Wyatt Lowe

Discipline: Biology

Authors:

#1 Michael Donnenberg

#2 Pradip Singh

Abstract Name: Kinetic Characterization of the Type IV Pilus Extension ATPase PilB1_CD from *Clostridioides difficile*

Clostridioides difficile is a major cause of antibiotic-associated infections and a leading source of illness in healthcare settings. A key factor in its ability to colonize and spread is the Type IV pilus (T4P), a flexible filament that allows bacteria to move across surfaces and attach to host tissues. The motor that powers pilus extension, known as PilB, is an ATPase enzyme that converts the chemical energy of ATP into mechanical work. Although this process has been studied in several Gram-negative bacteria, it remains poorly understood in *C. difficile*, a Gram-positive pathogen with distinct cell surface architecture. This project aimed to investigate the catalytic behavior of PilB1_CD, a T4P extension ATPase from *C. difficile*. The protein was produced in *Escherichia coli*, purified using nickel affinity and size-exclusion chromatography, and assayed for ATP hydrolysis activity. A colorimetric phosphate detection assay was used to measure the rate of phosphate release at varying ATP concentrations, and the data were analyzed to determine the enzyme's Michaelis-Menten parameters (V_{max} and K_m). Preliminary findings show that PilB1_CD follows classic enzyme kinetics and exhibits measurable ATPase activity, suggesting a conserved catalytic mechanism among T4P ATPases. Understanding the energetic properties of PilB1_CD helps clarify how *C. difficile* assembles its pili and may reveal new targets for disrupting surface colonization. This work contributes to a broader understanding of how bacterial movement and attachment are powered at the molecular level, highlighting a potential link between enzyme activity and infectious capability.

Wenqi Lu

Discipline: Business

Authors:

#1 Wenqi Lu

Abstract Name: The Impact of U.S. Section 201 and 301 Tariffs on China's Solar Panel Exports and Global Trade Diversion Effects

This study investigates the effects of U.S. tariff policies, particularly Section 201 and Section 301 measures, on China's solar panel exports and potential trade diversion patterns. The research aims to determine whether higher U.S. tariffs significantly reduce direct Chinese exports to the U.S. and whether these measures cause Chinese exporters to redirect their products to other major importing countries. Using monthly panel data from 2018 to 2025 collected from UNNCUR Travel Grant Comtrade, Ember, the U.S. International Trade Commission, and the World Bank, this paper constructs a fixed-effects panel regression model at the country-product-year level. The dependent variable is the export value of Chinese photovoltaic (PV) products, while key explanatory variables include U.S. tariff rates under Section 201 and 301. Control variables consist of exchange rates, GDP, solar commodity prices, trade exposure, and installed solar capacity. Empirical results confirm that U.S. tariffs sharply cut China's PV exports to America, while sparking a clear rerouting of shipments to fast-growing markets like Indonesia, Vietnam, and Bangladesh. Using a gravity-model setup, I map exactly how these barriers are rewiring renewable-energy supply chains. Policymakers now have hard evidence: tariffs do protect domestic industry, but they also push clean-energy hardware into new corners of the globe. This will reshape both who trades with whom and what the global PV map looks like in the future.

Yunzhen Lu

Discipline: Sociology

Authors:

Abstract Name: "Solugender": Reimagining Gender Beyond the Binary as Individualized Metaphor

This paper introduces what I tentatively call solugender, an exploratory framework that reimagines gender as an individualized metaphor. Building on feminist and post-structuralist critiques of essentialism (Butler, Haslanger, Shelby) and trans and queer theory's insistence on self-definition and first-person authority (Stryker, Bettcher), I experiment with solugender as both diagnostic and generative—a way to articulate lived experiences shaped by race, class, migration, and mental condition. In this framework, gender functions less as a label than as a symbolic language through which individuals translate and reconfigure their social and affective realities. Methodologically, I examine solugender alongside gender pluralism, fluidity, and abolitionism, using criteria of minimizing oppression, practical feasibility, and fostering well-being. While solugender is future-oriented, it remains aware of the historical conditions under which gender has been named and policed, using them as empirical baselines. I juxtapose three examples testing the framework's utility (1) Samoa's fa'afafine, where gender operates as a social role embedded in kinship, (2) 2010s–2020s digital folksonomic practices; and (3) online emergent identity practices among neurodivergent Gen Z, such as xenogender formations. Reading these as shifting naming regimes with both poetic autonomy and collective adaptability of gendered meaningmaking, I ask and argue what kinds of futures they make imaginable—and whether an individualized grammar of gender might de-regulate without erasing power, and empower without re-essentializing. As an undergraduate researcher, I present solugender as a developing framework open to critique and refinement. My goal is not to finalize a theory, but to test whether this metaphorical reorientation of gender can contribute to social justice—by resisting normative regulation, enabling inclusive self-expression, and reframing gender as a resource for psychological well-being and collective flourishing. I ultimately hope this concept can serve as a heuristic that other researchers might adapt in gender studies, cultural analysis, and social policy contexts.

Muriel Lubelczyk

Discipline: Chemistry

Authors:

#1 Saghar Jarollahi

#2 Brittany White-Mathieu

Abstract Name: Macrocyclic Chromophores as a Novel Class of Fluorescent Molecules

Fluorescent proteins are extremely useful in biological imaging techniques that enable the observation of cells and biological processes. Green Fluorescent Protein (GFP) is widely considered the most commonly used fluorescent protein for biological imaging due to its accessibility and compatibility with biological molecules. The portion of the protein that is responsible for the fluorescent response is an imidazolidinone-based chromophore that is not fluorescent outside of the restrictive protein structure, limiting the development of this compound as a scaffold for advanced fluorescence-based imaging techniques. This research aims to demonstrate that restricting the free rotation of the chromophore via macrocycle formation will enable fluorescence outside of the protein environment and establish imidazolidinone-based chromophores as scaffolds for fluorescent molecule development. Here we describe progress toward the synthesis of macrocyclic imidazolidinone-based chromophore molecules with restricted rotation. We expect the rotational restriction to allow fluorescence in a GFP chromophore macrocycle to yield a new class of small molecules that can be tailored for imaging applications. Efforts to convert a synthetically accessible oxazolidinone intermediate into the final imidazolidinone core will also be described. The optical properties of all synthesized molecules will be investigated using UV-Vis and fluorescence spectroscopy, highlighting differences between linear and macrocyclic structures and oxazolidinone and imidazolidinone cores to illustrate the advantages of macrocycle formation and nitrogen-swapping. Together, the synthetic efforts and optical characterization of novel fluorescent molecules described here will result in the development of new imaging techniques to improve our understanding of biological processes in living systems.

Joseph Lubig

Discipline: English and Literature

Authors:

Abstract Name: A Vignetted Life

The connections we make throughout our lives shape who we are. Friends, family, and romantic partners all play a role — big or small — in how our personality and behavior take form as we grow older, for better or worse. It's not just the bonds we form and maintain that change us but also the ones that break, wither, or change in some way. It is all of those connections that I seek to implement within my story. In my novella, "A Vignetted Life," I translate into narrative the research done by multiple experts in the fields of behavioral science and psychology, with emphasis on Erik Erickson's theory of psychosocial ego development. My presentation will showcase how my main character, Forest O'Berry, exemplifies these psychological concepts as he recalls moments of his life at the ripe old age of 85. Forest talks about the rocky relationship with his immediate family, the father figure he finds in his gym teacher, and friendships that form and fade as the years progress. All of this leads to him coming to terms with who he is at the tail-end of his life. To understand the influence our friends and family have on us is to understand our friends and family themselves. This action creates a stepping stone to understanding others outside of ourselves and our close relationships embracing empathy and differing perspectives.

Chloe Lucas

Discipline: Biology

Authors:

Abstract Name: Identifying Enrichment Methods for Bacteria within the Midguts of *A. vexans* Mosquitoes from the Oklahoma City Metro Area

Mosquitoes are common vectors for diseases such as West Nile Virus. Mosquitoes' midguts contain a complex microbial community, playing a significant role in mosquitoes' innate immune systems. Analyzing the microbiome within the midgut of mosquitoes could reveal bacteria that impact the transmission or suppression of viruses. One approach to this analysis is cultivating microbes from the midgut. Microbial cultivation is challenging because many microbes rely on complex, often unknown environmental factors, making it difficult to replicate their natural habitats. To overcome this, an experiment was designed to test media formulated to mimic the mosquito midgut environment, aiming to enhance the cultivation of microbes adapted to that niche. Bacterial diversity within the midguts of the *Aedes vexans* mosquitoes caught within Oklahoma City's Stinchcomb Wildlife Refuge was analyzed via 16S rRNA analysis of bacterial communities and isolates. Bacterial profiles from the community composition prior to inoculation were compared to enrichments using Mosquito Enrichment Medium (MEM). Bacteria were then plated onto MEM agar. Comparing species richness at 0 and ~45 hours after inoculation revealed a significant difference. Additionally, 37 isolates were cultivated. Genera, such as *Providencia* and *Citrobacter* are widely represented in community analysis, while only *Providencia* were isolated, along with a potentially novel species. Overall, these findings demonstrate that distinct media conditions enrich various bacterial species from the *Aedes vexans* midgut, including those that had yet to be cultivated. Collecting cultivable mosquito microbes is critical to studying the bacteria involved with the mosquito's ability to transmit viruses to a human host.

Chloe Lucas

Discipline: Biology

Authors:

Abstract Name: Comparing Mosquito-Microbiota Throughout Enrichment

Mosquitoes are common vectors for diseases such as West Nile Virus. Mosquitoes' midguts contain a complex microbial community, playing a significant role in mosquitoes' innate immune systems. Analyzing the microbiome within the midgut of mosquitoes could reveal bacteria that impact the transmission or suppression of viruses. One approach to this analysis is cultivating microbes from the midgut. Microbial cultivation is challenging because many microbes rely on complex, often unknown environmental factors, making it difficult to replicate their natural habitats. To overcome this, an experiment was designed to test media formulated to mimic the mosquito midgut environment, aiming to enhance the cultivation of microbes adapted to that niche. Bacterial diversity within the midguts of the *Aedes vexans* mosquitoes caught within Oklahoma City's Stinchcomb Wildlife Refuge was analyzed via 16S rRNA analysis of bacterial communities and isolates. Bacterial profiles from the community composition prior to inoculation were compared to enrichments using Mosquito Enrichment Medium (MEM). Bacteria were then plated onto MEM agar. Comparing species richness at 0 and ~45 hours after inoculation revealed a significant difference. Additionally, 37 isolates were cultivated. Genera, such as *Providencia* and *Citrobacter* are widely represented in community analysis, while only *Providencia* were isolated, along with a potentially novel species. Overall, these findings demonstrate that distinct media conditions enrich various bacterial species from the *Aedes vexans* midgut, including those that had yet to be cultivated. Collecting cultivable mosquito microbes is critical to studying the bacteria involved with the mosquito's ability to transmit viruses to a human host.

Olivia Lucia

Discipline: Biology

Authors:

#1 Olivia Lucia

Abstract Name: Investigating Environmental Drivers of Toxin Gene Expression in Harmful Algal Bloom-Forming Species Along the Coast of New Hampshire

Harmful algal blooms (HABs) caused by the dinoflagellate *Alexandrium* spp. pose serious risks to coastal ecosystems, aquaculture, and human health through the production of saxitoxin, a potent neurotoxin responsible for paralytic shellfish poisoning. Despite their global impact, the environmental and molecular mechanisms driving saxitoxin remain unclear. This research investigates how temperature and salinity influence the expression of the *sxtA* gene, a key component in the saxitoxin biosynthetic pathway that initiates toxin formation. To address this question, *Alexandrium* cultures were grown under controlled laboratory conditions that varied by temperature (15°C and 18°C) and salinity treatments (21 ppt and 26 ppt). DNA was extracted from each culture and analyzed using quantitative polymerase chain reaction (qPCR) to measure *sxtA* gene expression. A synthetic gene block standard and a culture dilution curve were used to develop a reliable qPCR assay and ensure accurate quantification. To evaluate whether *sxtA* gene activity corresponded with actual toxin production, enzyme-linked immunosorbent assays (ELISA) were performed to measure saxitoxin concentrations in the same experimental cultures. Preliminary results suggest that *sxtA* gene expression was the highest at 18°C, indicating that warmer temperatures may enhance saxitoxin biosynthesis. Salinity differences showed less consistent effects on gene expression, suggesting temperature is a stronger environmental driver. These findings help bridge molecular biology and ecological monitoring by revealing how environmental changes can regulate toxin production in harmful algal blooms. Ultimately, this research aims to improve predictive tools for bloom toxicity and support the development of faster, gene-based monitoring strategies for coastal management. By linking environmental factors, gene expression, and toxin output, this study contributes to a deeper understanding of how climate-driven changes may influence the frequency and severity of harmful algal blooms.

Luisa Lucigniani

Discipline: Business

Authors:

Abstract Name: The price of Sleep: How Rest Influences Worker Preferences

With rising unemployment rates, the job market has become increasingly competitive, compelling workers to enhance their productivity and efficiency. However, this raises the question of whether such demands come at the cost of adequate sleep. The topic of sleep has long been associated with health behavior, however recent studies prove that it has economic implications as well. Specifically, the literature has evaluated the relationship between sleep duration/quality and labor-market outcomes such as wages, employment, absenteeism, and presenteeism. Many advancements have been made regarding how sleep affects the economy on a national level, however the question remains: How does variation in sleep quantity and quality influence self-reported productivity among working-age adults? To answer this question, a 15 question survey was distributed using Repdata and 386 responses were collected. This study found that when participants were asked whether they would take a lower paying job that guaranteed more consistent sleep, respondents across sleep brackets, not just those with low sleep, would accept the position: suggesting that workers place intrinsic economic value on adequate sleep, even at the expense of income.

Ella Luedeke

Discipline: Computer Science

Authors:

#1 Indika Kahanda

#2 Natalie Spiro

Abstract Name: Exploring the Feasibility of Detecting Physics Student Misconceptions Through Writing Assignments Using Large Language Models

Students in notoriously difficult STEM courses often hold misconceptions due to the emphasis on problem-solving over conceptual understanding. Writing assignments can help instructors uncover these misunderstandings, but grading them is time-consuming and impractical, particularly in large classes. Large language models (LLMs) offer a promising solution for automating the identification of misconceptions in student writing. In this study, we analyzed student responses from an introductory physics short written response assignment, focusing on misconceptions related to motion. We evaluated multiple prompting techniques using two open-source LLMs, Meta's Llama 3.2 and Microsoft's Phi4, through in-context learning, where the models learn their tasks directly through the prompting. This assesses the LLMs' ability to accurately identify student misconceptions at the sentence-level. As an alternative, we employed supervised fine-tuning, where the models are explicitly trained with the gold-standard data, with BERT and ModernBERT models. BERT and ModernBERT are pre-trained open-source LLMs by Google. Experimental results indicate that fine-tuning outperforms in-context learning. However, filtering the training data to include only sentences relevant to the misconception as opposed to full student response improved in-context learning performance. In contrast, using synthetic data generated using another LLM for expanding the training data for fine-tuning had inconsistent effects. The best-performing models were evaluated using F1 scores, an evaluation metric that measures accuracy, and reached scores of 0.6 out of 1.0. This suggests that with additional refinement and more training examples, LLMs could potentially reach a level suitable for instructor use in identifying student misconceptions. This work demonstrates the potential for leveraging LLMs to provide scalable, automated feedback in STEM education, ultimately supporting instructors in addressing conceptual gaps more efficiently.

Ava Luedtke

Discipline: Nursing and Public Health

Authors:

#1 Jessica Nelson

Abstract Name: Oral Histories on Local Nurses

Many people experience formative moments in childhood that inspire them to pursue careers in the medical field, often influenced by family members in healthcare or pivotal events during high school. Oral histories are a valuable method for gathering personal accounts and insights into individuals' life experiences and significant historical events. This research explores the question: How are oral histories used to reveal patterns in nursing over time? Conducting oral histories requires audio and video equipment to record interviews, which are later transcribed—converting spoken language into written documentation. All materials will be preserved for future research at the University of Wisconsin-Milwaukee Archives. The UWM College of Nursing houses a dedicated museum featuring artifacts such as nursing tools from WWI

and pins awarded to graduating nurses. Gaining an understanding of nursing history over centuries helps contextualize the evolution of the field. In this project, nurses from the Milwaukee area are invited to share their educational and professional journeys through guided interviews. For example, a typical question might be, “How did technology change from the start to the end of your career?” To date, nine oral histories have been completed. Completing these oral histories provides valuable resources for connecting nursing experiences across generations, highlighting both similarities and differences in nurses’ lives. Additionally, this research will bring greater attention to the UWM Center for Nursing History and the significant influence nurses have had in healthcare.

Fernando Luna

Discipline: Environmental Science and Sustainability

Authors:

#1 Fernando Luna

#2 John Griffis

Abstract Name: Comparison Between the Effects D-Frame Nets and Kick Nets Have on Stream Quality Metrics and Macroinvertebrate Diversity

Accurate stream biological assessment is essential for monitoring freshwater ecosystem health, and the reliability of these assessments depends on both the biological indicators and the methods used to collect them. This study investigated how the sampling equipment, specifically D-frame nets and standard kick nets, may affect the assessment of macroinvertebrate diversity and stream quality metrics. Kick nets, with their larger collection surface and angled design, are expected to yield higher taxa richness and more consistent results compared to D-frame nets. To test this, macroinvertebrate samples were collected from Lily Cache Creek riffles at two sites in Plainfield, IL (Van Horn Woods and Four Seasons), using both net types across three sampling dates. Each sample was analyzed for total abundance, taxa richness, EPT (Ephemeroptera, Plecoptera, Trichoptera) taxa, MBI (Macroinvertebrate Biotic Index), SDI (Shannon Diversity Index), and pollution tolerance classifications. Kick nets consistently produced higher total organism counts (574 vs. 129), significantly greater total taxa richness, and a higher percentage of pollution-intolerant taxa was recorded at Four Seasons (80%), while Van Horn had a higher percentage of intolerant taxa (60%). The resulting EPT to non-EPT ratio yielded a p-value of 0.163 when the data from all three kick net samples and all three D-frame net samples were combined. D-frame nets yielded more variable results, especially in open-canopy sites with slower flow. These findings suggest that while both nets are effective for capturing EPT taxa, kick nets provide more reliable and comprehensive data for stream quality assessment, especially in cobble-dominated riffles with moderate to fast current. Procedure consistency is critical in ecological monitoring, and this study highlights the importance of net selection in maintaining data integrity for long-term stream management.

Kaitlyn Lund

Discipline: Environmental Science and Sustainability

Authors:

#1 Billie Harrison

#2 Emily Latch

Abstract Name: Is Newer Always Better?: A Comparison of Two Methods for Collecting and Analyzing Canopy Cover Data

When conducting field research, time and money are limiting resources, so finding more efficient and cost-effective methods to collect and analyze data is an important goal for many researchers. App-based methods are rising in popularity because they often are free or cheap and claim to be more user-friendly. These new tools can be especially tempting when older methods are frustrating to use, like the densiometer, a device traditionally used to measure tree canopy cover. Since canopy cover plays an important role in tropical ecosystems due to its influence on climate, habitat, biodiversity, etc., it is important to have trustworthy methods when assessing this biotic factor. This study compares a new app-based method (CanopyApp) to the traditional densiometer, to see whether the app is a suitable replacement in terms of accuracy and time saved in data collection and analysis. We sampled sixteen tropical forest research sites, since there were no previous studies using CanopyApp in tropical ecosystems, and both methods were used while being timed. After field work, the time needed to analyze the data from each method was also recorded. Thus, canopy cover percentage, time to collect data, and time to analyze data are the main variables being compared. Statistical analysis was conducted to compare the results. In the end, CanopyApp was not an accurate tool for assessing canopy cover compared to the densiometer, and its analysis time was significantly slower. In its current form, CanopyApp is not yet a suitable replacement for collecting and analyzing canopy cover data. Although many researchers may be eager to abandon the densiometer, our research shows that a newer method does not always equal a better one.

Morgan Lundberg

Discipline: Environmental Science and Sustainability

Authors:

#1 Cecelia Wood

#2 F. Marc Michel

Abstract Name: Tracking Iron Nanomineral Changes to Improve Water Quality Management in Freshwater Reservoirs

Freshwater drinking reservoirs are vital to public water supply, with approximately 74% of U.S. freshwater derived from surface sources. These systems often experience seasonal anoxia driven by thermal stratification, promoting the reductive dissolution of iron (Fe) minerals and the subsequent release of associated contaminants. Iron, a redox-active metal, not only imparts aesthetic and taste issues in drinking water but also facilitates the mobilization of toxic elements such as arsenic and lead. Two freshwater reservoirs near Roanoke, Virginia, Falling Creek Reservoir (FCR) and Beaverdam Reservoir (BVR) serve as test sites due to their comparable hydrologic and geologic settings. To prevent anoxia, FCR uses a hypolimnetic oxygenation (HOx) system that delivers oxygen to deep waters, oxidizing dissolved Fe and causing it to precipitate as ferrihydrite (Fhy) and settle back into the sediments. Ferrihydrite (Fhy), a poorly crystalline Fe(III) oxyhydroxide, is metastable and can transform into lepidocrocite and eventually into more stable goethite in the presence of Fe(II). Characterizing the iron mineralogy within these reservoirs is therefore critical for understanding redox-driven mineral transformations and their influence on water quality. Confirming the presence and extent of these transformation pathways provides key insight into biogeochemical cycling in drinking water reservoirs. High-resolution transmission electron microscopy (HRTEM) was used to image and identify Fe minerals at the atomic scale. HRTEM allows precise measurement of d-spacings, the unique structural fingerprints used to identify minerals. Preliminary results indicate the presence of abundant ferrihydrite and goethite, minor lepidocrocite, and trace magnetite. Ongoing work focuses on quantifying uncertainty in d-spacing measurements, which is particularly complex for nanocrystalline samples containing multiple, coexisting mineral phases.

Declan Lustenberger

Discipline: Biology

Authors:

#1 Declan Lustenberger

Aysel Khalil

Kimberly Dobrinski

Abstract Name: The Spark of Memory: When a Neuron Whispers, I Remember

How does the brain link one moment to the next? Although cortical neurons respond rapidly to stimulation, it remains unclear whether a single activation leaves a short-lived intracellular “residue” that later influences subsequent activity. This project investigates whether individual cortical neurons retain fast, measurable traces of recent stimulation, functional signatures that could represent one of the smallest building blocks of time-binding in neural systems. To examine this, we combine high-resolution calcium imaging with rapid early-gene expression analysis. Using GCaMP-based fluorescence and confocal microscopy, we track intracellular calcium dynamics following controlled stimulation and quantify whether a detectable after-signal lingers beyond the immediate response window. Additionally, we perform qRT-PCR on established immediate-early genes like *c-fos* and *Arc* to determine whether molecular markers of recent activation display similar short-interval changes. Together, these approaches allow us to analyze both fast biochemical events and early transcriptional events associated with neuronal activity. Our analysis compares responses across brief delay intervals in both isolated neurons and small network cultures. To organize these effects, we utilize two quantitative measures: a Residual Response Index capturing changes in calcium decay dynamics, and a Calcium Residue Index describing post-stimulus persistence. Evidence of even a subtle, rapid residue supports the hypothesis that cortical neurons possess intrinsic mechanisms for linking closely spaced events, providing insight into how the brain organizes continuous experience. This work contributes to broader efforts to understand neural plasticity, time-binding, and memory feedback.

Emma Luttrell

Discipline: Psychology

Authors:

#1 Emma Luttrell

Abstract Name: Identity Valence and Social Contexts in Autistic Emerging Adults.

Drawing on social identity theory, this study examines how the positive or negative feeling associated with an identity (identity valence) interacts with various social contexts for autistic emerging adults. Emerging adulthood (ages 18–25) is a critical developmental period characterized by identity exploration, increasing independence, and heightened vulnerability to mental health challenges. This study aims to deepen the understanding of this marginalized population, as well as identify valence in specific contexts. Data will be drawn from an ongoing survey study of 350 participants recruited through Simons Powering Autism Research for Knowledge (SPARK). Participants rate their feelings about their autism/autistic identity in several contexts, including family settings, friend settings, healthcare settings, and workplace settings, on a scale from 0, indicating “Extremely negative,” to 100, meaning “Extremely positive.” Preliminary results of paired-sample t-tests with 73 participants (Mage = 22.68; 55% female; 30% heterosexual) indicate more positive feelings about their autistic identity in family context ($M = 69.68$; $SD = 28.63$) compared to both work ($M = 40.94$, $SD = 26.96$; $t(72) = 7.35$, $p < .001$) and healthcare environments ($M = 57.38$, $SD = 25.85$; $t(72) = 3.17$, $p = .001$). In addition, participants rated friend contexts as more positive ($M = 68.63$, $SD = 24.92$) compared to both work ($t(72) = 7.50$, $p < .001$) and healthcare settings ($t(72) = 3.32$, $p = .007$). The findings are expected to inform more inclusive practices and identity-affirming support in contexts for autistic emerging adults.

Trinity Luxeder

Discipline: Biology

Authors:

#1 Trinity Luxeder

#2 Alexis Pastore

#3 Kenneth Fortino

Alexis Pastore

Abstract Name: Algal Growth and Macroinvertebrate Community Structure in a Piedmont, Urban Stream.

Algae influence freshwater stream food-webs by contributing to primary production and nutrient cycling. Algal community structure has been shown to be heavily influenced by consumer interactions, specifically macroinvertebrate grazing. Although reductions in algal biomass by grazers has been repeatedly demonstrated, facilitative interactions are often overlooked despite their importance, and grazers may play a key role in shaping the structure of algal communities. Our project aims to evaluate facilitative relationship between macroinvertebrate grazers and algal communities in streams. Previous research found that grazers were absent in an urban stream, suggesting they are particularly vulnerable to urbanization. We hypothesize that the absence of grazer species from an urban stream will result in altered algal community structure and abundance, compared to non-urban streams. To begin to test this hypothesis, we described macroinvertebrate community structure and algal growth in an urban stream in the Piedmont of Virginia. We measured algal biomass on unglazed ceramic tiles placed in pool, run, and riffle habitats, weekly over a four-week period. Algal biomass was quantified as chlorophyll-a concentration and ash-free dry mass (AFDM). In addition, we collected macroinvertebrates from duplicate Hess samples in each habitat, on week-one of the study. Comparing macroinvertebrate community structure, specifically grazer abundance, and algal growth will inform future research on how top-down and bottom-up processes shape freshwater stream ecosystems.

Carlos P. Luzuriaga

Discipline: Biology

Authors:

#1 Carlos P. Luzuriaga

#2 Kelly Jatib

#3 Schonna Manning

Abstract Name: Algal Turf Scrubbers: The use of diverse microalgae for the removal of contaminants from freshwater resources

Fresh water is a finite resource, and scientists look for sustainable treatment methods to filter out pollutants and biological contaminants. With more than 2/3 of our wastewater being released into the environment, this task proves difficult as these contaminants continue to significantly impact ecosystems, disrupt aquatic life, and threaten human health. Current pre-treatment methods use chemical precipitation and reverse osmosis; while effective at removing pollutants, these treatments are energy-intensive and often inaccessible. Algae are mostly photosynthetic prokaryotic and eukaryotic organisms, forming the foundation of aquatic food webs and global nutrient cycles. And research has shown certain microalgae can be utilized to remove pollutants from wastewater. Thus, algae-based bioremediation presents an innovative and eco-friendly solution to minimize the impacts of pollution from wastewaters. The goal of this project is to screen diverse microalgae

for use in algal turf scrubbers (ATS), sloped systems designed for the cleanup of water from point-source pollution. An effective ATS system should be low maintenance, while providing rapid uptake of nutrients. Resulting biomass may also be utilized for downstream applications, e.g., biofertilizer and biochar. Due to their documented high growth rates and rapid nutrient uptake, the following strains were acquired from the UTEX Culture Collection: *Chlamydomonas reinhardtii* (LB 90), *Spirogyra maxima* (2495), *Scenedesmus* sp. (1591), *Gomphonema intricatum* (FD386), *Synechococcus elongatus* (2973), *Chlorella vulgaris* (LB 2714), *Merismopedia* sp. (1902), and *Chlorococcum* sp. (3181). Cultures were grown under temperature and nutrient stress (BG11 vs. BG-11/20) to measure robustness, growth, and viability for deployment. Cultures were grown in 250-mL flasks containing 100 mL of culture with shaking at 125 rpm ($n = 3$). Cultures were measured by spectrophotometry at A680 nm over time at 23, 25, and 28 °C. Outcomes of this project should define microalgal strains suitable for ATS and the mitigation of nutrients, minimizing pollution to surrounding waters.

Ezra Lynch-Holland

Discipline: Psychology

Authors:

#1 Ezra Lynch-Holland

#2 Adam Winsler

Abstract Name: Elementary School Gifted Program Participation and Secondary School Academic Outcomes for Black Students

Gifted children show high potential to achieve but need specialized services to develop their capabilities. Black students specifically have been persistently under-identified as gifted and the efficacy of gifted programs for Black children is unknown. This psychology honors thesis will explore the impact of gifted identification on secondary school outcomes (6th through 12th grade) with data from the Miami School Readiness Project, a longitudinal study of students that attended Miami-Dade County Public Schools. Research questions include (1A) To what extent does being identified as gifted in elementary school contribute to secondary school academic outcomes for Black students?, (1B) Are positive effects mediated by elementary school academic performance?, and (2) Are the observed differences between gifted and not gifted Black students in secondary school the same for students in poverty vs. not in poverty, and for boys vs. girls? The sample for this study includes Black students that had data for at least one year of high school ($n \approx 11,198$). Of the sample, ~13% were identified as gifted in elementary school. Outcome data include cumulative high school GPA, standardized math and reading test scores in 8th and 10th grade, grade retention, attendance from 9th and 12th grade, school suspension, and on-time graduation. Multiple regression and logistic regression analyses will be done, controlling for child cognitive skills and social skills at age 4, gender, English language learner (ELL) status, poverty status, and early school performance. Results are expected to show gifted identification to be correlated with positive secondary school outcomes when compared to non-gifted students. It is expected that gifted education will show stronger positive effects for students in poverty and for boys. Finalization of data cleaning and variable making will be done in December. Data analyses will be done in January. The complete paper will be ready by the conference.

Daniel Lynn

Discipline: Chemistry

Authors:

#1 Dhilanka Udukalgae

#2 Daniel Lynn

#3 Shanuk Rajapakse
#4 Gayan Wijeratne

Abstract Name: Tuning the proton-coupled electron-transfer (PCET) reactivity of synthetic high-valent iron(IV)-oxo models through axial ligation

Heme-based metalloenzymes facilitate fundamental oxidation reactions by activating dioxygen and hydrogen peroxide to form high-valent intermediates, such as Compound I (oxo-iron(IV) porphyrin π -cation radical) or Compound II (ferryl porphyrin). Although the reactivity of Compound I has been the focus of thorough investigation, the reactivity capabilities of Compound II analogs remain relatively underexplored, despite their abilities to abstract hydrogen atoms from organic substrates such as xanthene. These reactions typically proceed through a proton-coupled electron-transfer (PCET) mechanism, which can occur via concerted or stepwise pathways (i.e., ET-PT or PT-ET). Growing evidence points to asynchronous PCET mechanisms, where proton and electron transfers are not perfectly synchronized, ultimately lowering activation barriers and elevating reaction rates. Here, we describe the PCET reactivity of [(F8TPP)FeIV(O)] and its axially ligated derivative [(F8TPP)FeIV(O)(DCHIm)]. Kinetic studies indicate that axial coordination considerably enhances reactivity, with this ligated ferryl complex reacting roughly six times faster with xanthene. When incorporating substrates of varying bond dissociation energies (BDEs), a linear correlation between substrate BDEs and log(kobs) was observed, corresponding to a strong thermodynamic basis for these reactivity differences. Intriguingly, high kinetic isotope effects (KIEs > 60) suggest that quantum tunneling contributes to the reaction pathway. Moreover, computational studies reveal that axial ligands modulate spin-state energetics, accounting for changes in PCET behavior and further corroborating an asynchronous PCET pathway. Overall, this research demonstrates the critical role of axial ligation on the reactivity patterns of ferryl intermediates, their mechanistic pathways, and relevant thermodynamic parameters. These insights further elucidate how enzymes employ axial ligands to regulate oxidative chemistry, which holds significant relevance in physiological and pathogenic pathways.

Amelia Lyons

Discipline: Social Work and Human Services

Authors:
#1 Randi Goettl

Abstract Name: Beneath the Mask: Exploring the Hidden Experience and Wellbeing of Female Neurodivergent Students at UW-Eau Claire

Neurodiversity is defined as any deviation from the norm in brain functioning. Neurodiversity remains underdiagnosed and underresearched among females due to the societal expectations, pressures, and gendered stereotypes that are placed upon women. Female-identifying neurodivergent college students often report elevated anxiety, depression, and social isolation relative to neurotypical peers, yet their voices remain underrepresented in campus research. Their suppression contributes to masking, increased pressures, and burnout, which has contributed to heightened concerns for students' overall well-being, mental health, and retention while pursuing higher education. This research team aims to create a conceptually driven mixed-methods design utilizing anonymous surveys and focus group formats to understand how neurodivergence shapes well-being across academic, social, and health domains in females at UW-Eau Claire (UWEC). We will collect demographic information and use the Ryff Psychological Wellbeing scale in our quantitative portion to understand this population on campus more broadly. We will then use the measure's six domains of wellbeing and happiness, including autonomy, environmental mastery, personal growth, positive relations with others, purpose in life, and self-acceptance, to create the interview questions for our focus groups. Through thematic analysis of semi-structured interviews, elements of well-being will be evaluated for recommendations to improve campus culture and possible targeted interventions for female neurodivergent students. We intend to build upon the previous research that has demonstrated the gendered disparities in the

experience of male and female neurodivergent folk and use our findings as a call to action for what needs to be done to make success on our campus achievable for UWEC students.

Jianru Lyu

Discipline: Communications

Authors:

#1 Jianru Lyu

Yijin Liu

Alexandra Reichstadt

Abstract Name: Digital Migration and Intercultural Communication: American TikTok Users on RedNote

This study focuses on the digital migration of American TikTok users to a Chinese local social media RedNote, following the 2025 U.S. TikTok ban and its impact on intercultural communication between American and Chinese users. Through a qualitative analysis of 50 selected bloggers, their posts, comments, and constructed a timeline using public data, the research identifies three key areas: (1) primary interaction themes, (2) opportunities and challenges in cultural exchange, and (3) the sustainability of RedNote for the U.S. users. The findings reveal that lifestyle and language-learning content dominate cross-cultural exchanges, enabling users to develop mutual curiosity, informal cultural learning, and opportunities for clarification of misunderstandings. Regarding the timeline, the sustainability of RedNote for American users may be limited. This study demonstrates how platform design, linguistic accessibility, and sociopolitical conditions could collectively shape the sustainability of intercultural interactions online. Although digital migration can facilitate initial cultural engagement, long-term participation depends on the development of shared community norms and meaningful cultural resonance.

Kelvin Ma

Discipline: Mathematics

Authors:

#1 Jason McCullough

Abstract Name: Constructions Of Macaulay Distributive Lattices

Given a collection of elements, we are interested in ordering them. When this collection with its order satisfies particular conditions, we call it a partially ordered set. An example is the positive divisors of an integer, ordered by divisibility. In particular, we consider lattices, which are posets with the additional condition that for any two elements in our collection, there exists a smallest possible element that is greater than our chosen two elements and there exists a biggest possible element that is smaller than our chosen two elements. Our research is on finding lattices that satisfy the Macaulay property, where we have both a partial order (not all elements can be compared) and a total order (all elements can be compared) on our collection. We show that all distributive lattices of height 3 are Macaulay. We construct non-Macaulay distributive lattices of height 4 and more.

Moazzam Maan

Discipline: Computer Science

Authors:

#1 Anil Shende

Liz Satynska

Abstract Name: Web-browser-based Visualization of Wildland Fire Data

Wildfires increasingly threaten public safety due to their volatile nature and changing climate conditions. In 2024, there were 64,897 wildfires that burned 8,924,884 acres of forested land (Data from NICC Wildland Fire Annual Report 2024). Such a staggering scale highlights the importance of effective planning and response training. Hands-on firefighter training is challenging, given the costs, risks, and dangers of setting up realistic training environments. In such a case, virtual 3D visualizations offer a compelling alternative. We present an immersive, browser-based, low-cost, ready-to-deploy visualization of wildland fire using data from QUIC-Fire, a physics-based cellular automaton fire progression simulator developed at Los Alamos National Laboratory. QUIC-Fire outputs binary files representing realistic fire spread in real-world forested environments for firefighter training and emergency planning. Our solution, created using A-Frame and Three.js, is built to make these simulations visually comprehensible. It renders the simulation's terrain, trees, fire, wind, and smoke progressions directly in a web browser, within an immersive virtual forest environment that the user can enter, walk through, and observe in first person. Users can also view the scene from above to obtain a bird's-eye view of fire spread, smoke, and wind dynamics. Our tree database, with four representative tree species models, enhances realism and allows us to manipulate parts of the trees directly (for example, trunks and leaves). Through a combination of data-handling and rendering optimizations, our solution renders simulations on a forested domain spanning roughly 10,000 square meters and containing over 40,000 trees — even on commodity hardware. It supports VR headsets and runs on desktops, laptops, tablets, and mobile devices. With plans for further development in collaboration with the firefighter community, we hope to make this product readily usable in real-world training settings in the near future.

Moazzam Maan

Discipline: Mathematics

Authors:

#1 Anil Shende

Abstract Name: A Structural Analysis of Largest Independent Sets in Families of Circulant Graphs

The Frequency Assignment Problem (FAP) involves assigning frequencies to devices on a wireless network optimally, i.e., using as few frequencies as possible for the network. Shashanka et al. characterized networks modelled as infinite graphs induced by the square and triangular grids, and showed that these can be tessellated by finite tiles T_k of size k , such that an optimal frequency assignment on T_k is an optimal assignment on the infinite grid. Furthermore, they exhibited frequency assignments that were optimal, and achieved $s_1 = k^2$, where s_1 is the minimum separation between frequencies assigned to neighboring devices. Since it is desirable that s_1 be as large as possible, our work aims to provide an upper bound on s_1 . If $s_1 \leq k^2$, then Shashanka et al.'s frequency assignment maximizes s_1 . We model the tiles T_k as families of circulant graphs S_k and H_k for the square and triangular grid respectively, and show that an upper bound on the independence number (the size of a largest independent set) of these graphs, denoted $\alpha(S_k)$ and $\alpha(H_k)$, also provides an upper bound on s_1 . For the square grid family, we show that $\alpha(S_k) = k^2$, proving that Shashanka et al.'s work does indeed maximize s_1 . For the triangular grid family, we show that $\alpha(H_k) \leq k^2 + \text{floor}(k/2)$, and conjecture that $\alpha(H_k) = k^2$. Finally, we show that S_k and H_k belong to a larger two-parameter family of graphs $G(r,k)$, where $G(2,k)$ is S_k and $G(3,k)$ is H_k . We show that $G(4,k)$ is isomorphic to the toroidal king's

graph, and thus $\alpha(G(4,k)) = k^2 + \text{floor}(k/2)$. Lastly, based on heuristic computational results, we conjecture that for all $r \geq 4$, $\alpha(G(r,k)) = k^2$ when r is odd and $\alpha(G(r,k)) = k^2 + \text{floor}(k/2)$ when r is even.

William Maass

Discipline: History

Authors:

#1 William Maass

Abstract Name: The Battle of Belleau Wood and the Forging of the Modern Marine Corps Identity

The central question of this research is how the United States Marine Corps shifted from an auxiliary naval force to an elite, mobile fighting force, and the role that the Battle of Belleau Wood play in that transformation. The Battle Belleau Wood, fought from June 1-26, 1918, in France during the First World War, was a pivotal engagement where untested American forces were able to stop and drive back the German advance in the Chateau-Thierry sector. While there were both Marines and Army soldiers present at the battle, newspapers disproportionally showed the Marines' actions, which created a public image of an elite and effective fighting force. This publicity that the Marines received would then be used after the war to show their relevance as a force. For this research, I looked at a wide range of primary sources in addition to some trustworthy secondary sources with some key sources including *With the Help of God and a Few Good Marines: The Battles of Chateau Thierry and Belleau Wood* by Albert Caitlus and *And They Thought We Wouldn't Fight* by Floyd Gibbons. In addition to those sources, interviews, letters, and Congressional hearings were examined. I was able to use the sources to examine the Marines effectiveness in the battle, the media attention that then followed, and the post war fight to remain a force. Additionally, research showed that because of Belleau Wood talks were started about reshaping the Marine Corps into a rapidly deployable, elite, amphibious assault force compared to just a naval auxiliary force. Ultimately, while the United States Marine Corps has been in existence since 1775, it was Belleau Wood that turned the Corps into what it is today.

Sarah Angela Mabeza

Discipline: Political Science

Authors:

#1 Robin Datta

Abstract Name: How Governance Structures Shape K-12 Technology Adoption During Crisis: Comparing Edmonds School District and NYC Department of Education

Why do school districts with similar federal funding respond so differently to emergencies? This comparative case study examines how governance structure shaped technology adoption during COVID-19 remote learning in Edmonds School District, Washington (21,000 students) and New York City Department of Education (1.03 million students). Both drew on Elementary and Secondary School Emergency Relief (ESSER) funding, yet achieved starkly different outcomes in implementation speed, community participation, and resource allocation. The study analyzed six primary documents from March through November 2020: four Edmonds board meeting records and two NYC DOE planning documents. Systematic content analysis identified technologies adopted, decision-making actors, deliberation factors, and implementation timing. The findings reveal three governance effects. Institutional structure determined implementation speed: NYC's centralized committees distributed 675,000 devices within six months through coordinated programs, while

Edmonds' board governance prioritized community deliberation over rapid deployment. Participation mechanisms reflected different institutional capacities. NYC systematized engagement through Parent Coordinators reaching thousands of families, while Edmonds enabled direct testimony that created accountability but limited scale. Both districts emphasized equity and infrastructure, yet governance shaped how resources were allocated. NYC focused on civil rights compliance including multilingual support and disability accommodations, while Edmonds prioritized teacher training and connectivity gaps raised through public comment. This study demonstrates that governance structure operates as an independent factor shaping policy outcomes even under similar funding conditions. The findings have implications beyond the pandemic: districts should establish governance protocols balancing decision speed with community participation before emergencies strike, rather than improvising under crisis conditions.

Aine MacDermott

Discipline: Biology

Authors:

#1 Aine MacDermott

#2 Melinda A. Yang

Melinda A. Yang

Abstract Name: A Python Tool for Accessible Inference of Selection in Human Genomes

Human evolutionary genomics draws on genetics, anthropology, and computer science to understand how genes have changed across time and across different populations. Yet for many early scientists, especially those new to computational research, these conceptual constraints can make entry into this field feel inaccessible. To help lower this barrier to studying human gene evolution, we developed a pipeline combining four methods used to study selection parameters. The pipeline (1) calculates the frequencies of alleles in present-day populations, (2) applies extended haplotype homozygosity (EHH) and integrated haplotype score (iHS) to detect the presence of selection, and (3) uses a method to reconstruct genealogical trees using Relate and the CLUES2 add-on to determine the strength and timing of selection. Using three large publicly available present-day human genomic datasets—the 1,000 Genomes Project, GenomeAsia100K Project, and the Human Diverse Genome Project—we created a user-friendly Python tool that accepts multiple parameter inputs for investigating selection in human genes and walks users through each step with a dynamic progress log. This system provides real-time feedback in a dynamic summary file of analysis outputs and results, flagging errors and offering troubleshooting suggestions if an error is encountered. To support interpretation, we also devised a new strategy to compare and visualize the fit of CLUES2 temporal models, allowing users to identify which modelling frameworks best capture changes in the timing and intensity of selection. Here, we describe the pipeline and share two case studies illustrating how it can be used to trace the evolutionary history of genes across worldwide populations.

obaïd machiwalla

Discipline: Engineering

Authors:

#1 obaïd machiwalla

#2 Krish Patel

#3 Filiberto Aguirre

#4 Niko Godoy Bravo

#5 Aiden Schultz

Abstract Name: Automated Weed Segmentation in Lawn Environments Using Deep Learning

Everybody wishes for a weed-free, healthy lawn, but the weeds won't cooperate. It takes time for manual pulling and other conventional methods of weed management, and spraying herbicides across the entire lawn wastes chemicals, time, and the environment. Although past work has investigated machine learning-enabled weed detection from data on big farms; the models presume expensive imaging hardware, stage lighting, or expert crop data, which limits their applicability to residential lawns. This work challenges such constraints through the development of a light and mobile weed-searching system on lawns using Detectron2, an advanced object detection framework. The model was then tested on the combined lawn scene dataset and was found to be 92.4% accurate, accurately labeling 89.7% of the weeds and scoring an overall F1-score of 0.91. In trials, the system accurately picked out three patches of weed with high-confidence values (0.96, 0.93, and 0.88) which comprised approximately 14% of the picture. This measurement can enable selective treatment rather than blanket spraying, with considerable cost saving in the use of chemicals. The results demonstrate that artificial intelligence has the potential to automate one of the most time-consuming procedures of lawn care—detection of weeds—in a manner that helps maintain environmental sustainability. The project is currently engaged in the completion of the system by incorporating real-time detection capability by means of smart cameras and adaptive treatment algorithms to achieve optimal chemical utilization efficiency and accuracy in suppressing weeds.

Faith Mac-Iriase

Discipline: Computer Science

Authors:

#1 Daniel Palmer

Abstract Name: Doodle-to-Image: Enhancing Text-Guided Image Generation with Sketch Prompts in ComfyUI

This project looks at how KSampler settings, specifically classifier-free guidance (CFG) and control (randomised and fixed), interact with sketch inputs and text prompts to improve image controllability. By refining prompt structure alongside parameter tuning, the study explores how multimodal guidance can better enforce targeted visual characteristics while balancing composition fidelity and output consistency. Stable Diffusion has become an effective approach for generating images from text prompts. To explore this, multiple image samples were generated using the same prompt while changing only one variable at a time. The ComfyUI software was used to test low, medium, and high CFG values, and compared fixed control inputs to randomised ones. Results were compared between text-only prompts and sketch+text prompts, where a simple doodle offers additional structure. Changes in how closely the prompt was followed by the model, the consistency of shapes and layout, and the amount of variation between outputs were observed across each experiment. From these observations, lower CFG values tended to produce more creative but less accurate images, while higher CFG values made the results more literal and very distorted. Fixed control inputs created more stable images across samples, and randomised control inputs made each output noticeably different even when everything else stayed the same. When comparing prompt types, sketch+text inputs were more reliable for keeping the structure of the subject, especially when CFG was set higher in Stage C (Text-conditional image generation) and lower in Stage B (image decoder). This combination of pretrained models gave the most balanced and predictable results.

Samantha Mack

Discipline: Architecture, Construction Management, and Interior Design

Authors:

Abstract Name: From Classroom to Community: Rethinking Educational Interiors Through Neurodiversity

While the industry is constantly evolving to be more accessible and inclusive, there is still a major lack of understanding when it comes to neurodiverse students in the educational arena. The educational environment can be a major stressor for students. These stressors can be eliminated by implementing proven practices that create comforting environments. Using third-place theory and environmental psychology as a framework, inclusive design strategies can promote sensory accessibility, flexible spaces, and community-oriented areas. Third place theory emphasizes the importances of informal, safe spaces that encourage communication, and autonomy; these qualities are vital in educational settings. Environmental psychology focuses on designed spaces that influence behavior and emotional regulation such as acoustics, lighting, and space planning. This research incorporates neurodiversity, education, psychology, and interior design principles. To develop programming to curate a high school environment that promotes belonging, well-being, and adaptive learning for all students.

Alexis Mack

Discipline: Criminology/Criminal Justice

Authors:

Abstract Name: Structural and Procedural Determinants of Sentencing Disparities in the Juvenile Justice System: Implications for Equity and Rehabilitation

Youth involvement in the juvenile justice system presents multifaceted challenges that implicate procedural equity, rehabilitative efficacy, and long-term social trajectories. This study interrogates the extent to which structural and procedural determinants such as pretrial detention, differential access to competent legal counsel, and plea bargaining mechanisms influence judicial outcomes for justice-involved youth. Contrary to conventional assumptions that adjudication severity is primarily offense-driven, evidence increasingly suggests that systemic factors exert a determinative influence, often reinforcing disparities along socio-economic and racial lines. Employing a mixed-methods framework, this research integrates quantitative analyses of publicly available juvenile court datasets with qualitative syntheses from extant literature on legal advocacy, procedural justice, and youth development. Preliminary findings indicate that pretrial detention markedly correlates with more punitive sentencing outcomes, even when controlling for offense severity, prior adjudications, and demographic variables. Concurrently, overburdened public defense infrastructure constrains juveniles' capacity to navigate plea agreements effectively, thereby exacerbating inequities and perpetuating cycles of system involvement. These dynamics not only compromise the principles of procedural justice but also precipitate collateral consequences, including educational disruption, psychosocial stress, and heightened recidivism risk. The study foregrounds the imperative for policy interventions that recalibrate the balance between accountability and rehabilitation. Potential reforms include the expansion of community-based alternatives to detention, augmentation of resources for competent juvenile defense, and standardization of sentencing protocols to mitigate discretionary disparities. By elucidating the mechanisms through which procedural and structural variables shape judicial decision-making, this research contributes to critical discourses on systemic equity, youth advocacy, and evidence-based criminal justice reform. The findings offer actionable insights for policymakers, legal practitioners, and scholars committed to fostering a more just, equitable, and rehabilitative juvenile justice system.

Kyle Mackey

Discipline: Biology

Authors:

#1 Finnegan Mittelstadt

#2 Jennifer Liang

Abstract Name: Testing the Function of Sulfated Glycosaminoglycans During Anterior Neurulation in Zebrafish

The neural tube is the precursor to the vertebrate central nervous system. Neurulation is the process by which the neural tube closes during early embryonic development. Failure of the neural tube to close results in neural tube defects (NTDs), which are among the most prevalent human birth defects. The causes of human NTDs are multifactorial, making NTDs challenging to study in humans. Neurulation in zebrafish occurs by similar mechanisms as in humans, and zebrafish embryos can be manipulated genetically and pharmacologically, making them an established model system for studying NTDs. Previous research in our lab has shown that the extracellular matrix (ECM) is required for anterior neural tube closure in zebrafish. When the ECM is deficient, the anterior neural tube fails to close causing a phenotype like the fatal human NTD anencephaly. Glycosaminoglycans are major components of the ECM, serving to provide structure and coordinate tissue movements. Most glycosaminoglycans in the ECM are sulfated by O-sulfotransferases, enzymes which are inhibited by chlorate salts. We hypothesized that embryos exposed to chlorate before and during neurulation would have a higher frequency of anterior NTDs than untreated controls, and that the frequency of NTDs would depend on chlorate concentration. We used molecular techniques to stain the pineal organ. We assessed the pineal organ's morphology to screen for NTDs. The pineal is normally a single oval-shaped structure and elongated or divided morphology indicated an NTD. ANOVA showed no significant difference in the frequency of NTDs found in chlorate-treated embryos compared to untreated controls. However, chlorate-treated embryos had a dose-dependent, incompletely penetrant phenotype similar to embryos deficient in ECM proteins. Chlorate-treated embryos and ECM deficient embryos had misshapen pineal organs, truncated tails, malformed yolk-sac extensions, and cardio edema. Higher concentrations of chlorate increased the frequency of these abnormalities but the frequency of NTDs remained low.

Helen MacWilliams

Discipline: History

Authors:

Abstract Name: Checkered Past: The Shifting Anthropological Collections of the Field Museum

The Field Museum of Chicago is a highly respected institution nationally and internationally with an important legacy in scientific, ethnographic, and anthropological history. The legacy of their anthropological collections, however, is currently being questioned and is in flux. The anthropological exhibition Alsdorf Hall of Northwest Coast and Arctic Peoples is a clear example of this. The shifting collection displayed and discourse of how the exhibition is presented is a historiographical artifact that illustrates the museum practices of the past transitioning into the museum practices of the present. I explore the history of the current exhibition, installed in 1983 that largely has remained unchanged, along with previous iterations. Drawing on sources such as Museum Politics and Stewards of the Sacred, interviews with Field staff, and the perspectives of museum visitors, I develop the general public and academic perception of the exhibition. I also compare the Field's most recent anthropological exhibition Native Truths: Our Voices, Our Stories and Northwest Coast within the lens of museum exhibition style and context to convey the change in museum exhibition practices over time. NAGPRA specifically is the main cause for the changes in the exhibition, and is explained as a whole and in this context. Compared to previous practices, the primary concerns of current

exhibitions that regard Indigenous Americans are establishment and explanation of NAGPRA, personal stories or artifacts rather than sweeping, impersonal displays, and an emphasis on current Indigenous Americans and their lives. Northwest Coast has the NAGPRA element currently but lacks the other two. The exhibition is artifact-rich, but utilizes theatrical techniques to display the cultures of the Arctic and Northwest Coast, which may seem offputting to some visitors. This can be seen in the mask exhibits or the shaman diorama. This makes the exhibition an excellent learning tool, though not as intended.

Japji Madan

Discipline: Psychology

Authors:

Amala Vadukumcherry

Abstract Name: Growing Into Adulthood: The Role of Future Time Perspective and Social Support in Psychological Well-Being

The present study explores the associations between future time perspective and perceptions of social support and their influence on psychological well-being in emerging adulthood. The sample consisted of 334 emerging-adults between the ages of 18-25 (average-age 18.76 years, 267 women). Subjects completed self-report measures of future time perspective, perceptions of social support, and psychological well-being. Regression results indicate that social support and future time perspective together predict psychological well-being. Follow up tests using the procedures recommended by Aiken and West (1991) indicate that social support moderated the links between future time perspective and psychological well-being. Specifically, emerging-adults with low-medium family support who see their future as limited were less. Further, the results indicate that seeing the future as open is linked with increased personal growth at all levels of support from friends, family, and significant others. However low-medium –perceived support from significant-other coupled with seeing the future as ambiguous was linked with lowered positive relations in emerging-adulthood. Also, viewing the future as ambiguous was also linked with reduced purpose in life at all levels of support from friends, family, and significant others. While these preliminary results do suggest that future-time-perspective and social-support together influence psychological-wellbeing in emerging-adulthood, one needs to be cautious with any conclusions that may be drawn given that the data are concurrent-correlational, and hence causal interpretations cannot be drawn; however, these results suggest that it is important to consider the combined effects of future orientation and perceived support to understand psychosocial development in emerging-adulthood.

Smridhi Madan

Discipline: Engineering

Authors:

#1 DessaRe Lampkins

#2 Rebecca Heise

Abstract Name: Hydrochloric Acid-Induced Lung Injury in a Murine Model of Alzheimer's Disease

Alzheimer's disease (AD) is a progressive neurodegenerative disorder marked by memory loss, chronic neuroinflammation, and protein aggregation in the brain. The 3xTg-AD mouse model recapitulates many features of human AD and displays increased immune sensitivity. Acute lung injury (ALI) is a severe respiratory condition characterized by damage to the alveolar epithelium, impaired gas exchange, and intense

neutrophilic inflammation, and can progress to acute respiratory distress syndrome (ARDS). The hydrochloric acid (HCl) aspiration model is a widely used preclinical method for simulating acid-induced ALI in rodents. HCl exposure leads to rapid injury of the airway epithelium and recruitment of inflammatory cells. This study investigates how HCl-induced ALI affects lung mechanics and inflammatory responses in 3xTg-AD mice. Experimental procedures were conducted on nine-month-old female 3xTg-AD mice. Mice were anesthetized, intubated intratracheally, and instilled with HCl to induce acute lung injury. Mice recovered off-ventilator for 24 hours. Control animals were undosed. At the endpoint, mice were re-anesthetized, and lung mechanics, including compliance (Crs), resistance (Rrs), elastance (Ers), and pressure-volume loops, were recorded. Bronchoalveolar lavage fluid (BALF) was retrieved, and cells from the BALF were isolated, counted, and fixed via cytopspin. HCl exposure significantly altered lung mechanics and inflammatory responses in 3xTg-AD mice. Mechanical ventilation measurements showcased elevated respiratory system resistance, increased elastance, and decreased compliance in HCl-treated mice compared to controls. Elastance was significantly higher, and compliance was significantly reduced. HCl-treated mice showed higher BALF cell counts compared to controls. Cytopspin staining confirmed inflammatory cells in the BALF of HCl-treated animals. HCl aspiration in 3xTg-AD mice significantly impairs lung mechanics and promotes pulmonary inflammation. These results highlight the susceptibility of AD models to peripheral injury and support further investigation into lung-brain immune signaling pathways.

Alexander Madanat

Discipline: Biology

Authors:

#1 Rachana Senthil

#2 Anna Bazell

#3 Kacey Marra

#4 Dzana Katana

Abstract Name: Stem Cell Based Therapies for Charcot-Marie-Tooth Disease: A Systematic Review of Preclinical and Early Clinical Studies

Charcot-Marie-Tooth (CMT) disease is an inherited peripheral neuropathy that gradually damages the nerves responsible for movement and sensation. Despite its prevalence, no treatment currently slows or reverses this decline. CMT causes chronic myelin loss, reduced support from Schwann cells, and progressive degeneration of peripheral nerve fibers. Stem cells are being explored as a potential treatment due to their ability to release supportive factors, reduce harmful inflammation, and may help repair damaged nerves. The purpose of this review was to systematically evaluate published evidence on stem-cell-based therapies for CMT. The scientific literature was searched for studies involving animal models or human participants with genetically confirmed CMT, identifying eleven eligible studies: eight animal studies and three human studies (one case report and two early-phase clinical trials). All human studies involved individuals with CMT1 or CMT1A. Across animal studies, most treatments led to improved coordination, stronger limb strength, faster nerve-signal conduction, and/or healthier myelin structure. Some studies found that repeated dosing or using Schwann-like cells produced the strongest effects. A few studies also tested molecules naturally released by stem cells and observed similar biological benefits. Human studies focused mainly on safety. Early findings showed that treatments were generally well tolerated, with only mild short-term side effects. One case report described functional improvement, but this single example cannot establish effectiveness. Overall, current evidence suggests that stem-cell-based approaches may offer a promising path for addressing nerve damage in CMT, but the data remains limited. Because the studies differed widely in methods, cell types, and sample sizes, larger and well-controlled clinical trials are needed to determine whether these therapies can provide consistent and meaningful benefits.

Samartha Madhyastha

Discipline: Computer Science

Authors:

#1 Samartha Madhyastha

#2 Enzo Nunez

Enzo Nunez

Abstract Name: Exploring Cyber Accounting Data in Extended Reality

As more businesses digitize their operations, accountants are no longer just number crunchers, they're also data managers and cybersecurity-aware professionals. Cyber accounting is an emerging field that combines accounting practices with modern digital and cybersecurity technologies. Using Extended Reality (XR) in accounting is a new idea that blends immersive technology with financial operations. XR turns complex financial data into 3D, interactive visual dashboards. Accountants can walk through a virtual environment showing a company's cash flow, balance sheet, etc. in 3D. That makes it easier to analyze trends, anomalies, or fraud by seeing patterns rather than reading numbers. Using XR for accounting is not yet widespread, but it offers huge potential by turning abstract numbers into interactive experiences and enhancing both cybersecurity and collaboration. Our primary data source is the Electronic Data Gathering, Analysis and Retrieval (EDGAR) system, used by companies and individuals to submit filings to the U.S. Securities and Exchange Commission (SEC). The data is retrieved using EDGAR API and cached by a backend server that uses GraphQL as a query language. The server is used to streamline the data collection and processing. We are currently exploring several metaphors for presenting the data provided by the backend, among which are the Forest and City metaphors. The goal is to leverage user mental models and minimizing cognitive load. For example, in City metaphor each building represents a company. To populate the city, buildings could be arranged per their respective company's metrics, including revenue and earnings per share. Our future plans include incorporating MCP with audio input. This way users can make data and representation selections through the implemented voice assistant. For example, a user would be able to call out the assistant and request it to chart quarterly profits for Apple, Google and Tesla across a decade starting from 2011.

Sheryl Madlangbayan

Discipline: Physics and Astronomy

Authors:

#1 Brian Harding

#2 Claire Gasque

Abstract Name: Investigating Intense Plasma Drifts and Associated Optical Emissions Using Swarm and TReX RGB All-Sky Imager Observations

Subauroral ion drifts (SAIDs) are fast (>500 m/s) westward plasma flows that occur equatorward of the auroral oval. Previous studies have established a statistical correlation between intense SAIDs (>4 km/s) and STEVE (strong thermal emission velocity enhancement), an unusual optical emission which appears as a mauve arc stretching east/west across the subauroral sky (Archer et al., 2019). Unlike typical auroral emissions, which have narrow emission features associated with distinct atomic or molecular transitions, STEVE emissions are a continuum that spans the optical spectrum, and their specific emission mechanisms are still debated. This project aims to investigate the relationship between SAIDs and subauroral optical emissions to better understand the physical conditions required for such emissions. We identified extreme (>3 km/s) westward plasma flows using data from the ESA Swarm satellite mission. We compiled a catalog of these events from 2019 through March 2025. We then cross-referenced these events with available RGB all-sky imager and spectrograph data from Canadian sites in the TReX network to search for

conjunctions between these observed fast flows and available ground-based imagery. We have identified 20 conjunctions which occur under favorable observing conditions (clear skies, no moon), some of which contain optical emission features. For cases with optical emissions, we are applying magnetic field-line mapping to different altitudes to estimate the emission heights and determine the spatial relationship between the optical features and the plasma flow channels. These results will enhance our understanding of how intense plasma drifts relate to optical emissions and may help refine models of magnetosphere-ionosphere coupling. This work also contributes to identifying conditions favorable for STEVE and may support future observational campaigns targeting subauroral phenomena.

Campbell Maenner

Discipline: Psychology

Authors:

#1 Campbell Maenner

Abstract Name: Intimate Partner Violence Among LGBTQ+ Women: It is not all Rainbows and Pride

The purpose of this short presentation is to explore the under-researched topic of intimate partner violence among LGBTQ+ women and the lack of support and visibility faced by this community when it comes to IPV. To preface, while I will focus on the experiences of LGBTQ+ women, those in the community who also identify as male and all gender identities that fall under the umbrella term of “nonbinary” are notably affected, too. The community as a whole faces high rates of IPV. While I have gathered research from eight peer-reviewed articles and have come up with main themes: "The Stigma Surrounding IPV and Receiving Help for LGBTQ+ Women," "The Diverse Experiences of LGBTQ+ Women who Face IPV," and "The Effects and Lack of Support for LGBTQ+ Women Who Have Been Through IPV," specifically, I will focus on the second theme. Within the theme of “The Diverse Experiences of LGBTQ+ Women,” there are three groups I will explore when it comes to IPV: LGBTQ+ University Students, LGBTQ+ Veterans, and LGBTQ+ Women in Turkey. When choosing what groups to research, my goal was to cater to a variety of ages and lived experiences outside of Western culture. This presentation engages not only with a research lens but with a mental health lens. Intimate partner violence is known to cause an onset of mental health disorders like Major Depressive Disorder, Generalized Anxiety Disorder, Posttraumatic Stress Disorder, and Substance Abuse Disorders. The examination of how those with different and intersectional identities' mental health is stigmatized and treated is also considered, as we are tackling diverse perspectives.

Mia Maestas

Discipline: Biology

Authors:

#1 Alexander Friedman

#2 Alexis Salcido

#3 Neftali Reyes

Abstract Name: Unexpected Striatal Activation from GHSR Stimulation by Ibutamoren

Ghrelin is a peptide hormone well known for stimulating appetite and regulating energy balance by binding to the Growth hormone Secretagogue Receptor (GHSR). This hormone acts largely through the hypothalamus- a brain region central to hunger, metabolism, and homeostasis. Ibutamoren (IBU) is a synthetic compound that mimics the growth-hormone stimulating effects of ghrelin and also binds on GHSR. IBU is widely used to

study the effects of GHSR stimulation as opposed to ghrelin due to enhanced stability, and a much longer half-life. To examine IBU's influence on GHSR activation, cFos immunohistochemistry (IHC) was used to measure neuronal regions across hypothalamic subregions of the brain. IHC is a technique which detects c-Fos protein expression as a molecular marker on neuronal activity. One subregion that was examined is the arcuate nucleus (ARC), which involves appetite- stimulating and appetite-inhibiting neurons. Using a dose of 1mg/kg, IBU did not significantly alter cFos expression in the arcuate nucleus. As this was an unexpected finding, our analysis spread to 50 other brain regions, where robust activation was identified in the dorsomedial striatum (DMS). This subregion is involved in motivation and decision making. To determine if these effects arise directly from GHSR activation, in vivo calcium imaging using GCaMP viral construct was performed. This technique showed that IBU strongly impacts striatal neural activity in live animals. These findings suggest IBU's influence goes beyond regulating feeding circuits as the hormone also impacts networks in the brain regulating motivation and decision making.

Dean Magara

Discipline: Computer Science

Authors:

#1 Steven Fernandes

Abstract Name: AeroRAG: Offline Retrieval-Augmented Generation Application for Aerospace Documentation Using Llama 4

I developed a Retrieval-Augmented Generation (RAG) application using the advanced open-source LLaMA4 language model. The main objective is to deliver an offline RAG model on aerospace content and obtain insights. This application would be deployable across different operating systems using Ollama and would not require an internet connection. The developed model would be secure, not hallucinate, and would respond only to the knowledge base on which it is trained. I would be utilizing the NASA STI Repository's public metadata dataset, delivered annually as NDJSON bulk downloads. It contains structured fields such as titles, abstracts, keywords, authors, publication dates, and PDF URLs. I built an innovative retrieval model using the foundational Llama 4 model. I also created a step-by-step guide for deploying the model and making it executable across different operating systems. The results obtained will be made publicly available.

Gabrielle Magill

Discipline: Psychology

Authors:

#1 Mary Still

Abstract Name: Navigation- and Landmark-Related Memory in Virtual Reality versus 2D Displays

Research has shown that successful navigation and memory for that navigation is impacted by a variety of factors. Active involvement in navigation and the presence of effective landmarks along the route have been identified as key elements. Although many studies have been conducted in a real world environment, the majority of the studies depend on laboratory research with studies varying widely in their level of fidelity. This study explores how simulation immersion might impact the effects of active navigation and landmark distinctiveness. Feelings of presence in the environment will be manipulated by assigning the participants to navigate in either an immersive 3D display condition using an HTC Vive Pro 2 virtual reality headset or a nonimmersive 2D condition on a computer monitor. Participants will both actively navigate one environment using an Xbox controller and passively navigate another environment by watching a pre-recorded video. Distinct and nondistinct landmarks will be present in each route. We anticipate presence will be higher in the immersive display type, more accurate route memory for portions of the route with distinctive landmarks, and more accurate route memory for active navigation than passive navigation. The results from this research will help inform decisions about study design in relation to participant presence and immersion in navigation and route memory research. The results will also show the relative benefits of active navigation and landmark distinctiveness in navigation and route memory.

Samantha Magowo

Discipline: Biology

Authors:
#1 Elena Morin
#2 Andrew Wojtovich

Abstract Name: Optical control of protonmotive force in mammalian cells

Mitochondria play a central role in ATP production through oxidative phosphorylation. This process is driven by an electrochemical gradient across the inner mitochondrial membrane known as the protonmotive force (PMF). Alteration of this gradient has been directly associated with metabolic dysfunctions in neurological and cardiovascular disorders. Advances in optogenetics have shown that the use of old mtON to increase mitochondrial PMF can increase ATP production in *C. elegans* and isolated mitochondria. However, this tool has demonstrated limited mitochondrial localization and low efficiency in mammalian cells (HeLa cells), resulting in inconclusive outcomes. To address these limitations, we conducted a comparative study between a newly developed mitochondria-targeted light-activated proton pump called “mito-glow” in order to enhance PMF in HeLa cells. We showed that mitoGlow exhibits better mitochondrial localisation than mtON and that mitoGlow selectively increases PMF upon light activation. Overall, we demonstrated that the newly developed light-activated proton pump exhibits high mitochondrial localization, and its photoactivation supports the generation of the PMF compared to mtON. This improvement enables optical control of mitochondrial PMF dynamics in mammalian cells, opening new avenues for understanding mitochondrial energy regulation and dysfunction.

Audrey Mah

Discipline: Health and Human Development

Authors:
#1 Audrey Mah
#2 Lauren Leiker
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Abstract Name: Inequity in Maternal Care for Ecuadorian Women: Prevalence of Preeclampsia in a High-Altitude Environment and Lack of Access to Preventative Healthcare

Preventive healthcare is fundamental to promoting health equity worldwide, particularly in maternal care. Within this context, preeclampsia is a critical example of how preventive strategies mitigate the disparities in maternal care. Preeclampsia remains a leading cause of maternal and fetal mortality rates worldwide, affecting 2-8% of pregnancies. While social and demographic factors have been widely studied within preeclampsia, the environmental determinants, specifically high altitude exposure, are often overlooked in maternal health research. This study investigates the relationship between high altitude environments and the prevalence of preeclampsia rates in Ecuador. A large portion of its population resides at high altitude due to the location of the Andes Mountains within the country. An elevation above 3500 meters exposes pregnant individuals to chronic hypobaric hypoxia, reducing oxygen availability and uteroplacental blood flow. Using a population-based set of over 400,000 births from 2015-2017, in an observational study setting, results showed a statistically significant association between higher altitude and increased rates of preeclampsia. This project utilized the 95% Confidence Intervals to estimate the unknown statistical parameter, calculating a p-value below our alpha significance level, rejecting the null hypothesis. The adjusted odds ratios suggest that women living above 3500 meters were 2.4 times more likely to develop preeclampsia than those at lower elevations. These results support our hypothesis that high altitude is an independent risk factor for preeclampsia. Although this research is geographically limited to Ecuador, it expands on prior smaller studies, highlighting the need for tailored maternal care initiatives. Women in remote high-altitude regions often face reduced access to early diagnosis and prevention. This research emphasizes the need for access to preventive measures for the advancement of healthy equity in high-altitude regions.

Spencer Mahaffey

Discipline: Engineering

Authors:

#1 Megan Hardwick

#2 Aidan Patterson

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#4 Xiangchun Xuan

Abstract Name: AC Electrokinetic Focusing and Trapping of Nanoparticles in a Ratchet Microchannel

Insulator-based dielectrophoresis (iDEP) has emerged as a crucial technique for the manipulation of micro- and nano-sized particles, making it essential to prefocus these particles into a tight stream for subsequent manipulation in microfluidic devices. We report, in this study, AC iDEP focusing of nanoparticles in a ratchet microchannel, where the focusing behavior is strongly influenced by the frequency of the applied AC voltage and the ionic concentration of buffer. By adjusting the AC field frequency, particularly at lower frequencies, nanoparticles can be effectively focused into a narrow stream along the channel's centerline. It has also been observed that particles can be focused at different positions within the channel, either near the tips or at the centerline of the ratchets, depending on the ionic concentration of the buffer. This variation in focusing positions underscores the potential of the AC iDEP technique for nanoparticle separation and led us to pay special attention to conditions where particles become trapped near the constrictions. Therefore, we extend our study to examine the flow pattern around the ratchet tips. In this part of the work, we use particles as tracers to visualize how flow first appears near the constrictions, how recirculating motion develops, and how these flow structures change as we vary the electrical conditions and ionic concentration of buffer. By linking flow regimes with where particles focus or become trapped, we aim to show that focusing and trapping can be used together to control and separate particles in an iDEP microdevice.

Abrar Mahmoud

Discipline: Biology

Authors:

#1 Abrar Mahmoud

#2 Sam Chiappone

Abstract Name: Subunit-Specific Roles of PP2A in Ceramide-Responsive Phosphorylation Networks in Breast Cancer

Bacterial sphingomyelinases (bSMases) are enzymes produced by certain bacteria that hydrolyze sphingomyelin, a lipid present in animal cell membranes, generating bioactive sphingolipids such as ceramide. Ceramides can modulate cancer progression, either promoting or inhibiting tumor growth depending on the bacterial species, cancer type, and cellular context. In breast cancer, Protein Phosphatase 2A (PP2A), a critical serine/threonine phosphatase, is frequently inactivated. PP2A regulates numerous key signaling proteins, including Akt, p53, c-Myc, and β -catenin, and its dysregulation contributes to irregular oncogenic signaling, driving tumor development and progression. Despite its central role, the specific contributions of the ceramide-activated PP2A to phosphorylation networks and downstream signaling remain poorly understood. The present study aims to systematically characterize how knockdown of PP2A- α , PP2A- β , or neither subunit affects kinase-phosphosite relationships in breast cancer cells. We analyzed a dataset of

eighteen samples divided into three groups corresponding to PP2A- α knockdown, PP2A- β knockdown, and control, with each group further subdivided into bSMase-treated and untreated conditions. Mass spectrometry was used to quantify phosphosite abundances across all samples. Using R-based computational workflows, we plan to assess differential phosphorylation, kinase-phosphosite enrichment, and pathway-level signaling changes across conditions. Kinase-phosphosite interactions will be evaluated using a combined scoring approach, integrating Pearson correlation of phosphorylation profiles with motif-based predictions, where higher combined scores indicate stronger predicted regulatory relationships. This study provides a framework for dissecting subunit-specific effects of PP2A on breast cancer phosphorylation signaling and establishes a foundation for future investigations into how ceramides influence phosphatase-regulated pathways. These insights may ultimately guide targeted therapeutic strategies aimed at modulating kinase-phosphosite networks in cancer.

Summer Mahmoud

Discipline: Interdisciplinary

Authors:

#1 Hyewon Park

#2 Dr. Cheri Barta

#3 Megan McGarry Bouapha

Abstract Name: Innovative Alumni Communication and Engagement: Connection Across Cohorts to Create a Lasting Legacy of Belonging and Success

Efforts to advance educational equity increasingly depend on communication systems that foster community continuity, make equitable student experiences visible, and sustain long-term program impact for first-generation and limited-income college scholars. The project team, working in Grant Writing and Advocacy within the Center for Educational Opportunity (CeO) in collaboration with the internship program at the Office of Experiential Learning (OEL) at UW-Madison, identified a significant gap in the program's outreach: the lack of a centralized system for tracking alumni engagement and connecting alumni back to current students. This gap created challenges for efficient communication across the broader alumni network and among stakeholders committed to student success, fellowship, and support structures. The purpose of this initiative is to design and implement conduct landscape research on how comparable student-support programs structure alumni engagement through CeO's quarterly alumni newsletters and establish the framework for a new CeO alumni website. To develop these tools, this research will explore qualitative methods including interviews with alumni, collaborative conversations with staff and scholars, and review of internal documents to understand what narratives, data, and communication gaps mattered most. The emerging results show that structured storytelling, especially when centered on alumni experiences, plays a measurable role in strengthening program identity, increasing students' sense of belonging, and improving the program's ability to document long-term impact for the future success of alumni engagement and their relationship to the university and its scholars as a larger ecosystem. This project will reflect and educate NCUR's 2026 theme by demonstrating how communication innovation can support equity-driven programs and expand student opportunity. Building a lasting infrastructure for alumni engagement positively contributes to a broader model for community-rooted education support programs seeking to strengthen belonging and long-term student success.

Maura Mahoney

Discipline: Psychology

Authors:

Abstract Name: The Examination of Coaching Behaviors Effect on Athletes with Attention Deficit/Hyperactivity Disorder

Research has found a link between different coaching behaviors and levels of self-esteem and motivation in young athletes. Deficits in self-esteem and motivation are common symptoms of Attention Deficit/Hyperactivity Disorder (ADHD). The present research aimed to examine the moderating role of different coaching behaviors on the self-esteem and motivation of college-age athletes with ADHD. The two coaching behaviors being examined in this study are autonomous and controlling. Westminster College student-athletes were recruited through email. The athletes were given a battery of online, self-report assessments that aim to examine symptoms of ADHD, self-esteem, motivation, and their perceptions of their head coach's behavior. It is predicted that athletes with ADHD who have a coach that supports an autonomous coaching style will have higher motivation and higher levels of self-esteem. It is also predicted that athletes with ADHD who have a coach that supports a controlling coaching style will be less motivated in their sport, have lower levels of self-esteem, and more impairment. Results from this study indicate that athletes with higher levels of ADHD symptoms reported higher levels of self-esteem, even under the moderating effect of both coaching styles. Also showed a strong positive correlation between autonomous coaching behaviors reported and sports motivation, as well as a relationship between controlling coaching behaviors reported and higher levels of amotivation. Further research should continue to explore the effects of coaching behaviors on athletes with ADHD and other psychopathologies. Increased knowledge on this topic will aid in creating better coaching habits that support the needs and development of all athletes.

Kaden Mahoney

Discipline: Engineering

Authors:

Abstract Name: Physics-Based Constitutive Modelling of Plastic Deformation in Machining

Machining- specifically metal-cutting is one of the most used and versatile manufacturing techniques. The metal-cutting process can create high strain and strain-rate environments with extreme temperature gradients that can have a large impact on the properties and durability of the part, cutting tool, and machine. Recent studies have shown that plastic deformation mechanics are governed by underlying deformation mechanisms such as dislocation motion, dynamic recrystallization, and adiabatic shear banding. However, most machining models still rely on phenomenological constitutive models that do not incorporate these underlying physics. This research addresses this limitation by developing a constitutive model that accounts for internal deformation mechanisms. Orthogonal cutting allows for the complex three-dimensional cutting dynamics to be simplified to a unidirectional cut observed in a two-dimensional plane. A custom in-situ orthogonal cutting experimental setup was designed and constructed to collect synchronous high-speed visible and thermal imaging and cutting force data. Data was collected from Ti-6Al-4V orthogonal cutting trials. This data was processed using digital image correlation and particle image velocimetry tools to acquire velocity, strain-rate, and temperature data within the primary deformation zone. From this, plastic flow, vorticity, and heat generation throughout the cut can be mapped. A general yield equation within stress-space was derived analytically, providing a quadric yield-surface that interpolates between von Mises and Drucker-Prager yield behavior. A physics-informed neural network (PINN) was used to integrate experimental data into the analytical model, evaluate the Taylor-Quinney coefficient, validate the yield-surface equation and develop an inverse hybrid model. This model drastically improves the accuracy of material behavior prediction in Ti-6Al-4V. Future research will evaluate more materials and more extreme cutting conditions. This research will allow for significant improvements to product quality, tool life, and energy efficiency in metal-cutting machining and manufacturing.

Hana Mahyoub

Discipline: Psychology

Authors:

#1 Hana Mahyoub

Abstract Name: The Politics of Pity: Language-Induced Essentialism and Race on Public Attitudes towards Foreign Atrocities

Historical and psychological evidence alike can testify to the covert, yet highly powerful influence of language, metaphor, and rhetoric on attitudes towards intergroup conflicts and atrocities. However, there is a gap in literature in how generic language and essentialism may have a similarly influential effect on public attitudes in conflict scenarios. Essentialism is the idea that a social group has a distinct, innate, and immutable “essence” about them that permeates all members of the group, and recent research suggests that it is related to prejudice along in-group and out-group lines in intergroup conflicts. To measure how essentialism and victim race may affect American attitudes and willingness to help in intergroup atrocities, I invented a fictional social group called “Tarovas,” about whom participants will read a series of neutral facts about their lives and culture. In this slide deck, essentialism will be manipulated by using generic language to describe Tarovas (e.g. “Tarvos love to swim”) or specific language (e.g. “This Tarova loves to swim”). Race will be manipulated by the Tarovas being described as either native to Eastern Europe or Eastern Africa. At the end of the slide deck, participants will read a brief paragraph about the Tarovas recently falling victim to an intergroup atrocity committed by the U.S., and then complete a survey to measure the extent of their sympathy towards and willingness to help the Tarovas.

Bailey Maiers

Discipline: Environmental Science and Sustainability

Authors:

#1 Rachel Henninger

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Lily-Ayn Gray

Abstract Name: Coral Decline and Fish Community Homogenization: Insights from Three Florida Keys Reefs

In the Florida Keys, declines in live coral have been linked to altered community composition in associated species (Thanopoulou et al., 2022). Globally, coral cover and structural complexity have been shown to enhance fish productivity and sustain diverse assemblages, with higher coral cover supporting greater species richness and functional diversity (Morais & Bellwood, 2020). To evaluate the relationship between live coral cover and associated fish assemblages in the Florida Keys, surveys were conducted at three reef sites in the Atlantic Florida coral reef track in November 2025: Grecian Rocks; Alligator Reef, and Looe Key. The purpose of this study was to determine if live coral cover in these near-shore reef communities impacts fish species diversity. In this study, the proportion of live coral cover was quantified using belt transects, while

fish species richness was recorded through stationary point analysis and belt transects. Comparative analyses revealed significant variation among sites with the highest coral cover supporting the greatest fish diversity, including a higher proportion of reef-associated herbivores and small carnivores. In contrast, sites with reduced coral cover exhibited lower species richness and were dominated by generalist species. Thus, analyses indicated a positive correlation between coral cover and fish community complexity and declines in coral cover were associated with homogenization of fish communities. These findings underscore the importance of live coral in maintaining fish biodiversity and highlight the vulnerability of Florida Keys reefs to ongoing stressors.

Timothy Makar

Discipline: Exercise Science and Nutrition

Authors:

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Abstract Name: TEST-RETEST RELIABILITY OF A SELF-PACED TREADMILL PROTOCOL TO ASSESS MAXIMAL OXYGEN CONSUMPTION

Self-paced exercise testing protocols (SPPs) have emerged as a valid alternative to traditional ramp protocols for assessing $\dot{V}O_2$ max. This study aimed to evaluate the test-retest reliability of a 10-minute treadmill SPP for the assessment of $\dot{V}O_2$ max. Apparently-healthy adults ($N=8$; 22.9 ± 3.8 yrs; 24.2 ± 2.4 kg/m²; 50% females) completed 3 SPPs on a treadmill on 3 separate days 48 hours apart. The SPP consisted of 5 x 2-min stages (10-min total test time) where the subject self-selected a treadmill speed and grade for each stage to elicit work rates corresponding to the following rating of perceived exertion (RPE) values: 11 (light), 13 (somewhat hard), 15 (hard), 17 (very hard), and 20 (max). Subjects were blinded to the self-selected speed and grade and oxygen consumption (ParvoMedics TrueOne 2400) was continuously measured during the SPP. After a 10-min recovery, subjects completed a 4-min $\dot{V}O_2$ max verification trial. One-way repeated measures ANOVA was used to compare $\dot{V}O_2$ max values across the trials. Intraclass correlation coefficients (ICCs) were also calculated to assess the reliability of the SPP protocol for assessing $\dot{V}O_2$ max. $\dot{V}O_2$ max values (mean $\pm$ sd) were 44.1 ± 5.0 , 44.1 ± 5.3 , and 44.3 ± 4.1 mL $\cdot$ kg⁻¹ $\cdot$ min⁻¹ for trials 1, 2, and 3, respectively. There was no significant difference in $\dot{V}O_2$ max values across the three SPP trials, $F(2, 14) = 0.075$, $p = 0.928$, $\eta^2 = 0.012$. ICC analysis using a two-way mixed-effects model (ICC[3,1], single measures) showed excellent reliability for $\dot{V}O_2$ max across the three trials, with an ICC of 0.935 (95% CI: 0.78–0.99). In our small sample, the SPP demonstrated excellent test-retest reliability. By allowing participants to regulate their own work rates, SPPs eliminate the need for researchers to estimate starting intensities, stage durations, and workload increments necessary to reliably achieve volitional fatigue within 8-10 minutes.

Maksym Makarchuk

MT - Montana State University - Bozeman

Discipline: Physics and Astronomy

Authors:
#1 Matt Jaffe

Abstract Name: Gaussian Decomposition Framework for High-NA Optical Cavities

How can we accurately model optical cavities with high numerical apertures (high-NA), where traditional paraxial approximations fail? These cavities are central to next-generation quantum photonic systems, enabling stronger atom–photon interactions, faster entanglement generation, and scalable quantum technologies. Modeling high-NA cavities is challenging because standard Gaussian beam methods assume small angles and slowly varying fields, which break down when light propagates at wide angles or encounters strong curvature. Accurately predicting the behavior of such cavities is crucial for designing experiments, improving resonator performance, and developing devices for quantum computing, advanced microscopy, and precision sensing. We introduce the first application of Gaussian beamlet decomposition to cavity analysis, rather than free-space propagation. This method decomposes the optical field into a set of localized Gaussian components, each remaining paraxial locally. Collectively, these components reconstruct the full non-paraxial field inside the cavity. By propagating them through the cavity and combining their transformations, we construct a round-trip operator. Solving the operator’s eigenvalue problem reveals the cavity’s self-reproducing transverse modes, mode spacing, and spatial field structure, even in geometries inaccessible to traditional models. This approach provides a systematic framework for analyzing highly non-paraxial cavities with predictive power and efficiency. We validated the method using analytically solvable cavities, confirming accuracy and computational efficiency. To further improve performance, we developed a beamlet-generation scheme adapted to the initial field curvature and applied the Lagrange invariant to ensure local paraxiality during propagation. Ongoing work focuses on mitigating errors introduced by reflections from strongly non-paraxial surfaces, optimizing beamlet sampling strategies, and extending the framework to more complex cavity geometries. This tool offers a flexible platform for high-NA cavity design, with applications across quantum optics, microscopy, and photonic engineering, where precise control of light fields and efficient mode matching are critical.

Catherine Malacane

Discipline: Engineering

Authors:
#1 Gabrielle Brim
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Abstract Name: Investigating the Effects of Sphingosine-1-Phosphate on Bone and Vasculature Cell Function

Ischemic stroke impairs neurological and motor function, leading to significant bone loss and increased risk of falls and fractures. While bone deterioration post-stroke is commonly attributed to reduced mechanical loading, the cellular mechanisms that contribute to stroke-related bone loss remain unclear. Our previous experiments in a mouse model of stroke revealed dysregulation of the sphingosine metabolic pathway in the bone marrow microenvironment. In this, we observed reduced expression of sphingosine-1-phosphate (S1P), a lipid metabolite known to support osteoblast survival, angiogenesis, and endothelial barrier integrity. Reduced S1P is known to produce inflammation and disrupt vascular endothelial barrier integrity, but its effects on osteoblast behavior remain unknown. This study is investigating cellular interactions between human osteoblasts and endothelial cells in a vascularized bone microdevice, a controlled microenvironment that enables cellular communication and regulation of flow and metabolite concentration. We hypothesize that reduced levels of S1P mimicking ischemic stroke will reduce osteoblast activity and production of proangiogenic factors, impairing endothelial growth and function. By mimicking post-stroke conditions in vitro, this approach allows examination of how metabolic disruption contributes to cellular dysfunction.

Understanding how S1P downregulation affects bone-vascular interactions can help identify potential therapeutic targets to prevent stroke-related bone fragility and improve long-term recovery.

Andrew Malacara

Discipline: Biology

Authors:

#1 Elyse Uthagrove

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Abstract Name: Lessons from the past: Leveraging museum specimens to advance freshwater biomonitoring

The unique conditions of a freshwater ecosystem are reflected in its biological assemblages. Changes in condition from natural variation or anthropogenic alteration can modify the composition of resident organisms. Therefore, an assessment of biological organisms (i.e., biomonitoring) can be used to complement water quality monitoring as these organisms can predictably shift in occurrence or abundance in response to environmental change. In Wisconsin, the practice of using aquatic macroinvertebrates for biomonitoring was systematized by entomologist William Hilsenhoff whose extensive collection (750,000+ specimens) obtained from hundreds of freshwater ecosystems across all 72 Wisconsin counties is housed at the Wisconsin Insect Research Collection at the University of Wisconsin – Madison. This collection can continue to provide a vital resource for future freshwater biomonitoring innovation, but its data remain largely inaccessible.

Fundamentally, the accurate interpretation of biomonitoring data requires updated taxonomic information so changes in assemblages can be appropriately linked to environmental perturbations. Furthermore, shifts in occurrence patterns may reflect fluctuations in geographical distributions indicative of larger scale change or management actions. Therefore, our aims are to 1) harmonize historic and current taxonomic data for sensitive invertebrate taxa and 2) document changes in occurrence through an examination of recent records available from the combined collections of all partner institutions and publicly available records in the Wisconsin Department of Natural Resources Surface Water Integrated Monitoring System database. These activities will support the accurate calculation of richness values and metrics for regulatory and community science monitoring efforts while also identifying strategic locations and habitats for contemporary sampling needed for evaluating long-term trends. In addition, the digital records of specimens generated from across the state will, like the Hilsenhoff collection itself, become an on-going and growing asset for regulatory professionals, members of the public involved in community water monitoring efforts, and other freshwater researchers.

Rachel Malander

Discipline: Computer Science

Authors:

#1 Steven Fernandes

#2 Lindsay Iverson

#3 Tamara Oliver

Dean Magara

Abstract Name: Building RAG Agents to Enhance Difficult Conversations among Undergraduate and Graduate Nursing Students

Effective communication is a critical nursing competency, yet students often experience anxiety and limited opportunities for practice before clinical encounters. Traditional teaching methods and standardized patient interactions provide limited, one-time practice and feedback, hindering confidence and transferability of skills. The findings from this study indicate that integrating an AI chatbot into nursing education can serve as an effective preparatory tool to enhance students' confidence, readiness, and communication skills for navigating challenging clinical conversations. While the chatbot experience had its limitations, it provided most students with a valuable opportunity to practice, reflect, and apply feedback before engaging in live simulations. The combination of positive Likert-scale results and qualitative reflections underscores the chatbot's roles in reducing anxiety, promoting skill development, and offering structured, accessible practice in a low-stakes environment. As nursing education continues to explore innovative technologies, RAG-driven simulation tools have the potential to complement traditional training methods, bridge the gap between theory and practice, and better prepare future nurses for the complexities of real-world patient care. Further research should explore strategies to enhance emotional engagement in AI simulations, examine the long-term impacts on communication competency, and enhance chatbots' adaptability and realism.

Fabrizio Malatesta

Discipline: Biology

Authors:

#1 Brad Balderson

#2 Graham McVicker

Abstract Name: Capturing ultra-rare CRISPR-Cas9 off-target editing events in single cells

CRISPR-Cas9 genome editing offers powerful opportunities for therapeutics, but unintended off-target edits are a major concern. The McVicker Lab developed Superb-seq, a single-cell assay jointly profiling genome edits and transcriptomes to evaluate off-target editing and its consequences. However, the current pipeline's stringent filters miss potentially meaningful ultra-rare events. I developed a statistical framework to evaluate ultra-rare candidate edits identified using relaxed Sheriff filtering conditions. Allowing single-cell events and removing certain constraints generated an expanded catalog of low-frequency sites. To differentiate true Cas9-mediated events from technical artifacts, I implemented a guide homology scoring pipeline. This performs global sequence alignment between each candidate site and all known guide RNAs, assigning an alignment score based on sequence similarity and PAM proximity to reflect Cas9 targeting likelihood. To assess statistical significance, I developed an adaptive empirical p-value method. This approach compares observed alignment scores against a scrambled null background of randomized guide-site pairs to estimate per-site significance. The adaptive procedure dynamically increases permutations for initially significant candidates, providing high statistical resolution for promising sites while remaining computationally efficient. This analysis enabled the identification of 11 new significant off-target sites on chromosome 1, all of which were missed by the default Sheriff pipeline. Manual validation confirmed at least two of these sites as genuine, ultra-rare Cas9 edits, and the full set of significant sites showed a statistical enrichment in intronic and promoter regions. This framework enhances Superb-seq's sensitivity to detect ultra-rare CRISPR-Cas9 off-target edits and provides a more rigorous statistical foundation for distinguishing true Cas9-mediated events from background noise, contributing to safer and more precise genome editing analyses.

Chanord Malcolm

Discipline: Computer Science

Authors:

#1 Joshua Harrell
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Abstract Name: Privacy-Preserving Tax Analytics

As electronic tax systems are increasingly adopted worldwide, they face critical privacy and security risks due to reliance on cloud infrastructures and exposure of sensitive financial data. Traditional platforms often require raw access to taxpayer information, making them vulnerable to cyberattacks, breaches, and insider threats. These risks reduce public trust in digital tax systems. To address these challenges, we propose a privacy-preserving framework for secure tax calculation and risk assessment without revealing personal data. Our solution integrates Fully Homomorphic Encryption (FHE) and the CKKS scheme for approximate arithmetic to enable encrypted evaluation of income, deductions, and risk. Last year we showed simple calculations with encrypted data and trained SVM with plaintext data. This year we want to continue working on this project and take the model weights from SVM trained on plain data and perform inference on encrypted data. For future work, we aim to generalize this approach to additional machine learning models and explore the development of a user-facing application or web platform that integrates secure encrypted computation into real-world tax workflows.

Nishka Malhotra

Discipline: Sociology

Authors:

#1 Niraj Verma
#2 Anila Surin

Abstract Name: Land, Development, and Tribal Identity in India: The Heavy Engineering Corporation (HEC) and tribal land acquisition

Tribal land in Jharkhand, India, has been cultivated for generations by Adivasis, one of the largest aboriginal tribes of India. After India's independence in 1947, the government-owned Heavy Engineering Corporation (HEC) was established as a tomb to the industrial development of a new India. Land for the massive project came from acquiring large tracts of Adivasi land. Even in cases where compensation was paid, the social and cultural costs borne by Adivasis far exceeded the land's market value. Our research (a) traces this history of how the discourse of modernization and development was used to justify dispossession of land; (b) how this led to the spatial displacement of tribes, separating extended families, affecting livelihood, and impacting tribal identity; and (c) how this loss has been transmitted intergenerationally over the past 70 years and become part of Adivasi folklore, deeply entrenched into the Adivasi psyche. A qualitative research design examines the discourse on development, dispossession, and tribal identity. This will be integrated with the results of 20 semi-structured interviews with tribal leaders, community members, social activists, urban planners, lawyers, and subject-matter experts, including anthropologists and historians. A content analysis will identify key patterns from this integrated data. We expect our results to provide substantial evidence of how the rhetoric of modernization and development influenced HEC's acquisition of tribal land and how this loss of land impacted tribes by distancing and eventually eliminating them from their communities, traditions, and even their identity as agrarian tribes. Overall, our research findings will contribute to the discourse on development and help policymakers to understand Adivasi sentiments regarding land.

Discipline: Computer Science

Authors:

#1 Rahman Tashakkori

Abstract Name: Temporal Encoding for Fanning Detection of Honeybees

Honeybees are critical to our biosphere as a highly efficient pollinator. In recent years, an alarming number of hives have collapsed due to a variety of causes referred to as Colony Collapse Disorder (CCD). A crucial way honeybees maintain the health of their hive and the quality of the stored honey is by fanning. During fanning, bees remain stationary in front of the hive entrance and rapidly flap their wings to increase airflow. This results in regulating humidity and temperature, dispersing pheromones, and removing excess moisture from the stored honey before capping the cells. The time spent fanning, the number of bees participating, and the frequency of fanning events can provide important insights into a hive's health, longevity, and adaptability. Machine learning tools can be used to automate the detection and analysis of these events; however, video processing models are often quite large and computationally expensive. Models designed for single images have historically received more attention and are often more efficient and scalable. To take advantage of this, this paper proposes two techniques. One that encodes temporal data into the individual layers of an image before processing with an object detection model, and a second that does the same but instead uses a full convolutional network to encode an intermediary representation before parsing. Both are expected to reduce the model's size and computational complexity while achieving similar results. Also, this approach is expected to apply well to other events, such as washboarding, as well as more generalized action detection problems. With some adjustments, this technique could also be used in real time, providing another advantage over other video processing techniques.

Emma Maloberti

Discipline: Criminology/Criminal Justice

Authors:

#1 Jamie Chapman

#2 Shannon Smithey

Abstract Name: The Multivariate Analysis of Childhood Maltreatment and Adversity on Adult Functioning and Well-Being

Research has indicated that there is a strong relationship between adverse childhood experiences (ACEs) and negative outcomes in adulthood. Research has also indicated that there is a positive correlation between ACEs and adolescent deviance. Exposure to ACEs during childhood can lead to deficits in decision making, well-being, and overall life satisfaction. The purpose of this study is to assess the relationships among ACEs, adolescent deviance, and school-related deviance in predicting adult functioning and well-being. Participants (n=255) were recruited through the crowdsourcing platform CloudResearch and completed a series of online self-report assessments measuring their ACEs, adolescent behaviors, school-related behaviors, and adult functioning and well-being. Demographic variables, including age, gender, race, ethnicity, sexual orientation, and educational attainment, were also examined as potential moderating factors. Results from this study indicate that individuals who experience more ACEs in childhood are strongly correlated with committing adolescent deviance and school-related deviance. On the other hand, results indicated that there was no significant correlation between ACE scores and adult functioning and well-being. Future research should continue to analyze how early life adversity and adolescent deviance impacts long-term functioning and well-being across different facets of adulthood.

Argishti Manasyan

Discipline: Health and Human Development

Authors:

Elaine Khachaturyan

Leonie Sarkissian

Abstract Name: Building Beyond Function: The Impact of Prosthesis Aesthetics on Post-Amputation Depression

Despite many modern advances in healthcare, amputees still struggle with maintaining mental well-being post-amputation. While functional prosthetic design has advanced significantly, cosmesis dissatisfaction remains a largely overlooked psychological factor. Amputees face high rates of depression, anxiety, and reduced quality of life following limb loss. Post-amputation depression is widely recognized, but few studies have explored whether aesthetic dissatisfaction contributes directly to negative mental health outcomes. Much of this psychological burden comes from disrupted body image, social stigma, and difficulty adjusting to a changed sense of self. While modern prosthetics greatly improve mobility, they do not always address the emotional and identity-related challenges of amputation. This research draws on Maurice Merleau-Ponty's Phenomenology of Perception, and conducts an analysis of existing medical and psychological studies to determine whether dissatisfaction with prosthesis appearance correlates with high rates of depression. When a prosthetic seems unnatural or draws unwanted attention, it can worsen self-consciousness and contribute to long-term emotional distress. While a healthy mental state is important for all patients, amputees require strong motivation and a positive outlook even more than other cases, because of the physical therapy and musculoskeletal training that they must undergo to attain a full recovery. I propose that prosthesis aesthetics play a significant role in mental health, with realistic and artistic prosthetics often leading to better psychological adaptation than purely functional designs. The findings will show that aesthetic dissatisfaction is a significant psychological stressor, and these results will be discussed within the broader context of identity reconstruction and future prosthetic design. Even slight improvements in prosthetic design could help patients get back to a full, healthy life more quickly and with less mental anguish. The conclusions will serve to advocate for the need for aesthetic considerations in prosthetic development as a mental health intervention for amputees.

Evan Mancl

Discipline: Sociology

Authors:

#1 Evan Mancl

Abstract Name: The Social Construction of Cemeteries and Grief in the Chippewa Valley

Cemeteries serve as an important physical space of culture and history within communities across the United States. Due to changing trends in funeral rites, examining the use of cemeteries in the present can be a gauge for how they reflect grief within the community they are a part of. Through visual analysis of cemeteries' material conditions such as decorations, grounds maintenance, and infrastructure, this paper finds that cemeteries within the Chippewa Valley are given attentive care relative to the ages of those within. In other words, cemeteries with more recent graves were observed to be better cared for. This is further confirmed by interviews with funeral directors and groundskeepers who interact with these locations daily. Finally, the

paper concludes with a discussion of how families expressing grief use cemeteries in spite of the ways cemeteries are becoming more distant from the rest of the community with time. Considering the rapidly changing perspective of death within the broader context of society, this project found local patterns of grief that can be expanded upon by other scholars to further to better refine how death is socially constructed in other locations.

Shahabullah Mandozai

Discipline: Biology

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Abstract Name: Efficacy and Cytotoxicity of Honey and Honey-Coated Ag₂Se Nanoparticles on Wound Healing

Chronic wounds and bacterial resistance to conventional treatments have created an urgent need for safer and more effective wound healing materials. This study explores the therapeutic potential of honey, silver selenide (Ag₂Se) nanoparticles (NPs), and honey-coated nanoparticles (hNPs) of Ag₂Se as advanced materials for wound healing. Honey is widely recognized for its antimicrobial, anti-inflammatory, and antioxidant properties, while Ag₂Se nanoparticles possess notable antimicrobial activity and have shown promise in promoting tissue regeneration. Nanoparticles of Ag₂Se were synthesized and coated with honey using Pulsed Laser Ablations in Liquid (PLAL) method. By coating these nanoparticles with honey, we aimed to enhance their biocompatibility, reduce potential cytotoxic effects on human cells, and leverage synergistic effects to improve wound healing outcomes. Human dermal fibroblasts (HDFa) were used to evaluate cytotoxicity, proliferation, and cell migration using standard viability and scratch wound healing assays. Antimicrobial efficacy was assessed through zone of inhibition tests against *Staphylococcus aureus* and *Escherichia coli*, utilizing honey samples with varying levels of bioactivity. To make sure that the honey was attached to the NPs and to determine the specific compounds attached from honey to nanoparticles, we performed Liquid Chromatography-Mass Spectrometry (LC-MS), which is a powerful and accurate technique to determine exact molecules in a sample based of their masses. This comparative approach enabled us to assess the individual and combined effects of natural and nanomaterial-based agents on wound healing performance. Statistical analyses ensured the reproducibility and precision of our findings. Overall, the results support the development of innovative biomaterials that integrate honey with nanotechnology to promote safe, effective, and biologically synergistic wound care strategies.

Nikita Mankad

Discipline: Political Science

Authors:

Abstract Name: From Puritans to Progressives: Comparing Political Culture Between Massachusetts and

Across the American political landscape, Massachusetts and California occupy an intriguing place—both states are considered metaphorical “front lines” for liberalism, consistently voting for Democratic candidates and supporting progressive policies. Despite the similar “sea of blue” when looking at recent electoral maps, they do not experience, perform, or incorporate politics into society the same way. Understanding that distinction historically, culturally, as well as its impact currently, requires looking beyond maps or data to uncover concealed meanings, values, and habits that shape how communities imagine their relationship to power and democracy. It requires an examination of lived political culture and how history has worked to shape it. This paper explores the root causes of these divergences by examining the historical evolution of political culture in each state, with a particular focus on the cultural components of each state’s foundational periods. Firstly, a specific definition of political culture will be devised using various political and cultural theorists and accounting for discursive elements as well as levels of political participation and action. Using this definition, the key cultural elements present during the founding years of each state will be analyzed, juxtaposing colonial Massachusetts and the Puritan tradition that emerged in the state with the expansionist, pioneering mentality of California’s settlers. This paper will demonstrate how these distinct cultural remnants live through collective memory and in turn affect how each state’s contemporary political cultures reproduce these historical elements. Through this comparative analysis, this research aims to provide a nuanced understanding of how historical differences contribute to diverging understandings of liberalism within American politics. By examining how cultural foundations have influenced these two distinct ideas of civic engagement, we can better understand the clash between the traditional and modern understanding of what it means for a state to have a culture that is politically engaged.

Joseph Manning

Discipline: Biology

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#1 Angela Wong Lau

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Abstract Name: Ovarian Cancer Cell-Driven Reprogramming of Fibroblasts to Induce Collagen Remodeling and Promote Differential Monocyte Infiltration

Within the tumor microenvironment (TME), an abundant cell type, cancer-associated fibroblasts (CAFs), critically regulates ovarian cancer progression by altering the extracellular matrix (ECM) through protein secretion and modulating immune cell infiltration through paracrine signalling. This study investigated how ovarian cancer cells reprogram dermal fibroblasts (NIH 3T3) into CAFs and how this reprogramming affects monocyte recruitment. Understanding these mechanisms is essential for developing therapies targeting the TME. We used a transwell co-culture system where NIH 3T3 fibroblasts were exposed to conditioned media from three ovarian cancer cell lines (UPK10, 2F8, ID8 p53 KO) for 72 hours. Fibroblast reprogramming was quantified by immunofluorescence staining for aSMA. We then embedded these activated fibroblasts into 3D collagen droplets (rat tail type I, 1 and 2 mg/ml concentrations) and performed a monocyte infiltration assay using isolated bone marrow monocytes. We tracked fibroblast proliferation (CellTracker CMFDA) and monocyte infiltration (CellTracker Deep Red) at 0, 24, and 48 hours using confocal microscopy. Results demonstrated that ovarian cancer cell lines induce differential CAF phenotypes. Fibroblasts exposed to UPK10 cells exhibited significantly increased aSMA intensity compared to control, indicating reprogramming into an activated CAF phenotype. Conversely, fibroblasts exposed to ID8 p53 KO showed markedly reduced aSMA expression. Correlating to the activation status, fibroblasts reprogrammed by UPK10 showed the highest monocyte infiltration compared to the other conditions. Furthermore, all co-culture conditions promoted increased fibroblast proliferation. These findings confirm that ovarian cancer cells utilize paracrine signaling to reprogram fibroblasts, inducing specific CAF phenotypes that functionally

modulate immune cell recruitment into the TME. The results underscore the critical role of specific tumor factors in driving CAF diversity, which has direct implications for regulating the composition of the TME.

Haelee Manning

Discipline: Interdisciplinary

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Misael Duque

Abstract Name: Not Just Gear: How Safety Climate and Self-Efficacy Shape Oil and Gas Workers' Perceived Value of PPE

Fatality rates in the oil and gas extraction industry far exceed those of all U.S. workers, yet research on personal protective clothing (PPC) and personal protective equipment (PPE) remains limited. Guided by the Customer Perceived Value framework, this study examined how field workers evaluate PPC/PPE. An online survey was conducted with 57 U.S. field workers (100% male; 75% with ≥ 6 years of industry experience). Composite 1–5 Likert scores were computed for hazard mitigation, design attributes (comfort, fit, mobility), self-efficacy, safety climate, perceived burdens/risks, and overall perceived value. Workers reported positive evaluations of PPC/PPE (overall value $M=3.61$; hazard mitigation $M=3.99$; safety climate $M=3.64$), alongside moderate concern about maintenance burden, donning/doffing risks, and performance interference ($M_s \approx 3.2\text{--}3.6$). Multiple linear regression models showed that safety climate was the strongest predictor of overall perceived value ($\beta=0.47$, $p=.003$; $R^2=.36$), whereas comfort and fit were not uniquely associated with value after accounting for other beliefs. Hazard-mitigation beliefs were most strongly predicted by self-efficacy ($\beta=0.41$, $p=.003$; $R^2=.38$), and PPE-related anxiety reduction was positively associated with safety climate ($\beta=0.31$, $p=.054$; $R^2=.30$). Content analysis of open-ended responses identified slips, trips, falls, chemical and toxic exposures, heavy equipment, noise, and heat as salient hazards. Workers described gloves, flame-resistant clothing, and safety footwear as essential yet often hot, heavy, and uncomfortable, and called for lighter, more breathable, better-fitting designs that maintain protection and dexterity. These preliminary findings suggest that organizational context and worker competence may be as important as equipment design in shaping how workers value and use PPC/PPE. Future research should replicate these models in the full sample, examine subgroup differences, and link perceived value and self-efficacy to incident data.

Abigail Manning

Discipline: Environmental Science and Sustainability

Authors:

#1 Abigail Manning

Abstract Name: Measuring the impact of a sit-spot mindfulness practice on connectedness to nature using multiple instruments

Spending a short amount of time outside can benefit college students' mental health and connectedness to nature. College students undergo an overwhelming amount of stress due to school work, family and social life, just to name a few. Time spent outside in nature helps increase a sense of mindfulness and groundedness that was not previously present. In addition to the mental health benefits of nature exposure, there are also

pro-environmental effects. Those who spend more time outdoors feel a stronger connection to nature, and thus are more likely to show increased care for the health of the environment. Our study focuses on how exposure to nature through multiple, short sit-spot activities can improve mindfulness and nature relationships. Sit-spot practices involve spending ten minutes sitting outside in a preferred location eight times in the duration of one month. To observe how these exposures affect students' wellness and connectedness to nature, we conducted a pre-post-study in three classes during the Fall 2025 semester. The students completed similar questionnaires at the beginning and end of the study, allowing us to compare how their answers have changed as a result of the practice. This survey included multiple different quantitative and qualitative measures. We have equipped the PANAS (Short Form Positive and Negative Affect Scale), MPQ (Mindfulness Practice Questionnaire), IINS (Illustrated Inclusion of Nature in Self Scale), and NCI (Nature Connectedness Index). Results will illustrate the degree to which mindful time spent outside affects students' mental health and relationship with nature in order to inform universities of ways in which this can improve students' wellbeing.

Maansi Manoj

Discipline: Computer Science

Authors:

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Lia Mathews

Abstract Name: Enhancing Unmanned Aerial Vehicle (UAV) Based 3D Reconstruction Using Multi-Objective Loss Functions in Neural Radiance Fields

In an effort to improve scene reconstruction for Unmanned Aerial Vehicle (UAV) data in three-dimensional (3D) models, this work explores how Neural Radiance Field (NeRF) reconstruction methods can be applied to generate continuous 3D renderings of UAV imagery. This research asks whether integrating perceptual loss functions with a dynamic weight function, specifically Learned Perceptual Image Patch Similarity (LPIPS), with traditional pixel-level metrics can improve the structural and perceptual quality of UAV-based NeRF reconstructions. We examine how UAV-captured images allow for the generation of spatially coherent models using Multi-Layer Perceptron (MLP) networks, which map 5D coordinates, like spatial position, viewing direction, radiance and density values, along each camera ray. This enables high-fidelity novel-view synthesis. To assess reconstruction quality, quantitative error metrics, like Mean Squared Error (MSE), Peak Signal-to-Noise (PSNR), Laplacian-based sharpness, and Structural Similarity Index (SSIM) were implemented to evaluate pixel-level and structural accuracy between generated and ground-truth images. Preliminary results show that integrating LPIPS, particularly when applied at controlled frequencies, improves perceptual fidelity without sacrificing pixel accuracy. These reconstructions when made with aerial drone data create more photorealistic automatic imaging of topology, allowing for better understanding of real-time changes in topology and thus monitoring of those areas. Keywords—NeRF, MSE, LPIPS, SSIM, PSNR, 3D scene reconstruction, topography

Amal Manoj

Discipline: History

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#1 Amal Manoj

Abstract Name: Analyzing Factors Leading to the Outbreak of World War Two.

Before the outbreak of World War II, many issues were present. Three factors that were present were tension built up from global conflicts, ideologies, and alliances. This research paper will analyze how 1900s ideologies, along with global tension and the powerful alliances, affected the outbreak of the war and the full extent of it. It focuses on figuring out just how much those elements pushed the big powers to act the way they did, and how they built up tensions between nations. Historians have discussed before that fascism, communism, and Western ideologies all have tried ruling the world, yet this work digs deeper into how those beliefs actually drove the alliances that formed, the diplomacy and cooperation that fell apart, and the aggression that heated things through the 1930s. The studies/sources look into the historical context of the war while looking at multiple factors within the three main factors. It makes the case that World War II did not come from just one problem alone, but rather it grew out of how extreme ideologies mixed with countries chasing their own goals and the messy politics of alliances. That combination really laid the foundation for the fighting to spread throughout Europe, and then later on the whole world. When you see how those factors worked together, it helps make sense of how wars can break out from differences in views and the failure of diplomacy. Seeing how all of these factors can impact the outbreak of a war is an important lesson that could be used in order to analyze or prevent modern wars.

Vina Manouchehri

Discipline: Biology

Authors:

Abstract Name: Interkingdom Interactions as a Platform for Antifungal Drug Discovery

Introduction: The extent of microbial interactions is influenced by their environment (e.g., nutrient availability, oxygen concentration, temperature). While we are just beginning to understand how bacterial microorganisms communicate with each other, interactions between members of different kingdoms (interkingdom) such as those between bacteria and fungi are underexplored. *Candida albicans* is an opportunistic pathogenic fungus and a common colonizer of the human gastrointestinal (GI) tract. Previous studies have shown that *C. albicans* interacts directly with bacterial organisms and these interactions can be synergistic (e.g. *Streptococcus mutans*) or antagonistic (e.g. *Pseudomonas aeruginosa*). Hypothesis/Goal: We hypothesize that understanding how fungi and bacteria interact can reveal novel druggable targets. The goal of the present study is to co-culture a library of bacterial species with *C. albicans* to identify interkingdom interactions. Methodology: *C. albicans* SC5314 was co-cultured with one of 18 distinct bacterial strains using a biofilm formation assay in 1:1 media (TSB:RPMI). A concentration of 2×10^6 cells/mL of *C. albicans* was combined with a 1:20 or 1:200 dilution of an overnight culture of each bacterium and seeded into 96 well plates. Plates were incubated for 24 hours at 37 °C in 5% CO₂. Biofilm biomass was quantified using the Crystal violet assay. Results: We have identified interactions that enhance overall biofilm biomass (synergistic) or prevent biofilm formation (antagonistic) with some recapitulating previously reported findings (e.g. *Enterococcus faecalis* and *Streptococcus pyogenes*) while others are novel phenotypes (e.g. *Alcaligenes faecalis*). Further, all the interactions reduced or fully inhibited *C. albicans* filamentation, underscoring their complexity. Conclusions: Overall, our findings i) validate our screening platform, ii) identified interkingdom interactions that inhibit *C. albicans* filamentation, a key virulence factor, and iii) yielded multiple novel interactions. In future studies, we will test distinct culturing conditions (e.g. media) and characterize interactions in the context of mature *C. albicans* biofilms.

Tyler Mansker

Discipline: Biology

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#1 Orlando Ortega

Joanna Corduan

Abstract Name: Evidence for Bivalent Amino Acid Chemoreception: The Effects of Solvated Basic and Neutral Class Amino Acid Blends on the Feeding Behavior of Koi Carp, Goldfish and Brown Bullhead

Solvated amino acids are known to induce an enhanced feeding response among a broad cross-section of fish species, including members of the Carp (Cyprinidae) and American catfish (Ictaluridae) families. Through both aquaria studies and field work, we have shown that solvated binary blends of basic (Lysine, K) and neutral (Valine, V or Alanine, A) amino acids invoke a greatly enhanced feeding response within koi (*Cyprinus rubrofuscus*) and goldfish (*Carassius auratus*) for V: K or A: K ratios of ~1:1.5, with a completely attenuated response being observed for V: K or A: K ratios of ~2:1. For bullhead (*Ameiurus nebulosus*), optimal feeding behavior is observed for a blends possessing V:K or A:K ratios of ~1:2, with a completely diminished response also being observed for V:K or A:K ratios of ~2:1. These results strongly support the hypotheses that that amino acid chemoreception within these respective species utilize a bivalent receptor system dedicated to the concomitant detection of amino acids from the basic and/or neutral classes. Importantly, the complete attenuation of feeding response, for effectively equimolar blends of basic and neutral amino acids, strongly supports the hypothesis that the bivalent receptors' basic and neutral binding sites exhibit an EOR Boolean type relationship with respect to the expression of net stimulatory response. This interpretation is supported by the results of a 100 bivalent (EOR) statistical model of the proposed chemoreceptor system, which furnishes maximized and fully attenuated net stimulatory responses consistent with the analogous amino acid blends' experimental results.

Ritika Manthena

Discipline: Biology

Authors:

#1 Dianne Jennings

Nya McClenney

Abstract Name: Prevalence of Bacterial Tetracycline Resistance Genes in Virginia Soils

The spread of antibiotic resistance in bacteria is a growing health concern as it can make bacterial infections harder to treat. An increased prevalence of antibiotics in ecosystems due to overuse in agricultural and urban settings creates a selection pressure in bacteria for antibiotic resistance genes (ARGs). Bacteria can also pass these resistance genes to other bacteria through horizontal gene transfer, speeding up the spread of the ARGs. Environmental samples, including soil, can act as reservoirs for these antibiotic resistance genes (ARGs) because they house many different types of bacteria. By studying these environments for ARGs, we can better understand where resistance may be developing and how it could spread outside clinical settings. This study surveyed for the presence of tetracycline resistance genes in soil samples collected from across Virginia. Sampling locations included a livestock farm, a heavily used recreational trail, and a dog-walking field near a residential neighborhood. These environments were selected because they experience frequent human and animal activity and may be more likely to come into contact with antibiotics or fecal contaminants. Using primers targeting ARGs, genomic DNA isolated from the soil samples was tested to determine the presence of tetracycline-associated ARGs. Several of the soil samples collected were positive for tetracycline-associated ARGs, indicating that some environments may harbor bacteria with antibiotic resistance.

John Mantor

Discipline: Physics and Astronomy

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Abstract Name: Investigation of Electron Radiation Effects on HeLa cells expressing APOBEC3A

The purpose of our research is to study the effects of ionizing radiation by direct electrons on HeLa cells. The radiation source is AN-400 Van De Graaf particle accelerator at the Minnesota State University Applied Nuclear Science lab, modified to provide electron beams. The 350KeV electrons are extracted through a 25mm aluminum window to provide a broad external beam suitable for irradiation of biological samples. HeLa cells are prepared in a standard MTS assay plate with the liquid medium removed prior to irradiation. Separate regions of the plate can be irradiated, with the remainder including controls behind lead shielding. After irradiation the liquid medium is replaced and the cells incubated for 48 hours. Cell survival curves and repeated dose variance was measured up to near 90% cell death. Typical biological studies are performed at the experimentally determined LD-50, the radiation dose at which 50% of the cells survive at 48 hours. Preliminary studies comparing HeLa cells expressing APBOC3 (experimental) vs. control group expressing the catalytically dead mutant version show a significant (p value 0.0364) lower viability in irradiated experimental samples, suggesting that not only is APOBEC3A cytotoxic, but it accelerates irradiation-mediated cell death.

Alan Manzo

Discipline: Law and Legal Studies

Authors:

#1 Alan Manzo

Abstract Name: Authorship Via Preponderance: Integrating AI-Assisted Creative Outputs into Copyright Law

As technology evolves faster than our legal system can adapt, courts and lawmakers are increasingly forced to apply decades-old statutes to brand-new realities. Nowhere is this tension more apparent than in the realm of copyright law and artificial intelligence. Recent cases like *Thaler v. Perlmutter* — which denied copyright protection to works created entirely by AI — have set important precedents but left fundamental questions unresolved. Chief among them: how much human involvement is enough for an AI-assisted creation to qualify for copyright protection? This uncertainty exposes a critical gap in current copyright doctrine. Without a clear threshold for what constitutes “human authorship” in the age of AI, we risk both stifling innovation and undermining the core principles of copyright law. To close this gap, I propose courts and the Copyright office implement the preponderance standard: copyright protection should extend to AI-assisted

works when a human's creative contribution is both demonstrable and constitutes over 50% of the final output. Adopting this evidentiary standard preserves Thaler's case precedent, supports the structure and core principles of the Copyright Act, and harmonizes the capability of AI as a powerful tool without undermining the creative thought process. Applying the framework on Thaler's fact pattern and NICE, an AI integrated robust scheduling platform, demonstrates its ability to perform for both creative and scientific outputs, recognize responsibility, and align with other key components of the Copyright Act such as the Fair Use Doctrine. The preponderance standard gives a recognizable and predictable legal test that resolves authorship questions for AI-assisted outputs, preserving the protection of human creativity while fostering innovation.

Sebastian Marcano

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Discipline: Mathematics

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#1 Sebastian Marcano

Abstract Name: AES-256 and Naïve Bayes for Encrypted Reporting under Venezuela's Censored Telecommunications Landscape

This study evaluates whether an encrypted digital evidence library utilizing the Advanced Encryption Standard (AES) with a Naïve Bayes Classifier can pseudonymously secure reporting against censorship in Venezuela. From 1991 to 2025, Venezuela's telecommunications landscape has been regulated by the government agency CONATEL. By limiting access to open-source software such as virtual private networks, CONATEL has created barriers to unrestricted digital communication. As a secure alternative, AES, published by the National Institute of Standards and Technology (NIST), uses modular arithmetic to transform plaintext bytes, represented as polynomials, into unreadable ciphertext. The transformed data can be categorized using a Naïve Bayes Classifier to identify feature vectors into classes, with accuracy potentially improving on larger datasets. To contextualize the importance of this framework, a literature review of governmental reports from the U.S. Department of State, policy research by David Aragort, and industry data from ProtonVPN emphasizes the need for censorship-resistant systems. Practical implementations were assessed through a personal case study, in which reports were submitted to a Python program utilizing AES and Naïve Bayes classification. The results concluded that training the Naïve Bayes Classifier on more reports improved classification accuracy, highlighting the need for larger, more balanced datasets to reduce bias. Simultaneously, AES encryption served as a robust algorithm for securing reports. Future research could explore the scalability of this model and its adaptability to other machine learning classifiers, further validating its effectiveness as a framework for secure, private reporting under digital repression.

Emily Marchlewski

Discipline: Chemistry

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#1 Pete Smith

Abstract Name: Measuring rare earth content in industrial solid waste

Industrial waste streams are a domestic source of critical materials such as rare earth metals. Recovery of critical materials from waste streams is a focus of current research. Many industrial processes use holding ponds as a containment space for solid waste. These solid waste products commonly contain critical materials

that can be isolated and purified. Carbon-based waste samples from an industrial plant were collected before placement into holding ponds, and after placement in holding ponds. The waste samples were filtered to remove most of the liquid content before being placed into a drying oven to remove any remaining water content. Samples were then roasted in a muffle furnace to burn off organic material and leave behind any inorganic products such as critical materials. The roasted solids were analyzed using x-ray fluorescence to identify the elemental composition of the solids. The roasted solids were digested with concentrated nitric acid to solubilize critical materials. The nitric acid solution containing critical materials was then analyzed using ICP-OES. The ICP analysis indicates that the samples have 50-100 micrograms of light rare earth materials per gram of solid sample. This analysis was used to determine which carbon source from the industrial plant had the highest concentration of critical materials to be used to develop further recovery processes.

Benjamin Marcinko

Discipline: Health and Human Development

Authors:

Abstract Name: The Right to Live (or Die)

The early twentieth century saw much debate over the legalization of euthanasia. After Progressive-era reforms attempted to legalize euthanasia, also known as physician-assisted suicide (PAS), the fear of association with the Nazi party caused support in both the UK and the US to dwindle. It wasn't until the late 20th century, when Jack "Dr. Death" Kevorkian broadcast himself lethally injecting a patient, and the Netherlands completely legalized assisted suicide, that PAS became international news again. Today, many countries around the world are considering legislation to legalize PAS, hoping to deter the use of unsafe and unapproved methods such as suicide pods. Joining these countries are most family members of the chronically ill, as well as a select group of medical professionals, who argue that PAS allows patients to die with dignity. The opposition sees a majority of countries, major religions, and doctors who argue that legalized PAS will create a suicide contagion and a slippery slope that we are unable to recover from. These arguments are explored through the eyes of Dr. Daniel Sulmasy, who suggests that the inherent value of life supersedes personal desire, and Professor David Benatar, who parallels the necessity of having the choice to die with our basic rights. These academics are paired with voices from Morrie Schwartz, a man who chose life over death, to members of the National Youth Rights Association (NYRA), an organization that enables the slippery slope by pushing to expand the medical opportunities provided to youth. While NYRA's efforts are admirable, and I believe, as Dr. Sulmasy does, that society's priority should be to sustain life, I also believe that we need to switch our way of thinking and look at how we have failed those who are forced to resort to physician-assisted suicide to alleviate their pain.

Lauren Maresh

Discipline: Business

Authors:

Abstract Name: Is the "Gen Z Stare" Really a Thing?: An Exploration of Facial Expressions in Service Encounters

Service marketing quality can be difficult to measure as, unlike a physical product, it is intangible. Parasuraman et al.'s (1988) seminal work found that customers perceive quality based on five dimensions:

tangibles, reliability, responsiveness, assurance, and empathy. This study focused on empathy, specifically on how customers perceive facial expressions. The recently reported phenomenon of the “Gen Z Stare” has implied that this ‘blank’ expression by younger employees in service delivery encounters has produced uncomfortable and even antagonistic responses in their customers. This research studied whether there is a generational effect among consumers in how they perceive the stare along with eight other facial expressions, including a ‘fake smile.’ Gender and service context treatments were also considered in the analysis of correlations. Significant findings include that when being serviced by an employee in any service situation, as age of the customer increased, the likelihood of appreciating a ‘fake smile’ from the employee also increased in almost all generational cohorts and gender groups of the customer, corroborating prior research findings that younger generations are less appreciative of inauthentic or ‘performative’ expressions of feelings. Another notable finding was that the only instance the fake smile demonstrated weak to no significance was with a male service employee. This finding suggests that performance expectations are uniquely gendered, reinforcing the notion that female customer service representatives are subject to certain emotional and performativity expectations, specifically in professional settings. Interestingly, there was no significant correlation for the Gen Z Stare facial expression across service context, employee or customer gender, or generation was found. Future research is recommended to corroborate this finding or examine whether experimental bias in the generalization of the expression used to measure the stare was present.

Lukas Marlow

Discipline: Engineering

Authors:

#1 Sevki Cesmeci

Abstract Name: A Novel Elastohydrodynamic Seal for Supercritical CO₂ Power Cycles

Supercritical carbon dioxide (sCO₂) power cycles are emerging as a leading candidate for next-generation energy systems due to their high thermal efficiency, compact turbomachinery, and potential for reducing carbon emissions. However, effective shaft sealing remains one of the most significant technical barriers to realizing the full potential of sCO₂ power generation. Leakage in sCO₂ turbomachinery can reduce overall efficiency by up to 0.65 percent, translating into substantial economic losses for utility-scale systems. These losses highlight the need for advanced sealing solutions engineered for dense-fluid, highly compressible sCO₂ environments. This research investigates an elastohydrodynamic (EHD) seal concept that passively adjusts its clearance through pressure-induced deformation to reduce leakage and improve durability. A coupled fluid–solid interaction model was developed using finite-element analysis and computational fluid dynamics to predict seal behavior under varying operating conditions. The model was validated through proof-of-concept experiments using a 2-in. static shaft seal subjected to pressures up to 1.2 MPa, with polytetrafluoroethylene (PTFE) selected as the sealing material. Simulations and benchtop experiments revealed a quadratic leakage trend: leakage increased with pressure, peaked near 6 g/s, and then decreased to about 1.5 g/s at maximum pressure. The baseline model converged in about 2 seconds, providing rapid insights into seal deformation, clearance, pressure distribution, and stress behavior, while a modified model achieved improved accuracy with convergence under 20 seconds. Complementary analytical modeling and parametric studies demonstrated how key geometric and material parameters influence leakage performance, with trends aligning well with expectations. The results indicate that EHD seals can reduce leakage by more than 50 percent compared with conventional dry gas seals. By introducing a new approach to passive leakage control, this research advances the development of cost-competitive sCO₂ technologies and supports ongoing national efforts toward high-efficiency, low-emission power systems.

Shea Marney

Discipline: Education

Authors:

Abstract Name: Pick Up Your Books and Pens: A Study of the Fluctuations of Educational Inequality in the United Kingdom, France, and Germany Using PISA Data from 2000-2022

Education is a human right, but barriers to education, such as class, racial, and gender inequalities, create an environment where educational institutions limit disadvantaged students' educational potential. In response to this barrier, the proposed study analyzes the fluctuations of educational inequality in the United Kingdom (UK), France, and Germany using the Programme for International Student Assessment (PISA) data from 2000 to 2022. As previous literature identified, educational policies differ in their impacts depending on their respective countries. Additionally, previous researchers have shifted from using educational success and attainment to measure educational inequality and have begun utilizing educational achievement levels. This exemplifies the importance of the proposed project, as PISA collects scores in mathematics, language arts, and science from 15-year-olds in all participating nations, as well as demographic, social, economic, and educational variables to provide researchers with the data to make sound conclusions about international educational inequalities. The proposed study utilizes the International Database Explorer (IDE) to compile and compare variable indices before completing an exploratory time series analysis. Results could show an overall reduction in educational inequality in terms of the differences between the mean educational achievement of the extremities of variable indices. Institutionally-reinforced inequalities should never hamper a child's education; moreover, decision-makers knowing the overall trends of inequality and the policies influencing inequality is an intrinsic step in lessening institutional impacts.

Krishna Maroju

Discipline: Health and Human Development

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Abstract Name: Optimizing Computer Vision Tools for the Rapid and Objective Assessment of Subtle Parkinson Disease Motor Symptoms

Parkinson's disease (PD) is a common neurodegenerative disorder that can produce significant physical and mental health challenges over time. Motor symptoms of PD can include tremors, bradykinesia, rigidity and postural instability and can be difficult to quantify with precision. Standard clinical assessments, such as the Movement Disorder Society-Unified Parkinson's Disease Rating Scale (MDS-UPDRS) rely heavily on clinical observation and are therefore susceptible to subjectivity. Computer vision-based assessments offer a conducive way to provide objective measurement, but these methods require further validation to ensure accuracy. In this study, 6 individuals with PD and 7 healthy older adult controls were video-recorded while completing the finger tapping task of the MDS-UPDRS. Joint coordinates were extracted from each participant's left and right hands using the open-source MediaPipe computer vision algorithm. We applied a range of Savitsky-Golay filters to the coordinate data, systematically testing filter parameters including polynomial order and frame length, to determine the most accurate filter for extracting finger tapping frequency. Preliminary analysis indicates that specific combinations of Savitsky-Golay parameters yield the highest accuracy in measuring dominant hand finger tapping for both PD participants (82.5%) and adult

controls (92.8%). The filter was less accurate in estimating finger-tapping frequency for the non-dominant hand (PD participants: 55.6%, controls: 87.1%). These early results suggest that open-source computer vision tools, paired with optimized filtering parameters, could potentially serve as effective and objective measures of assessing left and right motor severity and subtle Parkinson's Disease deficits. Continued analysis with the full dataset is underway. Future research is necessary to ensure accuracy and validate these findings across participants to assess clinical utility and implement these tools in clinical practice.

Regina Marquez

Discipline: Psychology

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Milagro Almendarez

Abstract Name: Associations between Black & Latine Caregivers' Academic Socialization and Children's Academic Self-Efficacy

Caregivers instill educational and academic values through socialization practices within marginalized Black and Latine families, influencing children's academic self-efficacy. Caregivers engage in academic socialization by repeating messages about perseverance in class, the importance of education for advancement in society, and suggesting strategies to navigate racialized barriers. These socialization practices can further affect children's academic self-efficacy outcomes. While prior studies have examined academic socialization, few have focused specifically on how Black and Latine caregivers' academic practices predict the development of children's academic self-efficacy. Many caregivers encourage their children to pursue higher education. However, caregivers' academic socialization varies across families, as some may use different approaches, strategies, and messages with their children. To address gaps, the current study examined how Black and Latine caregivers' academic socialization practices influence children's academic self-efficacy. The current study included 284 Black and Latine caregivers and their children (5 to 11 years of age) from a larger ongoing study. Caregivers completed an 8-item measure of academic socialization, and their children completed a 5-item measure of academic self-efficacy. We used SPSS to conduct a linear regression to examine the relationship between caregivers' academic socialization and children's academic self-efficacy. The overall model was significant, $F(1, 261) = 12.94$, $p < .001$, $R^2 = .05$. Results indicated that caregivers' academic socialization significantly predicted children's greater academic self-efficacy, $\beta = .22$, $p < .001$. Our results suggest that caregivers' messages about academics contribute to children's beliefs about their academic abilities. Findings highlight the importance of programs that bolster parents' academic socialization efforts in order to enable children to feel efficacious in navigating academic challenges and thrive in learning environments.

Kaison Marrow

Discipline: Political Science

Authors:

Abstract Name: Online Radicalization and Perversion of Public Discourse: An Analysis of "Debate Culture" and Political Engagement in Youth

The first televised debate in the US between presidential candidates Richard Nixon and John F. Kennedy changed the way that American youth engaged in participatory politics. That first televised event, which was a civil exchange of ideas and proposals based on truth and facts has been replaced by online spectacles, exchanges of insults, and the radicalization of ideas. Political pundits, social influencers, and news agencies have since adopted argumentative programs and use social media algorithms to reinforce radical ideologies by way of deliberate confirmation bias. American youth are no exception and have become increasingly more susceptible as social media has made political engagement more readily available than ever. As youth become more engaged in online spaces, where political content is targeted to them based on their viewing habits, their own political ideology and identity has become increasingly radicalized. This loop has created a debate culture where perception is more valuable than fact and propaganda is easily accepted. The arguments put forth in this current article discuss the potential causes, implications, and impacts of how this commercialization of public debate through technological platforms has contributed to increasingly polarizing arguments and the perversion of public discourse.

Benjamin Marshall

Discipline: Interdisciplinary

Authors:

#1 David Schweitzer

Abstract Name: The Beauty of Uniquity: A Statistical and Biomechanical Analysis of Pitchers with Unique Arm Angles

In today's modern age of analytics, fans have more information than ever before about anything in the world of sport. Starting with the introduction of Statcast to Major League Baseball, the push toward analytics has reached new heights in the last decade. One such analytical addition is new metrics for pitching mechanics, specifically a comprehensive understanding of things like release point, spin, rotational axis, and arm angle. This initial study examined the factors that contributed to the success of qualified pitchers from the 2025 MLB season with unique arm angles, specifically below 30°, compared to their counterparts with a more traditional arm angle. Using public data available on BaseballSavant.com, a dataset for the study was collected that contained a variety of different factors that were believed to be indicative of pitcher success. These factors included some traditional metrics, such as handedness, velocity, and physical size, as well as new certain attributes that have recently surfaced as valuable measures of success, such as horizontal and vertical break, spin rate, and strike zone metrics. After an initial study, the research has since been expanded to other areas of pitching and biomechanical analysis. The initial study has been conducted by using linear regression and other high-level statistical analysis techniques, primarily through the open-source coding language R. The current study has the same goal, aiming to determine the factors that lead to success for pitchers, but contains a heavier focus on biomechanical and physiological factors after finding in the initial study that success cannot be measured simply by an athlete's pitch profile. It is predicted that other factors alongside arm angle will be more indicative of pitcher success, including external shoulder rotation, wrist pronation or supination, and peak braking force in the plant leg.

Roxanna Martell

Discipline: Mathematics

Authors:

#1 Maria Karla Romero

#2 Luis Rodriguez

Abstract Name: The Math Behind Google's Page Rank Algorithm

This project investigates how mathematical principles can be translated into real-world computing by reconstructing Google's PageRank algorithm and applying it to a simulated search engine. PageRank, introduced by Larry Page and Sergey Brin in 1998, ranks webpages based on their link structure and models user behavior through Markov chains. Although commonly associated with computer science, the algorithm relies heavily on linear algebra concepts such as eigenvectors, stochastic matrices, and iterative convergence. The purpose of this research was to understand how these mathematical ideas work together to measure webpage importance and how they can be implemented programmatically. To do this, I built a six-page mini-web, constructed its hyperlink matrix, and created the Google matrix by incorporating the damping factor that simulates random page jumps. I then used Python to run the power-method iteration until the PageRank vector stabilized. The results were used to develop a small search engine prototype, MDC-Google, which ranks pages based on their long-term visit probability. Through this process, I observed how changes in the hyperlink structure affect the final ranking and how quickly the algorithm converges for small networks. This project demonstrates that mathematical modeling plays a central role in modern information retrieval and shows how undergraduate research can connect theoretical mathematics with practical software development.

Paris Martin

Discipline: Exercise Science and Nutrition

Authors:

#1 Melissa Lodge

#2 Christie Ward-Ritacco

Abstract Name: Examining the Influence of Obesity Assessment Techniques on Obesity Prevalence in Middle-Aged Women

Excess body fat increases the risk for serious health conditions, yet body mass index (BMI), the standard measure for classifying obesity, does not directly assess body composition. As a result, individuals with high body fat but a "normal" BMI may be misclassified, a condition known as normal weight obesity (NWO). NWO is defined as having a BMI between 18.5–24.9 kg/m² and body fat greater than 30%. Misclassification can lead to inadequate treatment and missed opportunities for early intervention. This data analysis aimed to examine the prevalence of NWO in a sample of middle-aged women. Participants included women aged 40–64 years who were weight stable for at least three months, had a BMI between 18.5–45.0 kg/m², were non-smokers, lived independently, and were able to safely undergo body composition and physical function assessments. Data were collected over two in-person visits and additional at-home tasks. At the first visit, anthropometric measures (height and weight), vital signs, questionnaires, and objective physical function assessments were completed. Body composition, including percent body fat, lean mass, and fat-free mass, was measured using dual-energy X-ray absorptiometry (DXA). Among 106 participants (mean age = 53.0 ± 6.2 years), 33 women were classified with NWO (BMI 18.5–24.9 kg/m² and body fat >30%). Fifteen women had a normal BMI and normal body fat percentage (<30%). Thirty-seven women were classified as overweight (BMI 25.0–29.9 kg/m²) and had elevated body fat, while 21 were obese (BMI ≥30.0 kg/m²) with high body fat. These results demonstrate that body composition varies widely across BMI categories and underscore the limitations of relying on BMI alone to assess obesity. Incorporating body composition assessments earlier in the lifespan may improve early detection of risk and support more individualized, effective health interventions.

Ryan Martin

Discipline: Physics and Astronomy

Authors:

#1 Ryan Martin

#2 Brandon Daul

#3 Daeha Joung

Abstract Name: Magnetically Actuated Platforms for Tissue Assembly and Modeling

A 3D-printed origami-inspired magnetic scaffold was developed to explore how physical cues guide cellular proliferation in a 3D microenvironment, leveraging magnetic actuation via embedded iron oxide nanoparticles in the cellulose acetate (CA) matrix to enable precise remote folding under an external magnetic field, driving the hinge to reorient the upper face predictably while the bottom face remains fixed to the substrate. Microscale channels were fabricated, seeded with bioprinted NIH/3T3 fibroblast and/or A549 cancer cell clusters, and folded using a permanent magnet once fully confluent. Channel tapering created localized fluid shear stresses ranging from 0.1 to 1.5 dyn/cm², promoting convective nutrient transport and waste removal that enhanced cell viability (max. 40%) compared to static conditions. By adjusting channel width, adding an intermediate extracellular matrix hydrogel (IE) layer with tunable stiffness that introduces viscoelastic resistance during folding and mimics physiological tissue compliance while amplifying contact guidance cues, the scaffold delivered geometric and gravitational cues to modulate multicellular growth and interaction. This was further supported by the scaffold's tunable compressive strength (0.5 MPa at 7.5 wt% Fe₃O₄ NPs) and tensile strength (1.2 MPa at 2.5 wt% Fe₃O₄ NPs) that balanced mechanical torque opposition and structural integrity during repeated actuations. In coculture trials, fibroblast clusters proliferated within their seeded channels with matrix remodeling increasing local permeability by 25% and establishing chemotactic gradients that drive cancer cell invasion akin to tumor-stroma interactions under biomechanical forcing, thus promoting cancer cells into unseeded channel regions. This origami scaffold provides key insights for tissue engineering and cancer studies, acting as a flexible platform to study cellular interactions and proliferation dynamics, while its physics-informed design underscores the interplay of magnetic torque, hydrodynamic flow, gravitational body forces, and mechanotransduction in orchestrating 3D cellular assemblies and offering a scalable model for probing nonequilibrium growth in engineered microenvironments.

Avril Martin

OK - University of Central Oklahoma

Discipline: Gender, Ethnicity, Diversity, or Cultural Studies

Authors:

Abstract Name: The Textile Maker's Heirloom

Everyone has a sentimental item passed down from the maternal side of the family. In the IRB approved project, "The Textile Maker's Heirloom," I will be compiling a series of interviews to discuss the impact of fiber heirlooms in families and the relationship that the owners create with the object. Interviewees will be questioned about who made the item, what the item is, and their feeling towards the item. Topics of what an heirloom is, memorialization, and the socialization of women will be discussed during the presentation. These topics are analyzed through "The Material Kinship Reader: Material beyond extraction and kinship beyond the family" by Clementine Edwards and Kris Dittel. From this analysis I will also curate a collage of the textile items from interviewees to create a cohesive scene from what I gather from interviews. Oftentimes, fiber items that are used daily aren't mentioned unless prompted by a sentimental memory of the maker. This question was posed from my own experience as a fiber artist and having items from my grandmother as well

as noticing that everyone has an item from a maternal figure in their life. These items hold stories that are passed down through generations and held close to families.

Abigail Martin

Discipline: Art History

Authors:

Abstract Name: Fertility Rituals and Cultural Transformation: From Tenochtitlan to Present Day Mexico City

This essay investigates the transformation of fertility rituals in Mesoamerica from the pre-colonial era to the post-colonial period, specifically in Tenochtitlan and present-day Mexico City. By comparing the city's cultural practices across these two periods, this study asks how colonisation, shifting religious systems, and modern biomedical developments have reshaped cultural understandings of fertility, childbirth, and women's reproductive roles. Through utilising existing historiography, anthropology, and archaeological scholarship, this project examines a pre-colonial artwork and a post-colonial artwork as evidence of long-term continuities and transformations within reproductive symbolism. Through a combined visual and historical analysis within a comparative study to discuss how ritual meanings have changed through colonisation, the findings reveal that colonial rule and modern medicalisation altered ritual practices and legal boundaries. Still, themes of suffering, renewal, purity, and resilience persist across centuries. This observation will be further explored in relation to cultural resilience, religious assimilation, and ongoing politics of reproduction in Mexico.

Abigail Martin

Discipline: Art History

Authors:

Abstract Name: Famine, Art, and Authority: Art and State Power in the Irish and Chinese Famines

This essay investigates the effects of Mao's Great Famine in China and the Great Famine in Ireland through the art created during and after each of these catastrophes. Although many scholars examine each famine respectively, this study provides a comparative analysis of the two famines, their political and economic contexts, and artists' responses during and after the periods of tragedy. A brief historical survey of the circumstances leading up to, during, and after each famine examines the political, social, environmental, and economic factors that contributed to mass devastation and the long-term consequences of famine. Drawing from this overview, this essay analyzes four notable artworks: 'The Real Potato Blight of Ireland' by John Leech, 'Famine' by Rowan, 'Memorial' by Wu Yongkuan, and a propaganda poster by an unknown artist titled 'Chairman Mao', to demonstrate how artists interpreted and represented personal and collective experiences of famine. The comparative analysis asserts that both governing parties created the environment that led to famine, contradicted their extremity, and failed to provide adequate aid. As a final analysis, the artworks expose that censorship, propaganda, and state control forcibly shaped public memory and cultural narratives surrounding both famines.

Avril Martin

OK - University of Central Oklahoma

Discipline: Visual Arts

Authors:

Abstract Name: The Two I's of the Brooch: Identity and Intimacy

The use of a brooch has been historically utilitarian. Where does the contemporary use come into play? Contemporary jewelry primarily serves as an identity marker that can discreetly or boldly communicate a statement in intimate and public settings. For "The Two I's of the Brooch: Identity and Intimacy" I will present an overview of what brooches are used for and allow viewers to create their own brooch through social art practice. By looking at "Behind the Brooch" by Lorena Angulo and utilizing the elements of design I will be analyzing the contemporary usage of the brooch. The back of this piece of jewelry is in contact with the wearer. With no one on the outside being able to see it, there is power that comes into play. Eina Ahluwalia is an artist that crafts brooches with no information on the front with an extravagant personal quest on the back. Her choice to only detail the back of the piece amplifies her personal message. With the background knowledge of the artists in this book and participants crafting their own brooch I will gain insight on how people present themselves when prompted to make their own piece. This will give me anecdotal data on the impression brooches leave on them that I can apply to my personal art practice. Participants will be prompted to think about parts of their identity that they will want to be presented on the front and the back of the brooch. The anticipated result of this project is to get people thinking more about how they wear jewelry for adornment and to open up a discussion of what they know about brooches.

Nolan Martin

Discipline: Biology

Authors:

#1 Marosh Furimsky

Abstract Name: Aquatic Vertebrate Model Exposure to Methiocarb Insecticide at Varied Temperatures

Anthropogenic pollutants introduced to aquatic environments pose a risk to aquatic life already challenged by rising global temperatures. The effects of the insecticide methiocarb on a modeled aquatic ecosystem were determined at three different temperatures (28.5 °C, 24 °C, and 33 °C) to further study the relationship between the dissolved pollutant and variable temperatures. Methiocarb is a carbamate insecticide that can dissolve into water, where it can interact with aquatic organisms. Zebrafish, *Danio rerio*, were used as a model system for aquatic vertebrates that could potentially be impacted by the insecticide. The model specifically focused on the early developmental stages of aquatic vertebrates, measuring the effects of being exposed 24 hours after fertilization until 72 hours post exposure. This timeframe allowed for an analysis of the stressors on multiple variables including survival, hatching rate, yolk sac size, and body length. The fish were measured lengthwise daily using images taken on a microscope, with pixel measurements calculated by virtual software. Exposure to methiocarb at concentrations of 3mg/L yielded a significant decrease in length compared to the control group (day 3 average of 3.25mg/L vs. 2.57mg/L). This demonstrated that the insecticide impairs the early stages of development of aquatic vertebrates. Cold temperature exposure resulted in significantly shorter body lengths than the higher temperatures, indicating a slowing of development. The high and low temperature groups both decreased the effect of the methiocarb treatment on total length, evidencing that temperature can influence, and in this case reduce, the harmful effects of methiocarb.

Emma Martin

Discipline: Philosophy, Ethics, and Religious Studies

Authors:

Abstract Name: Musok and Film: Korean Shamanism and its Expression Through Film

Throughout South Korea's history, Shamanism has played a major role in understanding the universe, the spirit, and the self. Korean Shamanism, also called Musok, is a deeply personal religious practice which draws on the spirit of the ancestors for protection, and requires extensive initiation to take part in. Though still prevalent in the modern day, Musok has dwindled in popularity within the shadow of modernity and organized religion. According to Korea's 2015 census, just over half of South Korea's population does not identify with any religion, with the second most prevalent belief being Protestant Christianity. Despite this reduction in religiosity, influences of Shamanism can be seen across Korea's culture to this day. While Korea takes a largely secular, rationalist stance among popular culture, there is still a strong element of magic which enlivens society and is expressed through the arts. Korean film is one medium through which the spirit of Musok tradition is displayed. Through long, tense shots, quiet landscapes, and often heavy subject matter, Korean cinema aims to paint a more realistic and complex picture of Korean life, with strong themes of domestic disputes, financial struggle, and injustice in popular films. Across genre and region, the intense and mysterious nature of Korean film works hand in hand with a ripe, ancient history of spiritual practice to create a unique environment onscreen. I argue that portrayals of Musok and ritual in Korean film exist as tools of enchantment for modern society, which functions within a hypermodernized framework. Through analysis of *Exhuma* (2024), *The Wailing* (2016), *Memories of Murder* (2003), and *Manshin: Ten Thousand Spirits* (2013), I aim to illustrate Korean film as a source of cultural enchantment in the modern age, and the ways in which film intends to portray folk magic in the country.

Discipline: Environmental Science and Sustainability

Authors:

Abstract Name: Barometers & Brushstrokes: Reimagining Lexington's Historic Weather Records Through Art

Originating in 1849, the Smithsonian Institution supplied weather instruments across the nation and developed an extensive network operated by volunteers to record wind, temperature, atmospheric pressure, rain, and snow by hand in standardized ledgers that were telegraphed back to the Smithsonian to produce national weather maps. The U.S. National Weather Service Lexington Bureau Records, 1873–1988, at the University of Kentucky Special Collections Research Center, documented extreme floods, tornadoes, and storms that shaped the region's environmental history, and today the collection serves as both scientific artifacts and cultural reminders of Lexington's meteorological past. This collection of ledgers inspired the central question of the project, which attempts to connect environmental research and artistic expression: How can historical weather data be turned into artworks that enhance climate awareness, emotional reflection, and discourse engagement? Inspired by artists such as Natalie Miebach and Dana Montlack, whose exhibitions translate climate science into organic visual forms, this research responds to urgent cultural and ecological issues by inviting introspection, conversation, and renewal. The methodology involves visualizing original weather bureau reports through data physicalization producing 2D and 3D artworks with supplies sourced from the LEX Center for Creative Reuse, a local nonprofit that creatively upcycles art materials. The intention shaping the project is to use meteorological data and reflect it through various media to create art that implicitly visualizes climate data. This project offers viewers an engaging and philosophical experience of environmental history while aiming to expand public understanding of climate change through interdisciplinary storytelling rooted in place, memory, and resilience to spark contemporary dialogue about climate.

Nathan Martinez

Discipline: Engineering

Authors:

#1 Matthew Alexander

Abstract Name: Comparative Analysis of Single-Stage and Multi-Stage Lipid Extraction from *Chlorella vulgaris* for Biofuel Applications

The continued reliance on fossil fuels contributes significantly to climate change, yet current biofuel production methods remain inefficient and unsustainable. This urgency underscores the need for viable eco-friendly alternatives to support a sustainable future. Microalgae have emerged as a promising source for biofuel production due to their high lipid content and rapid growth in diverse environments which can allow for minimal growth competition. This study investigates the potential of *Chlorella vulgaris* as both a biofuel source and a potential agent for wastewater treatment, contributing to water purification while generating lipid-rich biomass. A key focus of this work is optimizing the lipid extraction process. The central goal is to compare the efficiency of single-stage versus multi-stage extraction methods, with lipid yields measured through gravimetric analysis. Several experimental trials were conducted under varied culture conditions and extraction parameters to determine the most effective strategy for lipid production and extraction. The results are expected to show that the multi-stage extraction method yields a higher lipid content than the single-stage process because of its improved solvent saturation control, and it allows for a more complete extraction process. Anticipated obstacles such as contamination, cultivation inefficiencies, and cost barriers are

addressed. The findings aim to provide crucial insight into scalable biofuel production systems and contribute foundational data for the future of algae-based technologies involving renewable energy. These outcomes will enable a quantitative comparison of extraction methods and highlight the practical implications for sustainable fuel development.

Jordan Martinez

Discipline: Psychology

Authors:

#1 Anna Madison

Abstract Name: Understanding Workload and Trust in Collaborative Human-AI (WATCH) Tasks

Human-Artificial Intelligence (AI) collaboration is rapidly expanding across domains, yet how people trust and interact with AI remains a critical research question. For the military, future operational environments will require Warfighters to interact with and adapt intelligent systems under compressed time horizons. Understanding human-AI collaboration for dynamic decision making is essential to ensure effective, responsible AI deployment enabling appropriate human workload, calibrated trust, and high system performance. A multi-modal framework offers a promising approach to predicting trust and workload by integrating subjective, behavioral, and physiological measures such as eye tracking and heart rate. We combined this multi-modal approach with a computer-based serious game where participants could play with and without an AI partner to examine how visual attention, workload and trust fluctuate in human-AI collaboration for dynamic decision making. Using the NASA-TLX survey to understand subjective workload, cognitive workload subscales suggested responses related to mental demand, temporal demand, and effort were all lower for the scenario performed with AI along with ratings of frustration. There was no difference in subjective rated physical demand or performance suggesting in both conditions, participants were able to accomplish task goals for the computer-based task. An area of interest analysis of eye movements provides an approach for understanding differences in gaze patterns across conditions, which suggested significant shifts in visual attention allocation in information areas related to AI interaction and monitoring the AI task execution. This research demonstrates that a multimodal framework for evaluating performance, trust, and workload with AI can be used to evaluate future AI tools and to develop real-time measures that allow for the bi-directional adaptation of future AI and machine systems to foster calibrated trust, maintain system performance, and balance human workload. Specifically, using eye movements allows for meaningful insights into the dynamics of human-AI collaboration.

Toni Martinez

Discipline: Interdisciplinary

Authors:

#1 Toni Martinez

Abstract Name: Radical Queer Subtlety: Non-Explanation, Refusal and Resistance

In 2025, the U.S. is a country wherein the rights and dignities of minoritized groups are getting stripped away at a dizzying pace. Since his inauguration, Trump has signed numerous executive orders stripping the rights of queer and trans people. Making explicitly political art is one of the only routes to enacting political change as a queer artist. However, with more and more social media platforms prohibiting explicit content, and more and more bills attempting to make all depictions of queerness “explicit” and therefore prohibited, the shape

political art takes may need to change. My project, radical queer subtlety, is based on the idea that there is room for queer art that is not immediately recognizable as queer to all audiences. “Radical queer subtlety” is a concept that reframes queer code-switching and argues for “subtlety” as a powerful tool the queer community can utilize through visual art and craft. Both José Esteban Muñoz and Jack Halberstam have argued the existence of a queer visual language, created through a shared experience of minoritized identity, and composed of spliced times and places. Julia Bryan-Wilson also noted a particular emphasis on craft within the queer aesthetic, and discussed the many queer connotations fibers arts can have. These scholars describe queer coded visuals as a product of minoritization, and while on one hand this is true, “radical queer subtlety” considers ways of recontextualizing this through the analysis of scholarly works, and through the creation of a body of artwork. These artworks encompass not only a reinterpretation of queer aesthetics, blending contemporary and historical queer symbols, fiber arts, and varying times and places, but also the ultimate goal of the project: to contribute to giving power back to the queer and trans community – an urgent effort in these times of political and social turmoil.

Jennifer Martinez

Discipline: Biology

Authors:

#1 Jennifer Martinez

#2 Sharanya Deshpande

Sharanya Deshpande

Abstract Name: Comparative Structural Analysis of LilSmirk Minor Tail Proteins Using Mycobacterium Bxb1

Bacteriophage tail proteins are essential for host recognition, yet many remain uncharacterized in newly isolated phages. We compared the minor tail proteins of Mycobacterium phages Bxb1 and LilSmirk using Phamerator, AlphaFold, HHpred, and ChimeraX, with Bxb1 serving as a functional and structural reference. Sequence-based tools showed little detectable similarity, but structural analyses identified several potential relationships, including a notable alignment between LilSmirk gene 33 and Bxb1 protein 9d93_8, a known tail wing brush protein. Other minor tail proteins showed weaker but potentially meaningful structural overlaps. These findings suggest conserved features that may be functionally significant, providing a foundation for improving LilSmirk’s functional annotations. Overall, structural approaches can reveal functional clues when sequence data are insufficient, supporting continued efforts to refine LilSmirk’s annotations and deepen our understanding of phage tail evolution.

Natalie Martinez

Discipline: Environmental Science and Sustainability

Authors:

#1 Jeffrey Hutchinson

Abstract Name: Structure and composition of forests in the Leon and Salado Creek Greenways

Greenways are protected natural areas within urban centers that preserve biodiversity of local flora and fauna and provide passive recreation opportunities. Leon and Salado Creeks are ephemeral streams surrounded by forest habitat located in northern San Antonio. Both greenways have unpaved and paved hiking and biking trails that receive moderate to high recreational activity and a diversity of shrubs and trees. Within two

greenways, we hypothesized there will be vegetation difference among the upper and middle slopes, and ephemeral stream within and between the greenways. We further hypothesized that a greater number of facultative and obligate wetland shrubs and trees will be documented in the ephemeral creeks. We sampled the upper slope, middle slope, and dry creek (ephemeral stream) on the east and west sides using the point-quarter method during May 2024 to August 2024, Eighteen point-quarter plots were placed in each of the 8 locations surveyed in both greenways. Based the point counts, tree and shrub mean richness, diversity, density, d.b.h., basal area, and biomass will be estimated by species. cursory observations indicate difference between the structure and composition of forests in Leon and Salado Creek Greenways. Results are currently being analyzed and will be presented at the meeting.

Emily Martinez

Discipline: Gender, Ethnicity, Diversity, or Cultural Studies

Authors:

Abstract Name: Intersectionality and the Trad Wife Phenomenon: Understanding the Role of Race, Class, and Gender

This research project investigates the "traditional wife" or "trad wife" phenomenon, focusing on homemaking roles through the lenses of Gender, race, and class. In today's digital age, social media has a significant impact on societal norms, and this study examines how these factors influence the behaviors and attitudes of women who adopt traditional wife roles. Interviews were conducted with University of Central Oklahoma (UCO) community members, including professors from the Women's, Gender, and Sexuality Studies program, students familiar and unfamiliar with the traditional wife movement, and individuals who identify as traditional wives. The research aims to contribute to the discourse on intersectionality by expanding our understanding of the trad wife movement. The researcher draws from personal experiences in a non-traditional family structure, contrasting her grandmother's adherence to conventional marriage ideals with her own feminist values. This exploration seeks to illuminate the interplay of race, class, and Gender in shaping experiences within the trad wife movement. Additionally, the project will assess the resurgence of traditional gender norms on platforms like TikTok and Instagram and how academics and journalists interpret the role of the Trad Wife movement in perpetuating these norms. The findings aim to enhance feminist scholarship on the Trad Wife phenomenon, fostering critical discussions on its implications for contemporary society.

Ana Cristina Martinez Muller

Discipline: Biochemistry

Authors:

#1 Angela Mammana

Abstract Name: Photophysical and Photochemical Studies of RNA as a Model for UV-Induced Damage in Nucleic Acids

Ultraviolet (UV) radiation is a well-known agent of nucleic acid damage, leading to structural and chemical modifications that affect biological function. These alterations play a crucial role in various fields, including molecular biology, medicine, and disinfection technologies. While extensive research has been conducted on UV-induced DNA damage, particularly using spectroscopic techniques such as fluorescence, circular dichroism (CD), and UV-Vis absorption spectroscopy, fewer studies have explored how RNA responds to UV exposure. Given that RNA serves as the genetic material for many viruses, understanding its photophysical

and photochemical behavior under UV irradiation is essential for advancing disinfection strategies, particularly in healthcare and environmental settings. This project aims to extend previous research by investigating UV-induced damage, photochemistry, and photophysics in RNA systems. Using fluorescence, circular dichroism (CD), and UV-Vis spectroscopy, we will analyze structural and electronic changes in RNA following UV exposure, comparing these effects to those observed in DNA. Additionally, this study will evaluate nucleic acids as potential virus mimics in UV germicidal applications, assessing their viability as surrogates for airborne and surface-disinfected pathogens. While the primary focus will be on solution-phase experiments, the research will also explore the feasibility of detecting and analyzing aerosolized nucleic acids, which could have implications for studying airborne viral transmission and optimizing UV-based air purification technologies.

Allison R. Martinko

Discipline: Psychology

Authors:

#1 Shevaun D. Neupert
#2 Edgar Lobaton
#3 Kathryn E. Swaim
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#5 Michael Cameron
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#10 Feiya Xiang
#11 Feiya Xiang
#12 Geet Khatri

Abstract Name: Acute Exercise and Episodic Memory Performance in Older Adults With Mild Cognitive Impairment

Mild cognitive impairment (MCI) is the disease state between normal cognitive function and dementia. Physical activity has been found to be beneficial for cognitive functioning in older adults, but less is known about the potential benefits of acute exercise for those with MCI. The current study examined cognitive abilities of 7 participants with MCI in sedentary and physically active states at two laboratory visits one week apart. Participants completed cognitive tests through the NIH Toolbox (i.e., the Picture Sequence Memory Test Form B) after exercise and sedentary states. The Picture Sequence Memory Test Form B was designed to assess episodic memory by asking participants to recall a series of illustrated events in a specific order on an iPad. Data collection was completed in August 2025, and data are currently being cleaned and prepared to be analyzed within the upcoming weeks. We anticipate that adults with MCI will perform better on the Picture Sequence Memory Test Form B on the days they were physically active compared to the sedentary test sessions. These findings could add to the understanding of the effects of acute exercise on cognitive performance for older adults with MCI.

Yahya Masri

Discipline: Computer Science

Authors:

#1 Emily Ma
#2 Zifu Wang
#3 Joseph Rogers
#4 Chaowei Yang

Abstract Name: Building a Computing Infrastructure Digital Twin (CIDT) for Real-Time Monitoring, Log Analytics, and AI-Driven Anomaly Detection

Modern data centers generate massive amounts of telemetry and system logs that must be monitored continuously to maintain reliability, diagnose failures, and respond to emerging issues. This project presents a Computing Infrastructure Digital Twin (CIDT) designed to unify real-time telemetry, centralized log analysis, and 3D visualization into a single operational platform for a 600-machine data center. The CIDT integrates four core components: Prometheus for distributed metric collection, a PostgreSQL event store for searchable log data, NVIDIA Omniverse for interactive 3D visualization of system state, and automated alerting for anomaly detection. To explore whether small AI models can support automated log understanding within the CIDT, we evaluated nine small and small-reasoning language models (0.6–4B parameters) using 46,000 real system logs. The task involved predicting standard syslog severity levels under zero-shot, few-shot, and retrieval-augmented prompting. Qwen3 models showed the strongest performance, with Qwen3-4B reaching 95.64% accuracy when combined with retrieval. These results suggest that small language models, when paired with structured context, can provide efficient support for tasks such as severity classification, anomaly triage, and early-stage root-cause analysis. The CIDT prototype demonstrates how combining real-time data streams with lightweight AI reasoning can enhance monitoring workflows and provide clearer visibility into system behavior. As data volumes and system complexity continue to grow, this framework offers a scalable foundation for rapid diagnostics, operational insight, and informed decision-making. Future work will focus on adaptive retrieval methods, tighter integration of AI-driven alerts, and establishing a full feedback loop in which the digital twin continuously learns from system patterns and refines its recommendations over time.

Caleb Mast

Discipline: Biology

Authors:
#1 Ersilia Mirabelli

Abstract Name: Formalin-induced mechanical hyperalgesia in mice

Neuropathic pain (NP) is a chronic condition that plagues many individuals and that is associated with diseases and trauma such as multiple sclerosis, diabetes and spinal cord injury. Currently, a few animal models are available for the study NP and involve extensive survival surgeries: spinal nerve ligation (SNL) and chronic constriction injury (CCI). Formalin is a well-known noxious stimulus that induces skin sensitization and inflammation, which typically resolves within a few hours. Therefore, formalin test is commonly used for the study of inflammatory and nociceptive pain in rodents. A recent study has shown that rats receiving a formalin injection developed hypersensitivity and spinal changes comparable to those observed following CCI and SNL but never developed and adapted in mice. In light of this and given the enormous contribution that the use of mice over rats could offer in research, we aimed to develop a novel animal model for the study of NP in mice. In our study, mice were injected with 20µl of 5% formalin in the dorsal right hind-paw and analyzed over the course of two weeks, to assess thermal pain using the Hargreaves test on days post-injection (DPI) 3, 7, 10, and 14. Formalin injected mice were found to have significantly lower pain thresholds on DPI 10 compared to vehicle-injected mice. Our study has proven that the subcutaneous, single injection of formalin is sufficient to cause sustained thermal hyperalgesia in mice. Further studies will investigate the molecular and cellular alterations in the spinal cord and brain of the formalin-treated mice.

Luke Masters

Discipline: Business

Authors:

#1 Pinar Ozturk

Abstract Name: From Panic to Adaptation: A Mixed-Method Analysis of University Faculty Perspectives on AI

The rapid emergence of generative AI tools, particularly following ChatGPT's November 2022 launch, has sparked intense debate within higher education about academic integrity, pedagogical innovation, and teaching practices. This study investigates how university faculty attitudes toward artificial intelligence evolved from 2020 to 2025, capturing perspectives both before and after widespread AI adoption. Using a mixed-methods approach, we analyzed 3,866 posts from eight academic subreddit communities to identify temporal patterns, thematic concerns, and sentiment variations regarding AI in academia. Our methodology combined computational and qualitative techniques. We collected AI-related discussions using Python and the Reddit API, then conducted sentiment analysis to classify posts by emotional valence. To ensure methodological rigor, we hand-coded 70 posts using a 19-category coding scheme developed through iterative refinement. Categories included AI-generated work detection, academic integrity concerns, pedagogical strategies, course redesign, faculty burnout, and AI benefits. We analyzed highly-engaged posts (top 20 positive and negative by upvotes) alongside a random sample to capture both prominent and representative perspectives. Findings reveal dramatic shifts in faculty discourse following ChatGPT's release. Discussion volume increased 485% (from 16 to 95 posts monthly), with 2023 showing 184% more posts than 2022. Academic integrity concerns dominate, appearing in 33% of all posts and 45% of highly-negative posts, though declining from 51% in 2020 to 23% in 2025, suggesting adaptation. Qualitative coding revealed complex attitudes: academic integrity appeared equally in positive (43.5%) and negative (40%) high-engagement posts, indicating nuanced perspectives rather than polarization. Positive posts discussed teaching strategies and course redesign, while 30% of negative posts reflected faculty burnout. Overall, 49% of posts discuss pedagogical approaches, indicating growing constructive engagement with AI integration. These findings provide empirical evidence of faculty perspectives during technological transition, offering institutions data-driven insights for developing evidence-based policies and professional development addressing both concerns and opportunities.

Hayden Mastin

Discipline: Nursing and Public Health

Authors:

#1 Jiale Hu

Abstract Name: Evaluation of the association between GLP-1 receptor agonists and perioperative outcomes

Glucagon-like peptide-1 receptor agonists (GLP-1 RAs) are increasingly prescribed for Type 2 Diabetes Mellitus, obesity, and metabolic syndrome. While these agents improve glycemic control, cardiovascular health, and postoperative outcomes, their use in surgical patients raises concerns regarding delayed gastric motility and aspiration risk. Current literature presents conflicting data, with no definitive link established between GLP-1 RA use and elevated residual gastric contents or aspiration. This study evaluated the association between GLP-1 RA exposure and perioperative outcomes using the TriNetX global research

network. Adult surgical patients undergoing anesthesia or sedation were categorized into GLP-1 RA user and non-user cohorts. Patients with pre-existing gastrointestinal motility disorders unrelated to GLP-1 RAs were excluded. Propensity score matching was utilized to compare outcomes, including aspiration risk, delayed gastric emptying, hypoglycemia, mortality, and length of hospital stay. Post-matching analysis revealed no significant association between GLP-1 RA use and adverse perioperative outcomes. The lack of correlation between GLP-1 RA use and perioperative complications challenges the necessity of strict cessation guidelines. However, given the varying evidence base, further research is required to clarify risks and standardize anesthesia protocols for these patients.

Bailey Matherne

Discipline: Music

Authors:

Abstract Name: Russian Nationalism and Orientalism Demonstrated in Rimsky-Korsakov's "Scheherazade"

In the 19th century, during the age of Romanticism, Europe became fascinated with the mysteriousness and exoticism of Asian cultures. Many European composers wanted to incorporate this newfound fascination into their works by using stereotypical musical conventions to imitate or depict the Eastern world. These depictions of Asian cultures were rarely accurate and often caricatured. Russia was no exception to this trend, but it clearly differentiated from the other Western European countries when executing orientalism. This is because of Russia's geographical proximity to Asian countries, thus influencing and exposing them to the different cultures. Many Russian composers such as Miliy Balakirev spent time on the Southern borders of Russia for inspiration. From this, the five composers that defined the "Russian sound", known as the Kuchka, relied on the findings of their leader Balakirev and others to develop (often inaccurate) "oriental" conventions. Nikolai Rimsky-Korsakov, probably the most famous out of the Kuchka, is notably representative of the Russian music sound and Russian orientalism. His largest orchestral work, *Scheherazade*, drew inspiration from *The One Thousand and One Nights*, a collection of Middle Eastern and Indian stories. Currently, existing analyses of musical orientalism in Rimsky-Korsakov's *Scheherazade* exclusively discuss his use of Middle Eastern affiliated tunes. This raises the question: is musical orientalism only using preexisting melodies as a model or is it part of a more general system of musical conventions? In order to define *Scheherazade* as an example of Russian orientalism, I first identified orientalist conventions commonly used by the Kuchka. I then analyzed the work's score and identified any of the faux Asian conventions described by previous scholars. After analyzing all of his *Scheherazade*, I found that Rimsky-Korsakov's representations of musical orientalism extended beyond the use of preexisting melodies and featured a broader set of Middle Eastern affiliated musical idioms.

Alex Matsayko

OK - University of Central Oklahoma

Discipline: Engineering

Authors:

Abstract Name: Concentration Analysis on Angiogram Contrast Agents Infused in Polycaprolactone for Development of Flow-Diverting Stents

Bioresorbable polymers are becoming increasingly more popular in the development of medical devices that can perform well and are not permanent. However, polymers do not reflect X-Rays and are invisible under

angiogram as a result. In using polymers for medical devices due to their wonderful material properties, it is important that they are completely visible under X-Ray and angiogram in the body for safety and observational purposes. Polycaprolactone is mixed with three angiogram contrast agents (barium sulfate, bismuth trioxide, and tantalum pentoxide) to create an angiogram-visible 3D printer filament using the Filabot EX2 filament manufacturing machine. Three concentrations (33%, 25%, and 20% by mass of the angiogram contrast agent) were developed for each respective contrast agent and luminosity under X-Ray was analyzed using images captured on the Vector MaxRay camera. The luminosity was analyzed using a grayscale value on ImageJ after taking X-Ray images. The three contrast agents with their differing concentrations of PCL showed a direct correlation in their visibility under X-Rays and the concentration of the contrast agent. As the concentration of the radiopaque contrast agent increases, so does its visibility and luminosity under X-Ray. Using angiogram contrast agents is an effective way to make polymers, such as polycaprolactone, visible under angiogram and ensure that the developed medical devices remain visible and are able to be studied and observed in vivo.

Neha Matta

Discipline: Interdisciplinary

Authors:
#1 Neha Matta

Abstract Name: More than a Mural: Sustainability in Community Engaged Art

The South End of Albany has been divested from for generations, and students have not been empowered to be changemakers in their own community. Nevertheless, the people of the South End are resilient and have a strong sense of community, and we have tapped into their energy across two community engaged projects. Through partnerships with the Nonprofit Excellence and Transformation Fellowship at Siena University, we have worked to create public art projects based on the ideals of placemaking, reclaiming space, and generational wealth building. After partnering with the Community Investment Trust (CIT) over the last year, we successfully painted a mural on the second floor of the building. Throughout the partnership, we prioritized community engagement best practices, which led to a mutually beneficial and collaborative final project. The mural was so well received, and the relationships we built were so genuine, that the Capital Region BOCES reached out to us to paint a mural in their space in the same building, deepening our impact in the South End. Drawing on feedback from the students, staff, and teachers at Capital Region BOCES, we have created a plan to beautify the fourth floor with a mural reflecting both the community's and students' interests. Our work illuminates how community-engaged projects that leverage community assets can support community well-being in the neighborhood. By working alongside the Capital Region BOCES students and teachers, we will co-create a mural that is uplifting, motivational, and empowers students to do whatever their heart chooses with the education they receive in that space. The project's outcomes have been deeper and more meaningful than just paint on the wall because our approach to community engagement relies heavily on relationship-building, incorporating feedback, and sustainable university-community partnerships, which leverages the community as co-creators rather than merely recipients of a service.

Will Mattes

Discipline: Psychology

Authors:

Abstract Name: Examining Loneliness and Resilience in Children of Divorce

This study examines the relationship between parental divorce and self-reported levels of resilience and loneliness among individuals who experienced parental divorce, as well as the potential association between the timing of divorce and loneliness and resilience outcomes. Previous literature suggested a relationship between parental divorce and both loneliness and resilience (although conflicting literature exists regarding the latter) as well as a possible association between divorce timing and later-life outcomes. Based upon the literature, it was hypothesized that both resilience and loneliness scores will be higher in individuals from divorced families than in individuals from intact families. Secondly, it was hypothesized that there would be a correlation between levels of both resilience and loneliness in individuals from divorced families and the age of the individuals when their parents divorced. To test these hypotheses, the Brief Resilience Scale (BRS) and the Revised UCLA Loneliness Scale (R-UCLA-Loneliness Scale) were administered to 196 undergraduate students following IRB approval and the informed consent of each participant. It was found that resilience and loneliness scores were not significantly higher in individuals from divorced families than in individuals from intact families. Also, it was found that resilience and loneliness scores in individuals from divorced families and the age of the individuals when their parents divorced were uncorrelated. Limitations included the homogeneity and limited size of the sample. These findings may support future research on the effects of divorce and assist mental health care providers and children and family professionals in narrowing down long-term risk factors for children of divorce.

Sara Matthews

Discipline: Dance

Authors:
#1 Kate Sicchio

Abstract Name: P5score: Breaking the Barriers of Code and Choreography

This documentary is a deep dive into the world of p5.score — a creative coding project developed by media choreographer Kate Sicchio. Using the p5.js coding library, p5.score is a way for choreographers to visualize and interpret their art through complex coding and iconography. The documentary follows a two-day workshop led by Sicchio in which participants use p5.score to generate visual scores. Through collaboration and experimentation, participants push the boundaries of how technology and choreography interact, creating immersive performances that explored the intersection between the human body and code.

Luke Mattox

Discipline: Psychology

Authors:
#1 Sherri Pataki
#2 Safia Fathelbab

Abstract Name: Cross-cultural Research on Body Image and Life Satisfaction in the U.S and Egypt

Luke MattoxCo-authors: Dr. Safia Fathelbab (Suez University, Egypt) and Dr. Sherri Pataki12-04-2025NCUR Abstract Cross-cultural Research on Body image and Life Satisfaction in the U.S. and EgyptThis research examined the relationship between body image and life satisfaction between male and female undergraduates in Egypt (N=100) and the United States (N=91). All participants completed The Satisfaction with Life Scale (Diener, Emmons, Larsen, & Griffin, 1985) and the Objectified Body Self-

consciousness Scale (Mekinely & Hyde, 1996) using an Arabic translation of each measure for participants in Egypt. Based on gender-based norms related to the importance of being physically attractive, we predicted women in both the U.S. and Egypt would experience greater self-consciousness about their body image than men. We also predicted that body image concerns would be more pronounced among American women than Egyptian women because of sociocultural norms emphasizing women's appearance in the U.S. versus the emphasis on conservative dress and modesty in Egypt (Rahman & Rahman, 2023). In both countries, we predicted that body image concerns would be related to lower life satisfaction, particularly for men where appearance concerns may be seen as less normative. In analyzing participant responses on the Objectified Body Self-Consciousness Scale, we will also explore the different components of self-consciousness including feelings of personal shame about one's body, body surveillance, and perceived control over one's body.

Pearl Matts

Discipline:

Authors:

#1 Ronald Green

Margaret Truluck

Sabeen Gaither

Abstract Name: Comparing Kanji Learning Methods for Beginning Japanese Students

This mentor-led presentation describes the development and supervision of an undergraduate research project that examines how beginning Japanese language learners acquire kanji through four different learning strategies. The project grew out of students' curiosity about why certain study methods feel more effective than others, and how to measure those differences in a systematic way. In response, I worked with three undergraduate researchers to design an experiment that could be carried out within an actual language classroom while still producing meaningful, interpretable results. The study will take place in the second-semester of the elementary Japanese language class during spring term, with approximately twenty volunteer participants. Each student will cycle through four kanji-learning methods, spaced repetition, handwriting practice, mnemonic-based study, and short reading-based acquisition, over an eight-week period (two weeks per method). For each cycle, students will follow a structured weekly learning plan and complete short self-assessments measuring retention, speed of recall, and perceived difficulty. This design allows the student-research team to compare the effectiveness of the methods both across the cohort and within individual learners. My presentation will focus on how the project was conceptualized, how students were trained in research design and data collection, and how we balanced methodological rigor with the realities of introductory language instruction. I will also discuss how this project supports the broader goals of undergraduate research: fostering intellectual curiosity, building confidence in empirical inquiry, and helping students transform classroom questions into collaborative scholarship. The presentation aims to offer other mentors a practical model for guiding discipline-specific research that is accessible, scalable, and deeply engaging for students.

Evan Maurer

Discipline: English and Literature

Authors:

Abstract Name: Reconsidering the Safety of Distance in Daniele Evans' The Office of Historical Corrections

In today's sociopolitical climate there is tension around every corner, and oftentimes it feels like the safest place to be is far away. In the college classroom, for example, it's often easier for Americans to discuss social or political controversies that aren't connected to our own history or culture. Daniele Evans' novella from 2020, *The Office of Historical Corrections*, follows Cassie Jacobs, a stalwart employee for the fictional Institute of Public History, a civil department dedicated to correcting historical misinformation. Cassie is a black woman, and this story follows the complications in her journey to root out racism in the small, fictional Wisconsin town of Cherry Mill. Cassie is sent to this town by IPH because her oldest friend and rival, Genevieve, corrected a plaque by inserting the names of the white people responsible for setting fire to the home of a black man, Josiah Wynslow, who ostensibly died in the fire. The two old friends ultimately don't agree on the correction, even though Cassie acknowledges that there is some moral rightness in naming those responsible. Tensions continue to rise when the historical marker is vandalized by a supremacist, the novel's villain, White Justice. Ultimately, the interpersonal struggles Cassie faces, such as when she cheats on her black boyfriend Daniel with a white man named Nick, and when she alternately clashes and bonds with Genevieve, feel just as important as the historical justice Cassie pursues through her role as IPH. Including this novella on a university syllabus and examining how racial prejudice affects our closest relationships might just help more people realize the safety that distance appears to provide is only an illusion.

Jessica Maurigi

Discipline: Economics

Authors:

Abstract Name: The Effects of News Media Sentiment on Investor Risk Tolerance

Previous studies have shown that media plays a significant role in shaping individuals' behaviors. This thesis examines the response of investor risk tolerance to positive or negative news media sentiment. Investor risk tolerance is the level of potential loss an investor is willing to accept. It is proxied by stock volume, weights, volatility, and prices. The existing literature suggests that several cognitive biases induce costly investment behaviors in a way that investors deviate from Modern Portfolio Theory, which is a mathematical framework for selecting investments in order to maximize their overall returns with an acceptable level of risk. Previous research has also established that stocks with no media coverage earn higher returns than stocks with high media coverage and that a negative mood reduces the demand for risky assets. I build on this by analyzing individual investor choices in the context of news sentiment at the firm level. I use dynamic ordinary least squares regressions combined with Bloomberg news sentiment data and data from the Securities and Exchange Commission's Electronic Data Gathering, Analysis, and Retrieval (EDGAR) filings. These filings are documents submitted by companies, corporate insiders, and blockholders. Blockholders are those who own a significant amount of a company's shares, and are required to submit an EDGAR filing when their ownership reaches 5%. These filings give shareholder-level portfolio composition data for insiders, fund managers, and other large investors. I expect that investors being exposed to positive or negative news media causes an increased or decreased risk tolerance, respectively. Gaining insight into this topic allows investors to become aware of how behavioral economics impacts how they invest, allowing them to overcome emotional investing choices and instead rationally optimize their portfolios.

Owen Maute

Discipline: Engineering

Authors:

#1 Owen Maute
#2 blake roberts
#3 Berker pekoz

Abstract Name: RadAround: A Field-Expedient Direction Finder for Contested IoT Sensing & EM Situational Awareness

This paper presents RadAround, a passive 2-D direction-finding system designed for adversarial IoT sensing in contested environments. Using mechanically steered narrowbeam antennas and field-deployable SCADA software, it generates high-resolution electromagnetic (EM) heatmaps using low-cost COTS or 3D-printed components. The microcontroller-deployable SCADA coordinates antenna positioning and SDR sampling in real time for resilient, on-site operation. Its modular design enables rapid adaptation for applications such as EMC testing in disaster-response deployments, battlefield spectrum monitoring, electronic intrusion detection, and tactical EM situational awareness (EMSA). Experiments show RadAround detecting computing machinery through walls, assessing utilization, and pinpointing EM interference (EMI) leakage sources from Faraday enclosures.

Mihir Maveli

Discipline: Computer Science

Authors:

#1 Mihir Maveli
#2 Farwa Kazmi
Farwa Kazmi

Abstract Name: Optimizing Accuracy of AI-ML Models for Three Major Heart Conditions by Evaluating Data Split Ratios.

Heart failure is one of the leading causes of death in the world. With this in mind, we have conducted a study on the three primary heart conditions (heart disease, heart attack, and heart failure). Our hypothesis is that AI-Machine-learning models may be used to reveal the sequential progression of these three conditions. To validate this hypothesis, we conducted an experiment using IBM Watson's AutoAI tool in order to find out which algorithm can best detect the linking factors between the three major conditions, as well as predict whether the condition is present or not with a high accuracy. All three models provided ranked pipelines of algorithms used, as well as displayed all of the enhancements. The models were able to achieve accuracies of 85.6%, 86%, and 88.3% for heart disease, heart attack, and heart failure respectively. Chest pain type, chest pain, and cholesterol were the highest ranked diagnostic factors for determining the presence of the three conditions. We confirmed these results with a medical doctor, and established that there is indeed a link between these heart conditions, and proper early diagnosis is essential for saving patients' lives. In this research we will explore deeper into the machine learning models and try to optimize their accuracies by using different data split ratios, which is the ratio between the data being used to train the model, versus the data being used to test the model. This research will focus on optimizing data split ratios for the highest possible accuracy, as well as how this can scale to larger sized datasets similar to the ones hospitals will use. We will also provide the exact details for all other elements for the most optimized model, including algorithm type, enhancements, and build times.

Marwaan Maxamuud

Discipline: Psychology

Authors:

#1 Katy Elliott

#2 Hannah Swerbenski

#3 Jennie Noll

Abstract Name: Examining How PTSD and Depression Mediate the Association Between Cumulative Trauma and Cognitive Functioning

Background: Trauma exposure is a public health concern with significant psychological and economic consequences¹. Exposure to trauma is associated with an increased risk of developing mental health disorders such as posttraumatic stress disorder (PTSD) and depression, which often occur both independently and comorbidly². In addition to these psychological outcomes, lifetime trauma exposure has been linked to impairments in cognitive functioning, particularly in executive functioning and episodic memory³. Notably, both PTSD and depression have been consistently associated with cognitive deficits, including difficulties in executive function, processing speed, and memory^{4,5}. Methods: 125 female participants completed 7 data collections over 26 years. Participants were 24 years old at psychopathology assessments and 37 at cognitive assessments. Lifetime trauma was assessed using the Comprehensive Trauma Interview (CTI)⁶. PTSD symptoms were assessed using the PTSD subscale of the CTI⁷. Depressive symptoms were assessed based on the Beck Depression Inventory⁸. Working memory was assessed using the Counting Span Task⁹. Processing speed was assessed using the Symbol Search Speed Task of the Wechsler Adult Intelligence Scale¹⁰. Results: The final model exhibited adequate fit ($\chi^2(5) = 9.45$, $p = .092$; RMSEA = .084, 90% CI [.00, .166]; CFI = .918; SRMR = .058). Lifetime trauma predicted higher depressive ($\beta = .37$, $p < .001$) and PTSD symptoms ($\beta = .38$, $p < .001$). In turn, depressive symptoms significantly predicted poorer working memory ($\beta = -.21$, $p = .009$) and processing speed ($\beta = .19$, $p = .049$), whereas PTSD did not ($p > .342$). Depression significantly mediated effects of trauma on working memory ($\beta = -.08$, $p = .034$) and marginally mediated effects on processing speed ($\beta = .07$, $p = .067$). Discussion: The results from the study indicate that depression symptoms rather than PTSD symptoms mediate the cognitive deficits associated with lifetime trauma. These findings can inform the importance of Cognitive Behavioral Therapy for Depression (CBT-D) for trauma exposed individuals and how it can buffer the link between lifetime trauma and cognitive deficits.

Brigitte Maxwell

Discipline: Biology

Authors:

#1 Michael Campbell

#2 Tony Foyle

#3 Rachel Housego

Abstract Name: Bacterial Microbiome Diversity Within Vineyard Groundwater

The application of fertilizers and pesticides on farms can have impact on ecosystems by changing soil and water chemistry. Many studies have focused on the impact of runoff from farm fields on surface watersheds, but farm applications can also modify sediment and ground water sources particularly thorough alteration of microbial communities. The objective of this study is to observe the microbiomes of six wells located on the Lake Erie Regional Grape Research and Extension Center vineyards to create an overall view of the groundwater composition during the summer season (June-August). Six wells from across the property were sampled from once every month (June 16th, July 17th, and Aug. 13th). Sediment was separated from the groundwater, both being used for DNA extraction, for a total of 36 samples. Bacterial 16S region V4 was amplified in 34 of the samples using PCR. Amplicons were sent to Novogene for Illumina sequencing. Preliminary sequencing data has shown the presence of bacterial communities within the groundwater and variation between the wells. This study looks at the diversity of groundwater and sediment-based microbial

life at a working vineyard. Changes to bacterial colonies will be compared between well locations and times they were sampled. Taxonomic analysis will be performed to assess specific diversity within each individual well.

Marayna Maxwell

Discipline: Environmental Science and Sustainability

Authors:

Abstract Name: Heavy Metal Impacts on the Freshwater Clam Species *Corbicula fluminea*

Heavy metals play essential ecological and biological roles when present in trace concentrations, but have the ability to become highly toxic when present in excess. This poses significant risks to ecosystems, organisms, and human health. Anthropogenic activities, such as mining, wastewater discharge, and fossil fuel combustion, have exponentially increased heavy metal inputs into freshwater systems at a rate much greater than ecosystems are equipped to handle. The chemical properties of heavy metals, like their low degradability, facilitate bioaccumulation through food webs. Coal ash, which is a common by-product of coal-powered energy production, acts as a major source of heavy metals such as arsenic, chromium, mercury, and lead. Mountain Island Lake, NC, a hub for biodiversity and a critical drinking water reservoir, has been historically impacted by coal ash storage and disposal, raising concerns about the long-term ecological and public health implications of heavy metal contamination in the ecosystem. This project expands upon prior research that examined metal accumulation in the freshwater clam *Corbicula fluminea*, a sensitive bioindicator species. Clam tissue and sediment samples collected upstream, downstream, and adjacent to the coal ash basin sites will be analyzed using ICP-MS to quantify a much broader suite of heavy metal concentrations than previously available in the prior research. Metal concentrations will be statistically compared across sites and correlated with previously measured sub-lethal cellular toxicity assays to evaluate organismal stress responses and cell health. This study provides a comprehensive assessment of coal ash-derived heavy metal pollution and its ecological consequences. The findings of this work will contribute to improved biomonitoring methods and techniques, inform ecological management strategies, and further broaden efforts in the mitigation of heavy metal contamination in freshwater ecosystems.

Ali Maynard

Discipline: Health and Human Development

Authors:

#1 Chad Hallyburton
Gabby Cox

Abstract Name: From Illness to Involvement: a Collaboration to Increase Student Engagement, Health Knowledge, and Success

Introduction: Illness-related absences are a significant barrier to success among college students. For example, in a national survey, over 50% of students reporting influenza (flu) infection also reported negative impacts on academic performance. Vaccination is an important tool to reduce common infectious illnesses like the flu. Our data shows a significant drop in first-year student vaccination compared to pre-college rates. As students transition to independent medical decision-making, they may experience barriers to vaccination, including cost, access, and questions about vaccine safety and infection severity. Our project described the effectiveness of a collaborative effort engaging first-semester college students, Undergraduate Research

Students (URS), faculty, and campus administrative units to promote student vaccination. Methods: First-semester students in a Course-Based Undergraduate Research Experience developed evidence-based public health messages promoting flu vaccination on campus. Campus wellness staff shared these messages via social media (Instagram) and print media posted in campus residential halls containing trackable QR codes directing students to additional flu-related information. Social media reach and QR code use were then analyzed by URS. Results: Social media messaging reached over 400 users. Print media potentially reached 3000+ residents, and QR codes were accessed by 25 students. An upcoming survey will describe first-year students' interest in pursuing further undergraduate research opportunities. Discussion: While it is difficult to determine precisely how many students were reached, prior evidence has shown that campaigns such as this one have improved vaccination rates. This pilot project leveraged existing resources across campus, including students and staff from several campus divisions, and demonstrated a novel faculty-student partnership approach to share information that supports student vaccine decision-making. The collaborations developed can increase the effectiveness of future outreach.

Trenton McAlmond

Discipline: Psychology

Authors:

#1 Edgar Rodriguez

#2 Kaydee Evans

Abstract Name: Administration of Intracerebral Oxytocin and its Effect on Social Motivation in C57BL/6J Mice

How does the localized administration of oxytocin to the nucleus accumbens of C57BL/6J mice modulate peer-to-peer social motivation? Low social motivation is a characteristic symptom of autism spectrum disorder (ASD). Oxytocin has been proposed as a possible treatment for the social deficits observed in ASD. Yet, clinical trials involving oxytocin produce varied results which suggest context-dependent effects of oxytocin. Utilizing novel behavioral assays designed to measure social motivation, we plan to determine how oxytocin affects rates of peer-to-peer sociability in both high effort interactions and low effort interactions. In order to investigate this effect, we implanted guide cannulas into the nucleus accumbens of C57BL/6J mice. The mice were administered an infusion of either oxytocin or phosphate buffered saline (PBS) and then underwent behavioral testing. Our past research has shown that mice receiving an intranasal administration of oxytocin will exhibit an increased social motivation in a low effort context. However, when high effort is needed, social motivation decreases. We hypothesize that the administration of oxytocin to the nucleus accumbens will result in a similar effect, in which high effort context reduces social motivation and low effort context increases social motivation. Preliminary results suggest that social motivation is decreasing after the oxytocin administration to the nucleus accumbens. These findings support previous research findings in which oxytocin acts to decrease social motivation in peer-to-peer interactions.

Aurora McCain

Discipline: Environmental Science and Sustainability

Authors:

#1 Joshua Adams

#2 Gordon Holley

#3 Shaoyang Yang

Abstract Name: Long-Term Growth Dynamics of Naturally Regenerated Loblolly Pine (*Pinus taeda* L.) Stands in the Western Gulf Coast

Loblolly pine (*Pinus taeda* L.) is one of the most important timber species in the southeastern United States, yet plantation establishment remains the dominant management practice across the region. Natural regeneration can reduce planting costs, preserve genetic diversity, and support long-term sustainability, but it is used less frequently than artificial regeneration. This study examined the long-term growth patterns of naturally regenerated loblolly pine at the Crossett Experimental Forest in Arkansas. Two clearcutting approaches, block clearcutting and strip clearcutting, were implemented in five acre units between 1980 and 1995. Harvests occurred in five year intervals, and stand measurements were collected in June of 2025. These data were used to evaluate the influence of clearcutting method and stand age on growth. Mean diameter at breast height, trees per acre, and basal area were analyzed through one way ANOVA to test age effects, and F tests were used to compare the two regeneration methods. The results showed no significant differences between block and strip clearcutting (p greater than 0.05), which indicates that both approaches support successful natural regeneration under similar site conditions. In contrast, stand age had a significant effect on growth (p less than 0.05). Mean diameter increased with age, while trees per acre and basal area decreased. These patterns reflect density dependent mortality and natural self thinning processes that are typical of even aged loblolly pine stands. The overall trends demonstrate that naturally regenerated loblolly pine can maintain strong stand development throughout early and mid rotation ages. This provides landowners with opportunities for moderate and recurring income, especially in areas located near pulpwood markets. The findings also offer long-term evidence that natural regeneration is a practical and cost effective alternative to plantation establishment in southern pine management. Key words: natural loblolly pine; long term; growth dynamics; ANOVA

Anna McCallister

Discipline: Psychology

Authors:

#1 Anna McCallister

Abstract Name: Growing Minds: A 7-Week Intervention to Enhance Children's Metacognitive Skills

This project integrates a literature-based analysis with applied program design to explore how growth-mindset interventions can support children's metacognitive awareness and self-regulation in educational settings. Grounded in Carol Dweck's growth-mindset theory, which emphasizes that intelligence and ability can be developed through effort, reflection, and effective strategy use, the project synthesizes research identifying key components of successful mindset instruction. Studies consistently show that fostering a growth mindset enhances motivation, persistence, and metacognitive reflection, though long-term change depends on the structure and context of implementation. Building on these insights, a seven-week growth-mindset curriculum was created for upper-elementary students in a community-based learning environment. Weekly lessons targeted core themes such as goal setting, overcoming challenges, using feedback, and viewing effort as a path to mastery through interactive discussions and hands-on activities. To support future evaluation, a survey was designed to measure participants' mindset orientation, metacognitive awareness, and self-regulatory behaviors, though it has not yet been administered. By aligning the program's structure with evidence-based practices, this project demonstrates how theoretical principles from developmental and educational psychology can guide interventions that foster resilience, motivation, and positive self-beliefs. Overall, it bridges theory and practice by illustrating how literature on growth mindset and metacognition can inform real-world educational programming and highlight directions for future research and refinement.

Jessica McCann

Discipline: Art History

Authors:

#1 Jessica McCann

Abstract Name: Provenance and Protocol: A Study of the De la Burde African Art in the Radford University Art Museum Permanent Collection

Museum collections often house many artifacts that have no discernable history or information that connect to their place of origin. This in turn makes it difficult to display these pieces due to not being able to fit them with a narrative to show the viewer. This research aims to determine the best course of action when confronted with this problem and to demonstrate the importance of acknowledging the background of these artworks and antiquities. The focus of this research is a collection of Colonial Era African artwork that is currently housed in the Radford University Art Museum Permanent Collection which will be used as a case study in order to reach the conclusion to this research inquiry. These works were all produced sometime during the 19th to 20th Centuries and were donated to the museum in 1992. Determining provenance, or the history of ownership, of pieces is of the utmost importance for museum collections in order to properly present the pieces in the correct context, and if necessary, return them to their place of origin. Research has been conducted on how museums should react when faced with pieces that may have been stolen or looted, as well as the importance of due diligence in the art market. However, there is little consensus on the right course of action, and it is difficult to determine provenance from pieces that were in private collections prior to being donated to museums. That is what this research seeks to address, a more direct approach to provenance research and accountability by museums on their collections. By using existing documentation on collections records and firsthand interaction with the collection at RUAM to provide a comprehensive history of the collection and a proposal for how to document acquisitions going forward.

Emersyn McCann

Discipline: Biology

Authors:

#1 Natalie Olander

#2 Emersyn McCann

#3 Eden Comer

#4 Olivia Andry

#5 Leah Chase

Abstract Name: Interneuron Development in an Animal Model of Bipolar Disorder

Bipolar disorder (BD), a neuropsychological disorder featuring cyclical periods of depressive and manic behaviors. The Chase lab aims to establish the face validity of a novel animal model for BD by assessing its behavioral and morphological traits. So we can better understand the pathophysiology of the disorder, others have shown that BD results in a decrease in interneurons within the prefrontal cortex and hippocampus. We are currently using immunocytochemistry to measure the number of parvalbumin (PV) and somatostatin (SST) interneurons in the hippocampus and prefrontal cortex in our animal model relative to controls. Preliminary results suggest that HCA leads to an increase in PV interneurons in the dentate gyrus of the hippocampus in male rats, while decreasing PV interneurons in the same region in female rats. Similar findings were also observed in the subiculum and the CA2/3 region of the hippocampus. These findings are particularly intriguing given that male rats exhibit more manic behaviors in this animal model while female rats exhibit more depressive behaviors. We are currently assessing whether HCA also leads to changes in PV interneurons in the prefrontal cortex as well as SST neurons in the hippocampus and prefrontal cortex. Ultimately, this study will allow us to determine whether HCA-induced shifts in manic/depressive behaviors

are associated with changes in the distribution of PV and SST GABAergic interneurons in subregions of the hippocampus and prefrontal cortex.

Daphne McCann

Discipline: Chemistry

Authors:

#1 Roshani Asuramana Padi Durayalage

#2 Nawagamu A. K. Rajitha Perera

#3 Michelle Mabry

Abstract Name: A Comparative Analysis of Green-Synthesized and Chemically Synthesized Silver Nanoparticles: Preparation Methods and Antimicrobial Potential

There is an increasing use of silver nanoparticles (AgNPs) in the medical and industrial fields. However, with an increase in potential applications, the antimicrobial effects of AgNPs on bacteria have sparked interest. Thus, by comparing how commonly found bacteria are affected by the type of synthesis, size and concentration of AgNPs, information can be gathered for future clinical use. This study investigates the impact of two distinct synthesis approaches, chemical and green, on the resulting AgNP characteristics and their subsequent antimicrobial action against a common bacterium. Chemical synthesis of AgNPs employed trisodium citrate as the stabilizing agent and sodium borohydride (NaBH₄) as the reducing agent. For the green synthesis, inner gel extract from Aloe vera leaves was utilized, with the gel's major bioactive components acting as both reducing and stabilizing agents. The characterization of the formed AgNPs was performed from the spectral analysis of UV-Visible spectrophotometer. Visible observation of color change and UV-Vis absorbance at 442 nm confirmed the formation of AgNPs. Spectral analysis confirmed the synthesized AgNPs maintained stability for up to two months. Antimicrobial effects of the synthesized AgNPs were determined against *Escherichia coli*. Bacterial cultures were exposed to AgNPs synthesized by both methods at various concentrations using disk-diffusion assay. Chemically synthesized 100 nm AgNPs exhibited a 0.6 cm zone of inhibition against *E. coli* at minimum inhibitory concentration of 500 µg mL⁻¹. Green-synthesized AgNPs created a zone of inhibition of 0.4 cm at minimum inhibitory concentration of 3500 µg mL⁻¹. According to these preliminary results chemically synthesized AgNPs demonstrated more antimicrobial efficacy towards *E. coli* than green synthesized AgNPs. In future studies the synthesized AgNPs will be characterized using DLS and XRD and the project will be expanded to test other microbial species.

Lilian McCarroll

Discipline: Interdisciplinary

Authors:

Abstract Name: Street Art, Street Artists, and Public Art in Houston and Their Relation to the People and Law

Throughout the history of the public art in Houston, Texas, artists have used their art to express support and fight for change. From large pieces on the sides of buildings to graffiti on bridges above large roads, these artists have used many different methods to get their points across. This paper is an exploration of graffiti, murals, notable artists, and other sources public art and how they have transformed Houston's urban landscape. Street artists draw inspiration from places all around the world and have helped in spreading many different cultures through the city. This paper also talks about more formal ways to view art in Houston, like free to view collections, museums, and other buildings. Forty-three sources are referenced in this paper with

a focus on government websites, news reports, magazines, artists' websites, and interviews. In person research was also conducted by going around to view much of the art and places mentioned in this paper. I also experienced some of the events talked about in this paper first hand and have gotten to see how artists have helped to raise awareness and inspire hope around different situations. Part of my goal for this paper is to draw more attention to all the art around Houston and how it has followed Houstonians throughout the city and its history. Street art is a way to see the ideas of different kinds people in contrast or similarity to what the government promotes or allows. I took that into consideration when researching and made sure to feature both government promoted projects and those that have been removed by them as well.

Raven McClain

Discipline:

Authors:

#1 Raven McClain

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#4 Anne Wiley

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Abstract Name: Evaluating Threats to Birds on Bowie State University Campus

Since 1970, North America has lost more than one in four birds—a decline with far-reaching consequences for ecosystem services such as pollination and insect control. As natural habitats are replaced by human development, understanding how to share built environments with vulnerable bird populations is crucial. Here, we present an initial assessment of bird mortality risks on the campus of Bowie State University (BSU) in Bowie, Maryland—a site of potential ecological importance to birds due to its proximity to the Patuxent Research Refuge and the largest contiguous greenspace in the D.C.–Baltimore corridor. We focused on the two leading, direct causes of anthropogenic bird mortality: collisions with building windows and predation by domestic cats (*Felis catus*). We conducted 228 surveys of campus buildings to document bird-window collisions from Mar to Nov 2025. We also deployed four trail cameras over a 1.5-week period to observe cat activity and estimate the proportion of the campus cat population that is neutered or spayed—a potential determinant of population growth. Bird presence was assessed using vocalizations identified via the Merlin Bird ID application. We detected 33 bird species on campus and recorded 46 avian fatalities attributed to window collisions. Collisions were significantly more frequent at buildings with a higher percentage of glass. Of the 10 cats observed, 40% were neutered or spayed—well below the estimated 70–90% threshold required to potentially reduce population growth. Additionally, we documented one instance of a cat scavenging a bird likely killed by a window strike, suggesting that cat scavenging may lead to underestimates of actual collision-related mortality. Based on our findings, we recommend assessment of night lighting on campus that may attract and confuse nocturnal migrants. We also recommend installation of UV-reflective window films on high-risk buildings as an initial mitigation strategy.

Nya McClenney

Discipline: Biology

Authors:

#1 Nya McClenney
#2 Ritika Manthana
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Ritika Manthana

Abstract Name: The Presence of Antibiotic Resistant Bacteria in Water Samples in Richmond VA

Our research investigates the presence of antibiotic resistant bacteria in water samples collected from urban parks in Richmond, Virginia. Monitoring antibiotic resistance in these environments is quite critical because of its potential implications that could affect public health. When bacteria develop resistance to antibiotics used to treat infections this poses significant challenges to disease treatment and infection control. Urban parks are areas that experience high levels of human and animal activity, increasing the likelihood of water sources in these areas to come in contact with antibiotics used in both human and veterinary medicine. This exposure could facilitate the development or spread of antibiotic resistant bacteria. Three park areas connected to the James River in the city of Richmond Virginia were used in this study. Byrd Park which draws water from the James River was selected for its central location and heavy recreational use. Pumphouse park draws water from the Kanawha Canal alongside the James River, providing a distinct type of water source with similar environmental conditions to Byrd Park. The Reedy Creek area of the James River was included because it receives runoff from surrounding urban, industrial, and agricultural activity, creating a potential collection point for contaminants. To assess the prevalence of antibiotic resistant bacteria, water samples collected from each location were then diluted and plated on media containing varying concentrations of tetracycline. Resistance was measured by quantifying the bacterial colonies that remained viable and continued to grow in the presence of tetracycline.

Andrew McCommon

Discipline: Chemistry

Authors:

#1 Andrew McCommon
#2 Margaret Meadows

Abstract Name: A Greener Synthesis of Squaraines

The fluorescent compounds known as squaraines are used for photodynamic diagnostics and therapy because they absorb and fluoresce in the infrared and near-infrared regions. Synthesized through a condensation reaction between squaric acid and electron-rich aryl groups, these reactions are typically conducted over several hours at reflux. Our research focuses on improving the synthesis of symmetrical squaraines by using greener methodology. Monowave heating has been substituted for traditional reflux heating, reducing reaction times from hours to minutes and decreasing the amount of solvent required. We are also investigating the use of greener solvents for both synthesis and recrystallization. By modifying the synthesis methodology, this research contributes to a more reliable, greener synthesis of squaraines for biomedical and chemical use.

Emma McConkey

Discipline: Architecture, Construction Management, and Interior Design

Authors:

Abstract Name: Providing Refuge and Comfort: Designed with Flexibility and Habitability for the Growing Concern of Natural Disasters

California continues to struggle with recurring natural disasters, including earthquakes, wildfires, mudslides, and flooding, that leave residents displaced and in search of a more reliable support system. The recent wildfire in the Palisades destroyed thousands of homes and businesses, making the need for safer and more resilient spaces impossible to overlook. Many temporary camps set up during emergencies still struggle to provide privacy, sanitation, and security, which makes it clear that a more thoughtful and humane approach is necessary. Research for this project was shaped by case studies, literature reviews, and online surveys, helping build a clearer picture of what displaced individuals need in both short- and long-term recovery situations. In response, this project proposes a community shelter with accompanying temporary housing units, designed to withstand extreme conditions while remaining inviting, supportive, and dignified. The design emphasizes access to clean drinking water, food services, recreational amenities, and safe, accessible accommodations for a wide range of users, including those with disabilities. Interior spaces are developed to be flexible, adapting to changing needs as communities move from immediate crisis into longer-term healing. Sustainability plays a central role in the project, especially as climate change intensifies the types of disasters Californians face each year, by combining resilient building strategies with environmentally responsible systems, sustainable materials, signage that promotes environmental awareness, and a focus on user well-being. This shelter aims to reduce additional strain on the environment while strengthening community preparedness. Ultimately, the purpose of this project is to create a place that offers more than temporary safety. It becomes a steady, restorative environment where people can regain their footing, reconnect with others, and rebuild hope after a disaster.

Bradley McConkey

Discipline: Engineering

Authors:

#1 Canreen Kaur
#2 Emma Palmisano
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Canreen Kaur
Emma Palmisano

Abstract Name: Dielectric Differentiation of Clinically Relevant Candida Species Using Multi-Frequency DEP Profiling

Rapid identification of fungal pathogens continues to be a challenge in clinical settings. In this project, we examined whether Candida species can be differentiated based on their electrical behavior rather than through biochemical processing. Prior work in our lab has shown that individual Candida strains have responded differently in electric fields due to variations in cell wall and membrane structure, but full comparison across major clinical species has not been investigated. The main objective of this study was to determine whether six Candida species show consistent differences in their dielectric properties. With this in mind we investigated their membrane capacitance, membrane conductance, and cytoplasmic conductivity. These differences in values could serve as a reliable indicator of species supporting faster classification for fungal infections. To investigate this we cultured *C. albicans*, *C. glabrata*, *C. parapsilosis*, *C. tropicalis*, *C. dubliniensis*, and *C. krusei* in identical conditions and suspended them in the same low conductivity buffer. With this our key parameters include crossover frequency, membrane capacitance, membrane conductance, and cytoplasmic conductivity. To ensure the accuracy of our results we ran all experiments in triplicate so that

variation could be tied to membrane structure instead of error. Across all of these measurements, each species showed very distinct dielectric profiles. With this *C. krusei* displayed the strongest polarization and highest cytoplasmic conductivity, *C. parapsilosis* showed the highest conductance, and *C. tropicalis* showed the highest capacitance. Of these, *C. dubliniensis* had the lowest values in all electrical properties. Based on our results these patterns remained consistent across multiple concentrations with little variation. Overall, these results indicate that *Candida* species can be classified based on their electrical properties. This work helps establish a clearer understanding of how fungal structure relates to electrical behavior and supports the development of faster diagnostic strategies for clinically relevant *Candida*.

Isabella McCord

Discipline: Art History

Authors:

#1 Kurt Rahmlow

Abstract Name: Mother Death: Re-gendering Death as a Symbol of Agency in the Context of Twentieth-Century German Feminism

Der Tod und Das Mädchen (Death and the Maiden), a motif deeply rooted in Germanic artistic tradition since the Middle Ages, personifies Death as a voyeuristic, sexually aggressive male figure. At the turn of the century, however, many artists within these cultures began to re-gender Death as a woman. Scholars who identify this shift, including Kate Elswit in “Berlin...Your Dance Partner is Death,” Sandra M. Gilbert in “The Supple Suitor: Death...,” and Karl S. Guthke in *The Gender of Death*, understand it in terms of Sigmund Freud’s Death Drive (first published in *Beyond the Pleasure Principle* in 1920). However, this view overlooks the context of emerging German feminism, which often asserted the inherent power of women, specifically mothers, that derived from their biological potential. Positioning the re-gendering of Death in the context of contemporary gender politics in Germany poses the question: how might these new images of a motherly Death be reimagined as symbols of agency? This study references contemporary publications by first-wave German feminists, as well as the written and visual work of two prominent artist-mothers—Käthe Kollwitz (1867-1945) and Else Meidner (1901-1987)—to gauge how women in the early-twentieth century came to be associated with death. The project pairs close readings with a visual analysis of works on paper by Kollwitz and Meidner to identify their engagement in discourse concerning the relationship between motherhood and death. The project argues that understanding these ‘Mother Deaths’ as they were conceived by artist-mothers in the context of both first-wave feminism and the tradition of *Der Tod und Das Mädchen* positions them as figures of empowerment and agency.

Aaliyah McCormick

Discipline: Political Science

Authors:

Abstract Name: The Boogeyman Is Not Real: Disgust, Anger, and Anti-Transgender Tactics in Contemporary American Conservatism

In the years since the landmark Supreme Court case, *Obergefell v. Hodges* (2015), transgender people, along with the LGBTQ+ community as a whole, have gained considerably higher visibility. That visibility has led to greater acceptance by many members of the public, and yet, backlash to transgender rights has become a primary stance for conservative politicians across the United States. Despite little evidence to support

conservative elites' claims that the transgender community poses a danger, elites nevertheless have raised alarm on the grounds of moral, ethical, and religious concerns. That alarm has been operationalized in the form of disgust directed at the transgender community. Disgust has long been used as a political tactic in practice, and greater sensitivity to disgust is linked with an increased likelihood of conservative views towards the LGBTQ+ community. Past research on the impact of emotions in political behavior has placed emphasis on the emotion of anxiety as the primary response to perceived threats. Nuanced analysis reveals that, for some, the emotion of disgust can replace anxiety as the initial reaction to a perceived threat. Instead of seeking out further information, as is the case with anxious responders, disgusted responders reject new information. This makes individuals more vulnerable to the manipulation of political elites, who prey on individuals' disgust to create an environment of fear and anger. I argue that the current attention towards the transgender community is another example in a decades-long political strategy. Using historical analysis, I investigate how the conservative political elites have utilized disgust against the LGBTQ+ community to motivate the conservative voter base.

Michael McCourt

Discipline: Engineering

Authors:

#1 Hee-Seok Kim

Rafiullah Jalal

Mathew Fleming

Abstract Name: Undersea Thermal Electric Generator Powered Profiling Floats

Imagine a self powered profiling float that could remain on station collecting ocean data for longer periods of time than any other battery operated device. This device will descend and ascend through thermal layers converting temperature changes into energy using thermal electric generators. This energy is then used to increase the floats duration in the field, collecting data, compared to simply relying on battery power alone. In this paper we discuss two prototypes, the first was to test depth control and water tightness. The second prototype used the lessons from the first and incorporated thermal electric generators to generate energy. From these prototypes we plan to show that thermal electric generators can be used in a way that increases the endurance of ocean monitoring probes and potentially other UUVs.

Seth McCrary

Discipline: Engineering

Authors:

Nathaniel Kleinbach

Abstract Name: Produced Water Critical Earth Element Extraction

Produced water is a major waste byproduct that is in the Oil and Gas industry, which is typically seen as something that can be an inconvenience. Government mandates for the purification of wastewater for proper recycling or removal has led to interest in finding monetary returns on produced water. Methods of characterizing water for valuable elements have become more of a real financial possibility with more and more attention being put on finding rare earth metals and critical elements. Our literature analysis has given us methods of extraction, but most of these are lacking in selection specificity or are technologies that have had advancements between the older research publications and now . With materials in our campus lab and

with the help from local labs such as Texas Pacific Water Resources, we intend to expand the understanding on the methods of characterization and extraction of rare and critical earth elements. So far we have learned how to use our lab equipment to characterize samples of produced water such as emission spectroscopy method. With the characterized samples, we will be able to partner with local labs to find the most efficient method of rare and critical earth metal extraction. With enough samples characterized and sample resources extracted, we intend to have a better idea of the modern technologies and can find where the processes can be improved.

Jacqueline McDonald

Discipline: Philosophy, Ethics, and Religious Studies

Authors:

Abstract Name: Called Without a Compass: Kierkegaard, Clarity, and The Sacred Ambiguity of Vocational Discernment

In modernity's obsession with certainty, vocational discernment—whether in professional trajectory, personal calling, or religious discernment—often transforms from a gift into a demand. In a culture that prizes clarity, control, and measurable identity as absolutes, the modern-self's demand seeks promised security but veils a deeper fear: choosing wrongly. This fear reflects an existential anxiety—the dread that one's choice could betray oneself, remove other potentialities, or sever one from divine purpose. Called Without a Compass: Kierkegaard, Clarity, and The Sacred Ambiguity of Vocational Discernment explores Søren Kierkegaard's concept of the “despair of infinitude” from *The Sickness Unto Death* as a framework for understanding this contemporary crisis of decision and identity. I situate vocational uncertainty within broader philosophical and psychological discussions of freedom, agency, and authenticity. When the desire for self-understanding becomes a desire for self-mastery, possibility gives way to paralysis. The very freedom sought through certainty becomes imprisonment within the self-constructed cell of infinite potential. Drawing on Kierkegaard's account of the self as a dynamic relation, I analyze how such entrapment arrives through disordered desire—whether divine, ethical, or existential. To extend this analysis, I engage the apophatic and relational epistemologies found in the works of Saint Teresa of Avila and Saint John of the Cross. Ultimately, I reframe vocation as a relational and receptive disposition rather than a mere intellectual problem of epistemic certainty. In light of this, I interpret Kierkegaard's ontological insight that despair arises when the self ignores or refuses its existence as a relation within a relation: vocational discernment, then, requires a posture of faith—“rest[ing] transparently in the power that established it.” (Kierkegaard 131).

Kennerly McElveen

Discipline: Health and Human Development

Authors:

#1 Pamela Wright

Abstract Name: Coping Skills Among Women With PCOS: A Comparative Analysis

Polycystic ovary syndrome (PCOS), a chronic endocrinopathy, affects ~13% of reproductive-aged women globally. PCOS is a complex, heterogeneous collection of symptoms involving hormonal and metabolic dysregulation. Notable symptoms are hirsutism, menstrual irregularities, visceral adiposity, insulin resistance, and subfertility, which negatively impact the quality of life. Women with PCOS are at increased risk of anxiety and depression, as well as other mental health disorders. However, limited research exists on coping

strategies used among women with PCOS. The purpose of this study was to examine coping strategies used among women with PCOS and compare them to women with no chronic health conditions. Participants were recruited via flyers and social media. Implied informed consent was obtained. The survey was comprised of demographic questions, the BriefCOPE, and Adult Coping Inventories (ACI). Data was collected via REDCap. Means/standard deviations were calculated for continuous variables, frequencies for categorical variables, and independent-sample t-tests for mean differences between the PCOS group (n=121) and healthy control (HC) group (n=168) on inventory scores. Participants (N=289) were 33.73 (± 7.53) years and mostly White (69%). The groups did not significantly differ in baseline characteristics. On the BriefCOPE Inventory, women with PCOS used more emotion-focused coping and avoidance compared to the HC ($p < 0.001$). On the ACI, women with PCOS scored significantly higher than the HC for using maladaptive coping strategies and avoidance ($p = 0.002$ and 0.018 , respectively). Poor coping strategies in women with PCOS may be linked to the psychological distress of chronic PCOS symptoms such as hirsutism, acne, subfertility, and depression. For women with chronic health conditions, poor coping skills may reflect a perceived lack of control over the condition and feelings of helplessness. Future research is needed to understand the impact of PCOS on developing poor coping strategies, identify clinical timepoints and measures to promote healthy coping strategies.

Bri McFerson

Discipline: English and Literature

Authors:

#1 Bri McFerson

Abstract Name: "I am Thou and Thou am I: Woolf's Critique of Unethical Imperative Using Socio-Environmental Analysis In To The Lighthouse"

Salah Bouregbi proposes that mysticism in Virginia Woolf's *To the Lighthouse* is sacred and exemplified in the characters of Mrs. Ramsay and Lily Briscoe. In his paper Bouregbi characterizes these characters as "rational mystics," who unite opposites and bring a rational aesthetic order to multiplicity. While understandable, this position ignores the social dimension of mysticism that Woolf implies is empowered by nature. Nature's binding quality results in two forms of mysticism that each character embodies. For Mrs. Ramsay it is a mysticism of absorption, in which other characters lose individuality in a broader reality. Lily's mysticism, on the other hand, emerges in and through social relations that are enabled by, yet stand apart from, an all-encompassing nature. In *To The Lighthouse*, Woolf highlights how mystical pursuit, specifically into social mysticism, enables the humanization of the character's experiences and maintains humanity through mystical progression. She does so through insight regarding nature's place in social interaction, bringing a dual vision of nature. Woolf sees humans as united in social obligation over and against nature; alternately, nature pervades all human social interactions providing a metaphysical unity. Woolf's embrace of what I call a socio-environmental mysticism emphasizes her argument on the importance of interpersonal connection. For this reason Woolf characterizes Mrs. Ramsay's mysticism as morally problematic while endorsing Lily Briscoe's socially responsive mysticism.

Griffin McGarry

Discipline: Physical/Occupational Therapy and Speech Language Pathology

Authors:

#1 Lauren Sara

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#3 Justin Lee

#4 Jennifer Earl-Boehm

#5 Jenny Ali

Coy Strehlow

Abstract Name: Peak Accelerations Are Higher at the Foot Versus the Ankle in Rear Foot Strike Runners

Introduction- Running is a popular pastime worldwide. It is an accessible and healthy form of exercise: it requires minimal equipment and boasts favorable associations with longevity and cardiovascular health. However, prevalence of running-related injuries (RRIs) is around 45%. RRIs are associated with higher peak accelerations which are often monitored by runners, clinicians, and researchers to help reduce risk of RRI. However, it is unclear whether accelerations measured at the foot (commonly used by clinicians) can approximate those at the ankle (commonly used by researchers). Purpose- Our purpose was to evaluate differences in peak acceleration measured at the foot versus ankle during treadmill running. Methods- We included adult runners whose natural foot strike pattern was rear foot strike (RFS). Noraxon Myomotion sensors were placed on the right foot and ankle. Participants warmed up for 3 minutes at a self-selected pace to ensure they reached their natural running rhythm. Twenty seconds of data were recorded and filtered using a Butterworth filter with a cutoff of 50 Hz. Peak accelerations were averaged for all steps within the 20-

second window and compared at the foot and ankle using paired t-tests (IBM SPSS).Results- Results are expressed as mean (standard deviation). 30 runners (15 females) participated in the study (age 34(18) years, running speed 5.6(0.9) mph). Mean vertical accelerations at the foot (8.5(3.1)) were larger than at the ankle (4.7(1.9); $d=1.8$; $p < .001$). Mean resultant accelerations at the foot (10.4(3.3)) were larger than at the ankle (6.7(2.7); $d= 1.7$; $p < .001$).Conclusion- Accelerations measured at the foot were consistently higher than those at the ankle, demonstrating that these cannot be used interchangeably. These findings highlight the necessity of clearly reporting and justifying sensor placement to ensure methodological rigor. Furthermore, guidelines for target accelerations at the ankle cannot be used for foot-mounted sensors.

Thomas McGlynn

Discipline: Psychology

Authors:

#1 Gregory Gidman

Abstract Name: The Effect of a Supportive-Oriented Parenting Style Compared to a Performance-Oriented Parenting Style on Young Adult Children's Intrinsic Motivation in Baseball Using Self-Determination Theory

This study seeks to examine how a supportive-oriented environment, fostered by parents, affects intrinsic motivation among male baseball players, compared to a performance-oriented environment, as they enter adulthood. The results of this study ideally would benefit parents seeking to instill in their children intrinsic motivation and a passion for baseball that lasts beyond their childhood. Previous studies, such as Ryan & Deci's study in 2000, sought to determine what drives people to engage in an activity with genuine interest, a concept known as Self-Determination Theory (SDT). The SDT is a psychological framework that compares internal motivation with external motivation. A 2022 study by Krommidas et al. found that higher perceived parental support significantly predicted higher intrinsic motivation and enjoyment among young athletes (ages 12-17). This study will specifically focus on intrinsic motivation among athletes aged 18-24 years and their correlation with parenting styles in accordance with the SDT. A questionnaire will be designed to glean specific information on the young adult child's parental involvement, the type of involvement (supportive vs. performance-fostering), and the athlete's perceived intrinsic motivation. The correlational design intends to identify the strength and direction of the variables to determine whether they are independent of one another. A random sampling of domestic and international collegiate baseball players will be the participants in this study. Anticipated outcomes are that collegiate-aged baseball players with parents who foster a supportive-oriented environment around baseball—one where learning, effort, and self-improvement are the focus—will have higher self-perceived intrinsic motivation for baseball. Additionally, athletes whose parents foster a performance-oriented environment in which winning and outperforming are strongly valued will have lower self-perceived intrinsic motivation for this sport.

Kayleigh McGraw

Discipline: Nursing and Public Health

Authors:

#1 Kimberly Navarro

Abstract Name: The Knowledge, Experiences, and Attitudes of Nurses Regarding Trauma-Informed Care for Sexually Abused Intrapartum Patients

Labor and delivery nurses care for women from diverse backgrounds who are preparing for a life-changing

event often marked by fear, excitement, sadness, and joy. Childbirth is one of the most vulnerable experiences a woman can undergo, and nurses must provide skilled, compassionate, and culturally competent care. However, 1 in 5 women in the United States have experienced rape or attempted rape, and for these survivors, labor can become re-traumatizing. Many report flashbacks, dissociation, and a sense of “being back in the rape” during childbirth. Routine procedures—such as patient positioning and cervical exams—are known triggers. Research further links prior sexual assault to unplanned cesareans, traumatic births, and childbirth-related PTSD. Trauma-informed care (TIC) provides a framework to reduce these risks by encouraging providers to understand trauma, recognize signs of distress, and act to avoid further harm. Although case reports show TIC can be applied successfully in obstetrics, there is no standardized TIC education for labor and delivery nurses. This gap represents an understudied but critical area of women’s health. This research will explore labor and delivery nurses’ knowledge, experiences, and attitudes regarding TIC for patients with a history of sexual trauma. Semi-structured interviews will be administered to 10 nurses and interpreted through Bourdieu’s sociological framework to identify potential educational needs. By revealing gaps in understanding, this study aims to support the development of targeted training programs that improve patient safety, promote positive birth experiences, and reduce psychological and physical harm for mothers and newborns.

Aliyah McGuire

CA - University of California - Merced

Discipline:

Authors:

#1 Valerie Anderson

#2 Jayson Beaster-Jones

Abstract Name: Creating a Sustainable Pathway for Undergraduate Research Experience and Mentorship in the Humanities

Building support for research opportunities in the Social Sciences, Humanities, and Arts (SSHA) is essential for a young research-intensive (R1) institution. The Undergraduate Research in the Humanities (UROC-H) program at the University of California, Merced (UCM) has operated to provide structure and support for humanities undergraduates to engage in research. Funded by the Mellon Foundation, UROC-H aims to expand undergraduate research in the humanities on a larger scale. Prior to the inception of UROC-H in 2016, the Undergraduate Research Opportunity Center (UROC) at UC Merced only housed STEM-focused research programs. UROC-H adapts the structure of these STEM programs to meet the needs and methodologies of the humanities fields. This cross-disciplinary approach has proven to be highly successful, leading to innovative outcomes. The program offers a full academic year of research fellowships, training, and conference travel, while also facilitating research project clusters that enhance faculty engagement and student receptivity to the research process. UROC-H has also contributed to strengthening the broader academic infrastructure by meeting the needs of undergraduate students, providing professional development for graduate students, and supporting faculty research. Notably, 87% of UROC-H participants plan to pursue graduate education, demonstrating the program’s impact on students’ academic and professional trajectories. Over the past decade, this data has shown that UROC-H not only helps humanities students connect to the research community but also empowers them to consider research in their professional or academic careers.

Lilia McHugh

Discipline: Dance

Authors:

Abstract Name: Dance Movement Therapy as a Practice for Transitional Recovery Program

For many in addiction recovery, rock bottom isn't just a moment in time; it's a process, a state of being filled with depression, guilt, and pain. Those who live in sober living houses (SLH) are relearning and rebuilding their lives from that rock bottom. SLHs provide resources for staying sober, including talk therapy, group therapy, 12-step programs, AA, and many others. However, these are not always inclusive or enough to motivate individuals to commit to sobriety. Dance Movement Therapy (DMT) provides an alternative path out of rock bottom by using the body as a tool for recovery. In my research, I examine these programs and question their effectiveness and inclusivity. I hypothesize that DMT can be a useful optional program for addiction therapy. We can implement movement-based therapeutic practices like Mirroring, Motivational Interviewing, and Psycho-dynamic oriented dance therapy as complementary to those that are already offered. As a therapeutic practice, DMT can foster a safe space that encourages self-expression, community, motivation, and understanding of emotions to maintain sobriety within SLHs. Rachel Singer, a Dance Movement Therapist who has experience working with addict populations, finds a positive correlation between the healing of addicts and their participation in dance movement therapy. The majority of my research findings are based on reputable researchers such as Dr. Doug Polcin, a program director at the Public Health Institute, as well as field interviews with staff and social workers who work directly with patients at SLHs.

Stacey McIntire

Discipline:

Authors:

#1 Stacey McIntire

Abstract Name: Bridging Theory and Practice: Scaffolding Research Competencies and Career Readiness in Undergraduate Aviation Education

In technical fields such as aviation, engaging students in research-centered coursework can be challenging because learners often prioritize operational proficiency over scholarly inquiry. To address this gap, a two-course undergraduate series was developed to emphasize the value of research as a transferable professional skill. The curriculum is designed to cultivate competencies applicable across diverse career paths, particularly the ability to ask insightful questions, frame relevant problems, and apply evidence-based reasoning to issues faced by today's aviation industry. The first course introduces students to core research methods, including study design, data collection, and analysis, providing a structured foundation for scholarly investigation. Building upon this base, the second course serves as a capstone experience that allows students to collaborate with industry partners on authentic aviation challenges. This scaffolded design enables students to transition from theoretical understanding to practical application, fostering both technical and analytical proficiency. Student feedback demonstrates that this approach enhances confidence, critical thinking, and the integration of research with professional practice. In addition, the model promotes essential workplace competencies such as teamwork, communication, and project management, which students and industry mentors identified as critical for career readiness. Overall, this instructional framework bridges the divide between academic learning and professional application, ensuring that aviation graduates are equipped with the research literacy and applied problem-solving skills required in a dynamic and evolving field. Beyond aviation, this adaptable model provides a blueprint for integrating research engagement into other professional disciplines where evidence-based inquiry is essential but often underemphasized.

Dakota Mckee

Discipline: Engineering

Authors:

#1 Elizabeth Stump

#2 Arnold Craig

Abstract Name: Cooking With Dakota: Compressing Freeze Dried Egg Whites Prior to Pyrolysis

Freeze-dried egg white (EW) proteins have been used as a novel precursor for green and sustainably produced graphene aerogels that are scalable, template-free, and require less steps in their synthesis. These graphene aerogels consists of a network of carbon fibers and graphene sheets created by a self foaming mechanism, allowing for hierarchical porosity. Previous studies have shown heat rate affects the density and microstructure of the graphene aerogels. This study explores additional effects to the graphene aerogels density and microstructure via compression of the precursor into rounded tablets. The resulting aerogels maintained hierarchical porosity and rounded shape but exhibited unexpected foaming behavior and the formation of shell-like structures. These results implied compression to the precursor affected the self foaming mechanism, and future research will explore the underlying causes.

L. Nichole McKee

Discipline: Economics

Authors:

#1 L. Nichole McKee

Teresa Carrion

Abstract Name: Protectionism, Push Factors, and Service Sector Pull: A New Look at Low-Skilled Female Migration

This thesis investigates the causal relationship between U.S. trade protectionism, and the migration of low-skilled Hispanic women. While economic theory and recent empirical work, like Uprety (2020), suggest that trade barriers increase migration, these models attribute the effect to capital-skill complementarity. They predict a rise in high-skilled immigration, suggesting protectionism drives capital inflows which demand skilled labor. This finding presents a significant theoretical puzzle for the current policy landscape. It fails to explain the persistent and rising migration of low-skilled women despite protectionist measures that, in theory, should reduce demand for low-skilled labor in the U.S.'s tradeable sector. To resolve this tension, I propose a novel "Push-Pull" framework that disaggregates the drivers of migration for this specific group. My primary hypothesis challenges the standard view by arguing that tariffs on Latin American exports in female-intensive sectors act as a severe economic "push". By destroying employment opportunities in the origin countries, tariffs amplify economic insecurity and displace women from the local labor market. This "push" is met by a structural "pull" from the U.S. service sector. Using Cortés (2022), I argue that demand in this sector is driven by needs of high-skilled native women and remains insulated from policy shocks, creating an absorption mechanism for displaced workers. Methodologically, this study employs a panel data analysis using a Fixed Effects model on a Country-Year dataset constructed from IPUMS USA (ACS) migration microdata and USITC bilateral tariff data. This approach allows the isolation of tariff impacts while controlling for unobserved country heterogeneity and economic trends. The research design includes a Difference-in-Differences (DiD) specification to exploit tariff spikes. By empirically linking trade policy shocks to service-sector migration flows, this research demonstrates a policy paradox: that U.S. protectionism may increase low-skilled migration by destroying the export-oriented jobs that would keep workers in their countries.

Eden McKinney

Discipline: Psychology

Authors:

#1 Sam Castelblanco

Abstract Name: Can You Smell That Smell? ADHD, COVID-19, and Anosmia

Previous research has shown olfactory deficits in some people diagnosed with attention deficit hyperactivity disorder (ADHD). ADHD is a neurodevelopmental disorder that affects around 129 million adolescents and 366 million adults around the world. In the United States, there are approximately 22 million people that are diagnosed with ADHD. This disorder primarily affects the prefrontal cortex area of the brain. The prefrontal cortex is a specialized area of the frontal cortex that focuses on various executive functions: decision making, attention, memory, and impulse control. Likewise, olfaction is housed within the frontal cortex. This proximity to the prefrontal cortex can cause some of the dysfunctional aspects of ADHD to affect olfaction. ADHD has the typical hallmarks of a lower chemosensory perception in children and adults. This chemosensory perception includes olfaction (sense of smell), gustation (sense of taste), and chemesthesis (sensory systems that detects burning, cooling, tingling, and numbing sensations). Similarly, 60% of people diagnosed with COVID-19 experienced anosmia (loss of sense of smell) for an extended period. Around 24% of people never regained their sense of smell. This is due to the viruses SARS-CoV-2 neurotropism that can affect the tissue found throughout the nervous system of the body. This includes the smell pathways, otherwise known as the olfactory pathways. Since the pandemic happened so recently, very little research has been conducted related to ADHD and COVID-19 symptoms. In this study, undergraduates will answer questions in an anonymous online Qualtrics survey about their own neurodevelopmental disorder diagnoses, past COVID-19 diagnoses, and history of anosmia with their diagnoses. We hypothesize that participants diagnosed with ADHD were more likely to experience anosmia if they contracted COVID-19 than participants who had no ADHD diagnosis. This research will contribute to basic science and will help us better understand anosmia as it relates to ADHD and COVID-19.

Grace McKrell

Discipline: Engineering

Authors:

#1 Grace McKrell

#2 Trang Vu

#3 Yu Miao

Abstract Name: High-Throughput Isolation and Identification of Bacterial Strains from Environmentally Enriched 1,4-Dioxane Degrading Consortia

Bioremediation is a sustainable and environment-friendly strategy for contaminated groundwater. 1,4-Dioxane as a prevalent groundwater pollutant, possible carcinogen, and common industrial waste product can be biologically degraded via metabolic or co-metabolic pathways. However, the feasibility and stability of 1,4-dioxane biodegradation are still challenged. Here, we focus on the engineering of synthetic microbial communities (SynComs) method and present the critical steps of enriching and isolating the bacteria that can form 1,4-dioxane degrading SynComs. To enrich the natural 1,4-dioxane and byproducts degraders, we collected soil and freshwater samples from a natural restoration river and continuously added 1,4-dioxane.

Meanwhile, 1,4-dioxane degrading bacterium *Pseudonocardia dioxanivorans* CB1190 was augmented (10% v/v) to initialize the biodegradation. Two resulting microbial consortia, SL417 and FW118, were identified by 16S rRNA amplicon sequencing, and dominant species were *Mesorhizobium* sp. and CB1190, respectively. We further developed a high-throughput serial dilution technique to isolate the consortium's single strains. The optimal dilution was determined according to Poisson's distribution, where there was the highest possibility of a single strain in each well of a 96-well plate. With observed biomass, a well's content was plated on agar and re-streaked until purity was visually confirmed. These isolated strains were identified by colony PCR (16S rRNA gene amplification) followed by PCR purification, gel electrophoresis, sanger sequencing, and BLAST alignment. The high-throughput cultivation and isolation process successfully separated out representative and slower-growing or less prevalent strains from the original consortia, such as *Mesorhizobium amorphae* PD-5 and *Afipia broomeae* B2PC1. The identified strains were representative of their environmentally enriched consortia, therefore were strong 1,4-dioxane bioremediation candidates, both individually and in the context of their consortia strain-mates. These microbial seeds will pave the way for recombination in duos or larger SynComs, through in silico modeling and in vitro experiments, and further applied in the field scale bioremediation engineering.

Amelia McLaren

Discipline: Biology

Authors:

#1 June Javens-Wolfe

Abstract Name: Human Transferrin Receptor Bispecific TREM2 Antibody Creation and Its Insightful Use in Alzheimer's Disease

Alzheimer's disease (AD) is the leading cause of dementia, affecting an estimated 7.2 million seniors in the United States. AD can develop in the brain for twenty years or more before symptoms appear, such as memory loss, which could enable a diagnostic window for intervention. AD causes neurons to be damaged or destroyed due to the accumulation of amyloid-beta protein fragments and an abnormal form of tau protein. The protein, Transmembrane Receptor Expressed by Myeloid Cells, TREM2, is essential in regulating the microglial response to amyloid-beta and tau accumulation in the AD brain. Microglia, the brain's resident immune cell, has two different paths of activation: one that is anti-inflammatory (M2), and one that is pro-inflammatory (M1). TREM2 is expressed in microglia and myeloid cells. It has a role in regulating microglial inflammatory responses. The TREM2 receptor is connected to DAP12—a signaling adaptor inside the cell that phosphorylates Syk (Spleen Tyrosine Kinase). By creating a TREM2 antibody, it stimulates SYK phosphorylation and phagocytosis. Portions of the antibody were developed from two different companies (e.g., Elana and Denali), who provided the aTREM2 and the hTfR (human transferrin receptor) binding domain, which was inserted in the aTREM2 fc portion. An hTfR receptor allows for two TREM2 antibodies to bind to TREM2 protein and mediate a stronger response via receptor clustering. The hTfR receptor also allows a therapeutic to surpass the blood-brain barrier—hTfR normally transports iron in the body. By inserting hTfR, then inversely, testing could show an elevated production of phospho-Syk using techniques like western blots, alphaLISA, and ELISA. Activating Syk matters because it activates the PI3K/AKT pathway that leads to M2 microglia, ultimately to provide data to collaborators and enable the construction of clinical-grade diagnostic assays.

Alaina McLarty

Discipline: Psychology

Authors:

Abstract Name: Law, Lying, and Self-Perception: An Exploratory Study

IntroductionSelf-Discrepancy Theory suggests that when people behave in ways that contradict their ideal self, their emotional well-being suffers, which can lead to feelings of self-disgust and a lower self-image. We expect this to apply to morally questionable behaviors as well, predicting that lying and criminal attitudes will be linked to higher self-disgust and lower self-esteem. We hypothesize that moral violations such as lying and criminal attitudes will correlate positively with self-disgust and negatively with self-worth.**Method**Using a correlational online survey, 115 undergraduate students at Texas Woman's University, including 104 females, seven males, and four declined to answer (M: 18.9, range: 18-34), participated. Measures assessing self-worth, self-disgust, lying, and criminal sentiments were administered to participants.**Results**The Self-Disgust Scale showed significant correlations with Pathological Lying Inventory(PLI) subscales ($r = -0.31$ to 0.45 , $p < 0.001$ to $p = 0.003$) and with Criminal Sentiments Scale Modified (CSS-M) subscales ($r = 0.28$ to 0.32 , all $p = 0.001$ to $p = 0.006$). The Contingencies of Self-Worth (CSW) subscales, others' approval, appearance, academic performance, family support, and virtue correlated with distress (PLI) ($r = 0.19$ to 0.36 , $p < 0.001$ to $p = 0.05$) along with others' approval and excessive lying ($r = 0.25$, $p = 0.012$). CSS-M's ICO correlated with the CSW subscales of family support, academic performance, and virtue ($r = 0.19$ to 0.24 , $p = 0.012$ to 0.049). Additional correlations emerged between police and family support, law and God's love ($r = -0.35$, $p < 0.001$), and TLV and virtue ($r = 0.296$, $p = 0.002$).**Discussion**The results validate the association between moral violations and increased self-disgust and decreased self-worth. Self-disgust showed strong correlations across all subscales, indicating a significant relationship between morally contemptuous behaviors and sentiments and self-disgust. Self-worth showed significant results in areas influenced by external pressures, including family, law, and religion. These findings support the Self-Discrepancy Theory, further indicating that acting against one's ideal self can cause harm to one's emotional well-being.

Reagan McLaughlin

Discipline: Art History

Authors:

#1 Reagan McLaughlin

Abstract Name: Jaguar Symbolism in Aztec and Maya Deities

The jaguar (*Panthera onca*) is a shared symbol across Pre-Columbian cultures of the Americas. Although scholars have examined jaguar symbolism within a single culture, few have approached the concept of jaguar symbolism interculturally. The aim of this study is to explore the meaning of jaguar symbolism in Aztec and Maya deities in the postclassic period. This comparison is based on historical research, religious iconography, and anthropological sources to argue that although the Aztec and Maya both incorporated jaguar elements into their depictions of deities, those elements do not share the same meaning. First, a brief introduction to jaguar as a cross-cultural symbol of the Americas is provided. Following, the examination of the Aztec jaguar demonstrates that the jaguar signified the power and divinity of rulers, through association primarily with the god Tezcatlipoca. Since the Maya associated the jaguar with many deities, this study focuses on God G and how jaguar symbolism uses specific physical features to indicate meaning. Thus, the specific meaning of the Jaguar symbolism did not translate interculturally.

Jamie McLaulin

Discipline: Geography/Geology

Authors:
#1 Elizabeth Wallace
#2 Arielle Nogueira

Abstract Name: Reconstructing 5000 Years of Hurricane Activity in Holyrood Pond Using Sediment Core Analysis

Hurricanes are hazardous and costly events that annually negatively impact people that live in coastal areas in North America. The current observational record of hurricanes is short (1970 - present) and does not offer insight into the effects of climate change on hurricane frequency. One method of improving and extending our observational record of hurricanes is to reconstruct paleohurricanes using sediment cores. These cores record hurricane activity in the form of coarse-grained overwash layers that are deposited when hurricanes move sand from beaches into backbarrier ponds. In this project, we analyzed sediment cores from Atlantic Canada to locate coarse-grained storm layers left behind by ancient hurricanes. Our sediment core was collected from Holyrood Pond on the southern shore of the Canadian province of Newfoundland. We identified storm layers in our core by sieving at one centimeter intervals at 125 microns. Radiocarbon dating suggests that our core from Holyrood Pond extends back 5000 years, with each centimeter representing approximately 29 years of deposition. Clustering of storm layers in time represent periods of increased hurricane activity. Using our new reconstruction and our current knowledge of the climate during the past 5000 years, we can determine trends in hurricane activity relating to climate change in the past to better predict changes in the future.

Leandra McMahon

Discipline: Psychology

Authors:
#1 Michael Roy

Abstract Name: How Family Functioning Influences the Coming Out Process Among LGBTQ+ Young Adults

The purpose of this study was to explore how coming out responses, family dynamics, race, life satisfaction, and resiliency intersect in the coming out process. We aimed to answer three questions: (a) Does one's coming out experience of positive or negative reactions contribute to overall life satisfaction and resiliency? (b) Does coming out influence family dynamics as compared to before and after disclosure? (c) Does race play a part in familial reactions to disclosure? We hypothesized that negative familial reactions would be associated with higher resiliency and lower life satisfaction compared to positive reactions, which would lead to lower resiliency but higher life satisfaction. That highly functioning families would respond more positively to their LGBTQ+ family members' disclosure. Finally, we hypothesized that Black and Hispanic individuals would experience more negative reactions as compared to White individuals. A total of 512 LGBTQ+ individuals aged 18-44 ($M = 22.90$, $SD = 4.48$) completed an online self-report survey that assessed their coming out experience and the impacts it had on the LGBTQ+ individuals. Participants responded to reliable Likert-type scales that analyzed coming out vigilance, positive coming out responses, family support, family adaptability and cohesion, life satisfaction, and resilience. Results indicated that positive familial reactions were associated with greater life satisfaction, but negative reactions were not associated with greater resiliency. Family functioning before disclosure predicted positive reactions, but family functioning itself did not differ before and after disclosure. Race, specifically Black and Hispanic families, did not predict differences in familial reactions to their LGBTQ+ family members' disclosure. These findings emphasize the importance of supportive families and suggest that strengthening family functioning prior to an individuals' disclosure may overall improve one's coming out experience as a whole. Keywords:

LGBTQ+, coming out, disclosure, family reactions, family functioning, life satisfaction, resilience, racial/ethnic differences

Mary McNab

Discipline: Health and Human Development

Authors:

#1 Naima Covassin

#2 Jingen Li

#3 Venkata Akhil Makarla

#4 Virden Somers

Abstract Name: Melatonin use: trends and implications for age-related diseases

Melatonin is a hormone produced by the pineal gland in a rhythmic manner that aligns with the light-dark cycle, with low levels during daytime and high levels at nighttime. While the primary role of melatonin is to facilitate synchronization of the body's rhythms with the 24-hour day-night cycle, it also manifests sleep-inducing properties. As such, melatonin is used by individuals with circadian rhythm disorders or sleep difficulties. In the US, melatonin is available as an over-the-counter supplement, and its use in the general population has increased in recent years. However, little is known about the prescription of melatonin by healthcare providers. The goal of this study is to assess temporal trends in prescription melatonin and potential patterns based on demographic and clinical patient characteristics. We will use the Rochester Epidemiology Project (REP), a population-based medical record linkage system that captures clinical encounters from the residents of Olmsted County, MN. Healthcare records of patients aged 18 years and older who were prescribed melatonin in a hospital or outpatient setting at Olmsted Medical Center or Mayo Clinic Rochester between 2007 and 2023 will be identified. We will abstract data on patients' characteristics, diagnoses, and other medications. Healthcare records will also be accessed to obtain information on the indication for melatonin prescription, to learn about healthcare concerns that prompt providers to recommend melatonin. Data collection is ongoing, and results will be analyzed upon completion. Preliminary data suggest that, although sleep difficulties are the most common indication for prescription melatonin, other medical reasons include headache and depression. Findings from this study will inform on trends in melatonin prescription over the past two decades and associated characteristics.

Summer McOrmond

Discipline: Biology

Authors:

#1 Patricia Aguila

#2 Guyatri Guda

#3 Aditi Kumar

#4 Monique Washington

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#6 Andrew Wiles

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#9 Dana Lapato

#10 Vasily Yakovlev

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#12 Timothy York
#13 Roxann Roberson-Nay

Abstract Name: Patterns of Ovarian and Gonadotropin Hormones in Emerging Adult Oral Contraceptive Users

Oral contraceptives (OCs) are often initiated during adolescence and emerging adulthood, a period of continued maturation of the hypothalamic–pituitary–gonadal (HPG) axis. Because hormonal exposure during this window may shape emotional, biological, and reproductive outcomes, it is important to understand the specific formulations young women take and the hormonal profiles these formulations produce. This study characterizes OC formulation features and measured hormone levels in young adult OC users (n = 30). Ethinyl estradiol (EE) doses ranged from 0.01–0.035 mg (mean = 0.022 mg), with 70% using ≤ 0.02 mg. Pill regimens included 21/7 packs (83%), 24/4 packs (10%), and 84/7 regimens (3%). Progestins included norethindrone (and acetate), levonorgestrel, norgestimate, desogestrel, and drospirenone. Duration of use ranged from 6–72 months (mean = 30.8 months). At both study visits, during the active and inactive pill, plasma estradiol, progesterone, luteinizing hormone (LH), and follicular stimulating hormone (FSH) were measured. Although OCs suppress the HPG axis, little research examines how formulation characteristics influence measured hormone levels in early-life users. Existing studies rarely compare hormone concentrations across modern low-dose versus standard-dose pills, and few evaluate whether duration of use or regimen structure affects estradiol, progesterone, FSH, or LH during active or inactive intervals. We will test three hypotheses: (1) Lower-dose EE formulations (≤ 0.02 mg) will show stronger suppression of estradiol and progesterone, (2) Longer duration of OC use will be associated with lower FSH and LH, and (3) Inactive-week hormone levels will vary systematically by estrogen dose and regimen type, not progestin type. Testing these associations addresses a gap in the early-life contraceptive literature.

Regina McRae

Discipline: Anthropology and Archaeology

Authors:
#1 Regina McRae

Abstract Name: Prehistoric Mortuary Practices

Mortuary practices can be defined as how humans dispose of, and treat their dead. Many of us are familiar with elaborate burial practices such as the entombment of pharaohs, like the pyramids at Giza, and the Necropolises of the Valley of the Kings and Queens; elaborate tombs such as the Mausoleum at Halicarnosses; and the Taj Mahal in India; water burials such as sailors at sea, or funeral pyres on boats that the Vikings practiced; or even the modern Jazz Funerals of New Orleans. It would appear to us that caring for our dead is a modern concept, practiced by humans, Homo Sapiens, as part of our various cultures. However, archeological excavations and scientific analyses show burial practices to have predated modern man, practiced by our ancient ancestors such as Neanderthal and Homo naledi, dating back as far as 250,000 years ago. Decades of work in the field by Dr. Jane Goodall with her chimpanzees proved that they have emotions, and experience grief and loss. Since they are our closest relatives, it can be deduced that ancient hominids also experienced grief and loss, and engaged in mortuary practices. I will discuss some of the major discoveries, their timelines, and the conclusions anthropologists have arrived at, to give us a glimpse into how our early ancestors may have honored their dead.

Madysen McRay

Discipline: Education

Authors:

Abstract Name: Exceptionally Flawed: A Look Towards Addressing Inequities of Identification in Gifted Education

Gifted education has been a part of our education system for over a century, and yet there continue to be ways we can work to improve the system to benefit all students. One way education professionals can achieve this is by implementing identification systems that cater to students of all races, ethnicities, genders, and abilities. This study aims to highlight and suggest solutions that school districts across the nation, as well as the Commonwealth of Virginia, can implement to make the gifted identification process more inclusive to all students. A comprehensive literature review of national and state data regarding current demographics of identified gifted students will include statistics about identification rates and percentages of students in gifted education to provide background information. Interviews will also be conducted to examine specific school districts in Virginia and investigate how they work to make gifted education more accessible to all students. Information about each method learned through these interviews will be highlighted, including data on the demographics of the involved students and the various identification and instructional methods used to engage students in gifted education. With these results, more school systems may be able to identify, evaluate, and implement new strategies for gifted identification and instruction to create a more inclusive gifted education environment. These findings also aim to provide practical recommendations for school systems that may be seeking to improve their gifted education systems. Through sharing these findings, this research will contribute ideas that seek to assist with improving gifted education standards to help all students reach their full potential.

Erica McRay

Discipline: Visual Arts

Authors:

#1 Erica McRay

#2 Ana Galizes

Abstract Name: The Spirit Animal Series

The Spirit Animal Series is a research-based exploration examining the relationship between spirit, instinct, and self. This work investigates the central research question: how do human psychological and emotional states mirror the energies of the animals and insects to which we feel most connected? Drawing on theories of embodiment, symbolic communication, and visual semiotics, the series interprets the human experience through visual representations of strength, rebirth, vulnerability, intuition, and resilience. "Conceptually, the project is influenced by the vibrant textile storytelling of Bisa Butler, the emotive figuration of Damola Ayegbayo, and the color symbolism of early expressionism (Lloyd, 1991)." Together, these frameworks respond to contemporary dialogues around authenticity, self-awareness, and embodiment in a fractured cultural landscape. Methodologically, the series employs acrylic paint on art paper, integrating expressive brushwork, layered pigments, and experimental use of saturation to construct figurative dialogues between human and animal forms. The process begins with improvisational sketches that evolve intuitively, reflecting a methodology grounded in instinctive decision-making and emotional response. Each composition utilizes contrast, form, and chromatic intensity to create a third space of engagement, spotlighting a psychovisual environment in which viewer, subject, and symbolic spirit coexist. Works such as "Sunrise Partners," "The Wild Temptress & Her Serpent," and "In Her Swan's Eyes" employ deliberate tension between unconventional, vibrant hues and subdued backgrounds to handle both visual complexity and contemplative stillness. The findings emerging from this project underscore the value of intuitive process and vulnerability as instruments of meaning-making. The series contributes to ongoing scholarly conversations on artistic self-

reflection, emotional psychology, and the cross-species metaphors that shape visual culture. Future works will deepen this inquiry, exploring color, narrative, and emotional duality across the boundaries of self and spirit.

Dillon McReynolds

Discipline: Biology

Authors:

#1 Baylor Jenkins

#2 Kristian Hargadon

Abstract Name: Investigating the Oncogenic Activity of the FOXC2 Transcription Factor in Melanoma Cells Through Complimentary Genetic Ablation and Pharmacologic Inhibition Approaches

FOXC2, a member of the forkhead box family of transcription factors, is emerging as an important oncogene that has been linked to several hallmarks of cancer progression. Often dysregulated in cancers of epithelial origin, FOXC2 has also recently been found to promote the progression of melanoma, a non-epithelial-derived cancer. Though FOXC2 has been found to drive diverse oncogenic processes that include cell proliferation, metastasis, and drug resistance, the mechanisms by which this transcription factor does so remain poorly understood. To address these issues, we have employed two distinct approaches to study the oncogenic functions of FOXC2 in melanoma. First, using a dual guide RNA-targeting CRISPR-del gene editing strategy, we have engineered a *Foxc2* whole gene deletion variant of the murine B16-F10 melanoma that will serve as a useful tool for comparative studies with its parental FOXC2-expressing wild-type counterpart. To supplement this approach, we have also performed studies with the MC-1-F2 pharmacologic inhibitor of FOXC2, and we report herein a differential gene expression analysis of untreated versus MC-1-F2-treated B16-F10 melanoma cells. Our data provide valuable insights into not only the specific genes regulated by this transcription factor but also the biologic pathways and processes in which FOXC2-regulated genes are involved, suggesting potential mechanisms of FOXC2-mediated melanoma progression that can be further investigated in future studies with our engineered FOX2-deficient cell line.

Isabelle McShane

Discipline: Biology

Authors:

#1 Lindsay Caesar

#2 Laura Tipton

Emma Megginson

Abstract Name: Identification of Fungi Isolated from Grand Caverns using DNA Barcoding

Bats, vital for biodiversity, face declines in North America due to White-Nose Syndrome (WNS), a fungal disease caused by *Pseudogymnoascus destructans*, and subterranean microorganisms show promise for producing antifungal molecules that may be useful in combatting this devastating disease. This study aimed to identify unexplored cave fungi isolated from Grand Caverns in Grottoes, Virginia, which could have potential bioactivity against *P. destructans*. Through DNA barcoding of fungal samples from four cave locations, we identified diverse genera such as *Mortierella*, *Linnemannia*, and *Aspergillus*. While no direct association with *P. destructans* was found, certain genera, like *Mortierella*, may have ecological connections to bat populations. Although the biological activities of these organisms have not yet been explored, members of these genera have been known to produce antifungal molecules, including those active against both human

and plant pathogens. Our findings support the growing evidence that caves host diverse fungal communities, and their utility as antifungal strains warrants further research. Understanding the role of cave fungi in these ecosystems could inform strategies for managing WNS and preserving bat populations.

Madison McWhirter

Discipline: History

Authors:

Abstract Name: The Governmental Facilitation of the Color Line in Atlanta and Chicago During the Early Twentieth Century

Before the creation of the Federal Housing Administration during the New Deal, various levels of government facilitated residential segregation in Atlanta and Chicago, and Jim Crow laws influenced their approaches. This paper explores the multifaceted and complex nature of residential segregation by comparing residential segregation in Atlanta, a southern city, and Chicago, a northern city, in the early twentieth century. Furthermore, it demonstrates the influence of Jim Crow laws in racially segregating Atlanta and Chicago. While Atlanta's Jim Crow laws explicitly required the separation of Black and white Americans in every aspect of public life, Chicago did not impose this separation in the same way, but their laws implicitly developed and functioned in a similar way to Atlanta's official segregation laws did. These cities reflect national trends of residential segregation and their goals to racially segregate their populations without invoking moral upheaval. While residential segregation occurred on a national scale, state and local government policies contributed to the variance in how the governments manufactured it. Many scholars have explored residential segregation through a single-city case study, but a regional-scale comparative analysis provides insight on each level of governments' role in the advancement of residential segregation. This paper uses zoning maps, national homeownership campaigns such as the Own Your Own Home and the Better Homes Movement, and local newspapers to demonstrate federal, state, and local governmental facilitation of residential segregation. Residential segregation's legacy from the early twentieth century continues to shape the present, and each level of government has an obligation to rectify their actions through laws promoting integration. Integration and equity-based advancements must consider Derrick Bell's interest convergence theory, which reveals racial progress only occurs when it also benefits affluent whites. Bell's theory illustrates the importance of convincing affluent whites that residential segregation negatively impacts everyone before implementing policy reforms.

Maddox Mear

Discipline: Economics

Authors:

#1 Wole Peters

Abstract Name: Economic Impact on U.S. Pharmacies

This study examines the influence of key economic indicators on consumer spending in U.S. pharmacies and drugstores, comparing the pre-COVID (2015-2019) and post-COVID (2020-2024) periods. Studies have found that economic uncertainty drives complex changes in pharmacy spending patterns, with research showing an increase in the purchase of preventive medication during high unemployment (Kozman et al., 2012) and strategic consumer adaptations to inflation including bulk buying and greater use of cost-saving tools (Tichy et al., 2023). Using a multivariable linear regression analysis of 56 monthly observations per

period, the study investigated the relationships between retail sales and five economic indicators: price burden, pharmaceutical costs, general inflation, unemployment rates, and interest rates. This research revealed significant shifts in these relationships following the COVID-19 pandemic. Most notably, the interest rate coefficient reverses from negative (-216.097) to positive (1409.527), while the impact of the price burden substantially decreases from -2,734,438 to -244,251. The pre-COVID model demonstrated stronger predictive power ($R^2 = 0.921971$) than the post-COVID period ($R^2 = 0.804724$), suggesting more volatile economic relationships during the pandemic era. The unemployment rate impact weakened considerably, with its t-statistic declining from -4.94 to 1.63. These findings indicate a fundamental transformation of how economic indicators relate to retail sales, highlighting the need for adjusted business strategies and updated economic models in the post-pandemic retail pharmacy sector.

Seth Medina

Discipline: Physics and Astronomy

Authors:

Abstract Name: Measurements of Radiation Damage Effects in DC-coupled Low Gain Avalanche Detectors

The effects of radiation damage on DC-coupled low gain avalanche detectors (LGADs) were studied. Measurements of leakage current, capacitance, and other characteristics, were taken of these detectors after exposure to 400 MeV protons of various fluences. These measurements were then compared to previous measurements of the same detectors before irradiation. These measurements will provide guidance for fast-timing instrumentation at future collider experiments.

ELVIS MEDINA

Discipline: Architecture, Construction Management, and Interior Design

Authors:

Abstract Name: Solving through color blocking.

The visually impaired project examines the design of a single-family home in Logan Square, Chicago, for an adult experiencing cataract-related low vision and his family. The research explores how a typical urban neighborhood, rather than segregated special-needs housing, can support safe, independent living for people with visual impairment. The home is designed for Ned and Sam, a same-sex couple raising two adopted daughters, who need an environment where Ned can navigate confidently while their children grow up in a diverse and supportive community. Logan Square was selected for its strong walkability, creative culture, and inclusive social identity. Chicago's public transit network and Logan Square's direct access to buses, the Blue Line, and bike lanes provide predictable mobility for someone with low vision. Parks like Palmer Square Park, Unity Park, and The 606 offer safe, consistent spatial patterns that help with orientation and create daily outdoor routines for the family. The neighborhood's artsy, culturally vibrant character and established LGBTQ+ presence strengthen social belonging. Case Study Family Integration + LGBTQ+ Inclusivity, drawn from research on visually impaired adults living in mixed-use urban communities, shows that neighborhoods with dense amenities, predictable street grids, and active public spaces significantly improve navigation confidence and reduce social isolation. The findings support the idea that individuals with cataracts benefit most from environments where transit, parks, and services are integrated into everyday circulation rather than separated into specialized districts. These insights directly inform the home's interior design strategies, which emphasize high-contrast wayfinding, layered lighting, clear circulation paths, and family-centered interaction

zones to reduce visual strain and increase safety. Overall, the research concludes that Logan Square's walkability, inclusivity, transit access, and community character combined with evidence from contemporary case studies make it an ideal location for this visually impaired parent and his family to call home.

Eliana Meding

Discipline: Engineering

Authors:

Abstract Name: Are Picture Filters Pulling Their Weight?

Pittsburgh had problems with lead in drinking water – so much so that the city provided ZeroWater filters to the residents. Pittsburgh is not the only city with lead problems; many people use water filters to remove lead and other toxins from their drinking water. The big three water filter companies are Brita, PUR, and Zero. These filters work by using a combination of mechanical filtration (physically trapping the particles), sorption (accumulation of materials on a surface), and molecular sieves (a material that separates and traps materials). The purpose of this experiment is to test these filters' ability to filter lead over the filter's advertised life span and beyond. Deionized water (no detectable lead) was mixed with lead nitrate to create a solution of 10 parts per billion (ppb) of lead; the USEPA action level is 15 ppb. We poured a quantity of lead solution through the filters over the advertised life span volume and beyond. Samples were taken periodically. The samples were tested for lead using an atomic absorption spectrometer, a device that measures concentration of elements by measuring the amount of light absorbed. We have evidence that so far the filters have removed most of the lead; however, some removal has been inconsistent. The research is ongoing, samples from the first 5 liters have been tested and all came back below the detection limit for lead. This was an expected result because the filters are still new. Samples will be collected every 10 liters and tested for lead with an end goal of pouring the advertised amount of water and beyond.

HANNAH MEDLEY

Discipline: Chemistry

Authors:

#1 HANNAH MEDLEY

#2 Sarah Farahani

#3 Jeffery Bell

Abstract Name: Potentiometric Analysis of Biofluids via Fully 3D Printed Sensors

Research in the field of point-of-care (POC) sensing aims to address global healthcare concerns while aiming for affordable and highly functioning alternatives to commercially available devices. POC sensors reduce patient stress from unnecessary practices, provide constant monitoring, and prompt reliable identification of different illnesses. Ion-selective electrodes (ISEs) offer a robust ability of adaptability, reliable and fast analysis with high sensitivity and selectivity for various analytes. Conventional methods for ISEs fabrication rely on polyvinyl chloride (PVC) which poses a challenge with respect to mass production. Additive manufacturing, such as 3D Printing, offers a refined approach for ISE fabrication due to precision, rapid fabrication, customization, and cost-effectiveness. Using a Fused Deposition Modelling (FDM) 3D printer, a customized solid-contact transducer can be fabricated which can then be paired with an ion-selective membrane, printed using stereolithographic (SLA) 3D printer, resulting in a fully 3D-printed solid-contact ISE. Using this approach, potentiometric sensors for diverse electrolytes have been fabricated and

characterized by various approaches, including potentiometric calibration, selectivity analysis, long-term stability tests, water layer tests, and shelf-life.

Aditi Mehta

Discipline: Nursing and Public Health

Authors:

#1 Aditi Mehta

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#3 Jamie Holdsambeck

#4 Lindsey Hitchcock

#5 Emily Johnston

Abstract Name: What Families Wish They Had Known: Research on Immediate End-of-Life Care Needs in Cancer Patients

Objective: We aimed to explore families' of children dying of cancer and advanced heart disease's immediate end-of-life needs. **Methods:** A secondary qualitative analysis was conducted of 110 interviews (n = 55 Oncology; n = 55 Advanced Heart Disease) with bereaved parents whose children died of cancer or cardiovascular disease in Alabama (n = 57), Massachusetts (n = 24), and California (n = 29). The cohort was racially diverse (45 White [41%], 43 Black [39%], and 15 Hispanic [14%]); the interviews were initially conducted between 2017-2024 to evaluate families' perspectives on quality of end-of-life care; they were recorded and transcribed. In this analysis, quotes related to immediate end-of-life needs were identified inductively by AM with regular review for face validity by LH. Then AM inductively developed an initial codebook that was iteratively refined by the whole research team. **Results:** Immediate End-of-Life needs fall into five domains: **Last Minute Medical Decisions:** At end-of-life parents regularly had to make final decisions regarding resuscitation, withdrawal of treatment, and hospice transition. This was challenging due to limited guidance, and inconsistent communication. **Critical Importance of the Environment:** Families valued private, quiet spaces, familiar staff, and opportunities for physical contact. **Psychosocial and Financial Resources:** Access to counseling, sibling engagement, and memory-making activities were inconsistent and gaps in these services limited adequate emotional support. **Logistical and Financial Burdens:** Families experienced logistical challenges such as travel, coordinating childcare, and navigating hospital processes, along with financial strain from missed work and out-of-pocket expenses, all of which intensified stress during their child's final days. **Clear and Compassionate Communication:** Across domains, clear and compassionate communication from healthcare providers was most influential as transparency and empathy eased decision-making, while inconsistency deepened distress. **Conclusion:** This study identified critical end-of-life needs of families whose child was dying of cancer and AHD, which can inform end-of-life education and supportive services

Anna Meilahn

Discipline: Biochemistry

Authors:

#1 Kelly Gorres

Abstract Name: The Role of xCT Protein Expression in Epstein-Barr Virus Infected Cells

The Epstein-Barr virus (EBV) is one of the most common viruses in the world, estimated to have infected

over 95% of the world's population. EBV is the causative agent of infectious mononucleosis, or “mono,” and is associated with several cancer types, including nasopharyngeal, gastric, and Burkitt lymphoma. As a member of the herpesvirus family, EBV persists in the body for a lifetime, evading immune system detection by entering an inactive, latent state after infection. EBV can reactivate and exit this inactive state in response to various stimuli, including stress and chemical exposure. During EBV reactivation, EBV spreads to other cells. The mechanism behind EBV reactivation is not completely understood. Understanding how EBV inhibitors and activators impact host and viral genes and proteins has important pharmaceutical and clinical implications. When EBV-infected cells were treated with EBV inhibitors, the gene that encodes the xCT protein, SLC7A11, was upregulated. xCT is a membrane transport protein of the dimeric amino acid cystine. Cystine feeds into downstream reactions that promote cell survival through antioxidation and preventing programmed cell death. To investigate the potential role of xCT in EBV inhibition, EBV-infected Burkitt lymphoma cells were treated with EBV inhibitors and harvested at various time points to establish a timeline for xCT expression relative to EBV activation. xCT protein expression and EBV activation were measured using Western blotting. xCT was upregulated by two EBV inhibitors, indicating a plausible role for xCT in restricting EBV reactivation. Future research establishing the importance of xCT to EBV inhibition, as well as the mechanism behind xCT-mediated EBV inhibition, is needed. Understanding how host and viral proteins and genes interact is critical for developing effective therapeutic interventions for EBV and related cancers.

Katriana Meiman

Discipline: Biology

Authors:

#1 Katriana Meiman

#2 Laura Sipe

Abstract Name: Mast cell contributions to connective tissue weakness

Hypermobile Ehlers-Danlos syndrome (hEDS) and Hypermobility Spectrum Disorder (HSD) are disorders of connective tissue laxity characterized by instability of bodily structures. Their underlying mechanisms remain poorly understood, but emerging evidence implicates protease-mediated collagen dysregulation as a likely pathological driver. Mast cells—reported to be hyperactive in approximately one-third of hEDS/HSD patients—release and activate proteases that may contribute to this weakening. To evaluate this possibility, we have optimized fabrication of fibroblast–collagen constructs that we will co-culture with activated mast cells in the presence or absence of protease inhibition. We will assess matrix organization using anisotropy values obtained from collagen visualization with Sirius Red and quantification using ImageJ. We expect that mast cell presence will reduce collagen fiber alignment only in cultures without protease inhibition. Our goal is to investigate whether mast cell-derived protease activity contributes to connective tissue weakness in hEDS and HSD.

Pierce Meinert

Discipline: Biology

Authors:

#1 Michelle Gibbs

#2 Liam Brown

Abstract Name: Phenotypic and Molecular Characterization of Metal Resistance in Soil Microbes

The soil microbiome is a diverse and vital community of organisms that aid in necessary processes like nutrient cycling, digesting organic molecules, and improving soil fertility. Many commercial fertilizers include metal micronutrients (Cu^{2+} , Zn^{2+} , Mn^{2+} , and Fe^{2+}) to support plant growth, but the effect of these metals on soil-dwelling bacteria is understudied. In this study, we characterized metal tolerance in bacteria isolated from agricultural soils and investigated molecular mechanisms of metal resistance. We cultivated 132 bacterial isolates from agricultural plots receiving different fertilizer treatments (macronutrients only, macro- and micronutrients, and no amendments) to characterize their metal tolerance. Using 16S rRNA sequencing and phylogenetic analyses, we identified 47 unique species from 17 different genera. We then characterized cellular responses to excess levels of Zn^{2+} in twenty isolates. We found a range of phenotypes depending on the organism, identifying metal resistance in *Chryseobacterium* sp. and *Stenotrophomonas maltophilia*, which exhibited cell proliferation with the highest zinc concentration tested. Some organisms were sensitive to all concentrations tested (e.g. *Prestia megaterium* and *Bacillus amyloliquefaciens*) while others exhibited a concentration-dependent phenotype (e.g. *Bacillus albus* and *Pseudomonas granadensis*). Because metal ions are essential for the structural stability and catalytic function of ribosomes, we investigated the impact of excess metals on ribosome assembly and function. We hypothesized that metal-resistance organisms have evolved adaptations that reduce metal binding to the ribosome. We used sucrose gradient density ultracentrifugation to assess relative levels of ribosomal complexes. Supporting our hypothesis, we found little to no effect on the abundance of actively translating ribosomes in the metal-resistant organisms. This research demonstrates how commercial fertilizers affect the soil microbiome, reveals a range of metal tolerant microbes, and explores mechanisms that enable ribosomes to adapt to metal stress. These findings are critical for developing sustainable agricultural practices and understanding microbial resilience in contaminated environments.

Brandon Meis

Discipline: Environmental Science and Sustainability

Authors:

#1 Hua Chen

Abstract Name: Microplastics in Croplands: Input, Key Effects on Yields and Carbon Dynamics, and Implications for Human Health

Microplastics (MPs) are plastic particles ranging from 1 nm to 5 mm according to the US EPA, with Polyethylene (PE) and Polypropylene (PP) accounting for over 51% of global plastic production. Global plastic production has already reached 367 million tons by 2020. With the increasing plastic use, MPs have become a significant environmental and health concern. A structured literature review analyzing 40 research articles was performed over 2 semesters. This involved annotation and evaluation of peer-reviewed studies, with articles selected for their relevance to cropland soil contamination, plant interaction, and human exposure risks. By integrating both agricultural research and human health studies, this review bridges microplastic contamination in croplands with the effects of human exposure. The objective was to examine MP sources in croplands, their effects on yield and nutrition, soil integrity, and risks to human health. MPs cause mechanical damage to plant roots, alter soil properties, and disrupt microbial communities. Studies have shown PP reducing soybean growth by 12% and decreasing nitrogen fixation by 17.1-27.5%, impacting soil microbial interaction. Additionally, studies with various soil samples have indicated an increase of 54.3% CO_2 and 9.7% CH_4 emissions. Studies have also found contamination of 50-300,000 MP particles/g in fruit and 20-70,000 MP particles/g in vegetables, raising concerns about human consumption. The human health risks include oxidative stress, immune dysfunction, reproductive toxicity, and potential carcinogenicity. Recent studies have found MPs in human blood, breast milk, placenta, and various tissues. Overall, MPs continue to be a growing concern. MPs contaminate soils, infiltrate plant tissues, impact ecosystem functions, and create risks to humans through consumption of contaminated foods. Therefore, understanding MPs interaction with our crops and human health is crucial to evaluating the overall impact of their presence, and developing strategies for reducing future risk.

Spandana Mekala

Discipline: Psychology

Authors:

#1 Shruti Patel

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Abstract Name: Studying with Music: A Behavioral Analysis of Music on Individual Attentiveness During a Stressful Task

Background music is widely used by students during academic work, yet research remains mixed on whether certain genres improve or impair cognitive performance and attention. Prior literature highlights that music engages neural pathways involving the auditory cortex, frontal lobe, and amygdala, influencing emotional arousal and attentional control. With this study, we wanted to explore how classical music, popular music, and silence influence calculation fluency and attentiveness in college students. This project utilizes a within-subjects experimental design in which each participant completes three math problem sets under all auditory conditions. All participants will experience each condition in randomized order to minimize sequencing effects. Performance will be measured by the number of items completed accurately within a two-minute interval. Post-task surveys will assess demographics, attentional traits, and self-reported concentration levels. We predicted that classical music would result in the highest task accuracy due to its consistent tempo and calming properties, while popular music, with lyrics and dynamic variation, may divide attentional resources and reduce performance. However, preliminary findings suggest the opposite trend, with participants performing best under popular music conditions. These early results indicate that familiarity and cultural exposure may moderate the cognitive effects of music more strongly than previously expected. This research may inform evidence-based study recommendations and provide insight into attention-enhancing strategies for students, particularly those with attentional challenges. As music is an accessible, low-cost tool, identifying optimal auditory environments could support academic focus, improve learning outcomes, and guide future interventions within educational settings.

TianYu Melzer

Discipline: Political Science

Authors:

#1 Roy Castellanos

Abstract Name: China's Information Operations in the Indo-Pacific: Understanding PRC Influence and U.S. Strategic Gaps

Chinese information operations (IO) have become a critical instrument of statecraft in the Indo-Pacific region, allowing the People's Republic of China (PRC) to influence political environments, shape public narratives, and coerce regional actors without crossing the threshold into armed conflict. This project examines how Chinese IO targeting third-party nations unveil the coercive strategy of Beijing's model of influence and evaluates how U.S. Indo-Pacific Command (INDOPACOM) can better compete in this domain. Drawing on existing literature of the PRC's "Three Warfares" doctrine: public opinion, psychological, and legal warfare, this research analyzes how China leverages state media, social-media manipulation, and AI-enabled disinformation to advance its political goals. Using case studies of Taiwan and Thailand, the project evaluates how these tools operate in distinct political contexts. The experiences of these countries illustrate

how China employs both rapid, high-intensity disinformation targeting elections and slower, long-term influence through soft power, social influence and cultural networks. This research assesses structural limitations within the U.S. response, including fragmented communication practices, slow interagency coordination, and gaps in INDOPACOM's capacity to detect and counter emerging IO threats. To address these gaps, the study proposes three measures: integrating IO with Public Affairs structures, training Public Affairs and Intelligence officers to operate with an information-domain mindset and leveraging private sector and AI capabilities for rapid analysis and counter-messaging. Strengthening these areas enhances U.S. and allied resilience and improves their ability to compete decisively in the information domain.

Jibel Mendez

Discipline: Environmental Science and Sustainability

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#2 Brian Laub

Abstract Name: Assessing Nutrient Export from Bioretention Basin Soils under Different Treatments

Bioretention basins are designed to improve stormwater quality, but their effectiveness can be compromised if soils release nutrients such as nitrate and phosphorus back into standing water. Understanding how vegetation and organic amendments influence nutrient leaching is important for improving basin performance. This study tests whether soils collected from a bioretention basin release nutrients during a 72 hour saturation period and whether mulch, organic material, or vegetation alter the amount of nitrate and phosphorus leached. Soil from an established bioretention basin was homogenized and placed into 16 oz mesocosms fitted with a side port tubing for leachate collection. Seven treatments were established: bare soil, soil with mulch, soil with organic material, soil with a native plant called frog fruit (*Phyla nodiflora*), soil with a non-native plant called rescue grass (*Bromus catharticus*), and soils containing either plant species combined with organic material. Simulated stormwater was added to each mesocosm and allowed to stand for 72 hours. Afterward, the leachate, along with input water and water only controls, was filtered and analyzed for nitrate and phosphorus. We expect bioretention basin soils to increase nitrate and phosphorus concentrations during the 72-hour saturation period, with bare soil and organic material treatments likely showing the highest nutrient levels. We also expect that mesocosms containing vegetation, especially the native plant species treatment, will reduce nutrient leaching compared to non-vegetated treatments. In contrast, rescue grass may show weaker nutrient retention due to its rapid growth and shallower root structure. Once simulated storm pulses are repeated, we anticipate nutrient release to decline over time as soil nutrient pools stabilize. These patterns will help identify which soil amendments or plant types most effectively limit nutrient output from bioretention basins.

Majoie Desire Mendouga Ngandi

Discipline: Environmental Science and Sustainability

Authors:

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#4 Alex Manda

Abstract Name: Interactive Air Quality Dashboard for North Carolina: A Data-Driven Tool for Environmental

Monitoring and Community Decision-Making

Understanding local air quality is essential for public health, yet many regions lack accessible tools that help communities interpret pollutant trends in a meaningful way. This project addresses the central research question: How can volatile organic compound (VOC) data be transformed into an interactive, user-friendly platform that supports environmental awareness and evidence-based decision-making across North Carolina? Although several environmental monitoring systems exist, most are either too technical for general audiences or lack county-level interactivity. This work aims to contribute a more intuitive and community-focused solution. The dashboard compiles publicly available VOC measurements from the Environmental Protection Agency (EPA) monitoring stations across all North Carolina counties. Data is cleaned, aggregated, and processed using Python, with visualizations built in Dash. The methodological approach includes time-series analysis to detect seasonal patterns, comparative visualization across counties, and threshold detection to highlight potential health risks. A search-based location selector allows users to instantly explore conditions for any county, while interactive charts and tooltips present pollutant patterns in an accessible format. An information button provides compound descriptions to help non-experts understand the significance of each measurement. Preliminary results show clear seasonal variations in VOC levels and noticeable differences across counties, emphasizing the need for localized environmental monitoring tools. The dashboard is expected to enhance public understanding by translating complex environmental data into digestible insights. It also lays the foundation for expanding the platform to include predictive modeling, additional pollutant types, and nationwide visualization capabilities.

Danela Mendoza

Discipline: Social Work and Human Services

Authors:

#1 Lesli Rodriguez

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Abstract Name: Balancing It All: A Survey for Parents

Parents often focus on their child's wellbeing instead of considering themselves as well (Bogdan, 2025). The parents might only be focused on the tasks that need to be completed with the child and completing household tasks (Bogdan, 2025). Lack of self-care is a problem due to even if the child's needs are met, the parents still need to care for themselves (Mollborn, 2011 p.33). Parental burnout is a national problem because parents are not taking care of themselves, only the children (Beresin, 2024). Roughly 63 million parents living in the United States reported being stressed (Beresin, 2024). The research focuses on how parents practice self-care and how it's perceived affects their child(ren). The student researchers reviewed 10 peer reviewed articles relating to how different types of self care impact parents. The student researchers identified Lazarus's Stress and Coping Theories and Bowlby's Attachment Theory to help guide the foundation of their research to help strengthen the study. A parent's mental and physical health matters too. Social workers can educate parents on how to set healthy boundaries and cope with stress. In the study being conducted the student researchers collect data on parental burnout and ask them how parents practice self-care. The student researchers explain why self-care is important. The student researchers create a solution that helps parents improve their wellbeing. The student researchers employ a mix of purposive sampling which will target parents who attend choices clinic and convenience sampling which will target participants we can easily reach. This approach informs the study by identifying common practices, parents engagement in self-care, and highlights areas where additional support may be needed. The results provide valuable data to describe current behaviors and guide recommendations for promoting self-care among parents.

Jasmine Mendoza

Discipline: Psychology

Authors:

#1 Jasmine Mendoza

#2 Yi-Ching Lee

Abstract Name: An Analysis on the Effect of Information Volume on Driver Comprehension of Tunnel Clearance-Related Message Signs

Tunnel clearance-related message signs are a type of traffic control device used to inform drivers of the maximum height a vehicle cannot surpass to pass through a tunnel. Such information is essential for maintaining efficient traffic flow, but there have been many cases of over height vehicles striking tunnels despite warnings. This phenomenon could potentially be attributed to a lack of comprehension of tunnel clearance-related message signs. Previous studies on traffic sign comprehension have found that many drivers are unable to recognize various road signs. Additionally, increased perceptual load has been shown to have detrimental effects on drivers' behavior, such as reducing speed and increasing lane shifting. There are a number of factors influencing drivers' perception and comprehension of road signs, such as color, size, and information volume. These are factors that have all been examined with the use of changeable message signs (CMS), a traffic control device used to provide drivers with information about road conditions or public safety announcements. Studies on drivers' comprehension of CMS have largely found a significant effect of information volume, with increased volume being associated with reduced comprehension. Although many studies have been conducted on traffic sign information volume (TSIV) and CMS, few studies have focused on tunnel clearance-related message signs. The present study aims to determine the optimal information volume on tunnel-clearance related message signs using redesigns of traditional signs which will be presented as CMS. In this two-part study, participants will first be surveyed on their comprehension of traditional tunnel clearance-related message signs compared to the redesigns. Following the survey, the redesigned signs with the highest comprehension scores will be superimposed onto footage of a video-game based driving simulation, which participants will interact with and answer questions about to further assess comprehension and perceived compliance with CMS.

Susanna Menendez

Discipline: Sociology

Authors:

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Selena Davila

Lesley Segundo Flores

Abstract Name: Bridging the Gap: Improving Latina Involvement in Medical Research

Latinas are severely underrepresented in medical research, yet they remain one of the fastest-growing populations in the U.S. The lack of participation leads to a limited understanding of health disparities and makes it difficult to develop adequate medical treatments for this minority population. Increasing Latina participation is valuable to improve inclusivity in scientific findings. The purpose of this study was to examine the perceptions and attitudes of foreign- and US-born Latinas about participating in medical research and providing biological samples. Women were recruited through snowball sampling and with the help of two partner organizations. Twenty-five women who live in Virginia participated in this study – 10 participated in 2 focus groups and the rest in one-on-one interviews over Zoom. Questions included what they thought medical and genetic research entailed, their willingness to donate different biological samples, questions or concerns that they might have, and ideas they could share on how to successfully recruit Latinas into genetic studies. Interviews were audio-recorded, transcribed in their original language, and coded using Dedoose

qualitative analysis software. Data analysis is ongoing, but our preliminary findings shed light on three themes which will make the basis of this presentation. First, the participants described their lack of information regarding opportunities in medical research, the process and what it entails, and the benefits of participation. Second, aspects of mistrust in both the healthcare system and confidentiality of information were critical concerns expanded in the interviews. Third, despite the concerns expressed, our participants also expressed interest in improving Latino health outcomes through their participation, which highlights the role of altruism in their decision to potentially take part in research studies. Based on the insights gathered from these interviews, we will provide recommendations to recruit Latinas and improve their rates of participation in medical research.

Diya Menon

Discipline: Computer Science

Authors:

#1 Diya Menon

#2 Lamont Cannon

Abstract Name: Gene Expression Differences in HIV Infection: A Computational Analysis

HIV is a destructive retrovirus that can lay dormant within cells, before eventually leading to AIDS in infected individuals. Though effective prevention of HIV is available commercially, effective cure of ongoing infection is absent. The gene expression pathways affected by HIV infection are not yet well understood and could provide insight into improved treatment avenues, therefore this project sought to identify the specific cellular processes affected by infection of the HIV virus. Differing gene expression levels as compared to standard controls were analyzed in multiple cell types experimentally infected with a modified HIV-1 type B strain. RNA was collected and shotgun sequenced to generate reads. These reads were pieced together computationally through mapping to the human exome. Using R software available on the VCU HPRC, the featureCounts program was run to quantify the raw amount of RNA mapped to each gene. This count data was then analyzed with DESeq2 to determine the most differentially expressed genes between HIV infected cells and uninfected controls. A text summary of the data was uploaded to g:Profiler to perform a functional enrichment analysis. Data for the most common locations, structural changes, and biological processes affected were collected and analyzed. Preliminary results showed that pathways, such as the lymphocyte proliferation pathway, were significantly enriched in the HIV infected sample, demonstrating that HIV is able to directly influence host cell behavior. Further results may provide insight into alternative gene expression pathways affected by HIV and pave the way for more effective cure of the infection.

Diya Menon

Discipline: Nursing and Public Health

Authors:

#1 Diya Menon

Abstract Name: Increasing Birth Weight and Gestational Age Data for Undocumented Mexican Immigrant Births: Understanding How to Improve Healthcare Access for Undocumented Mexican Immigrants in South Texas

The population of undocumented immigrants from Mexico has been steadily growing in Texas. Accompanying this growth is a health crisis, whereby undocumented Mexican immigrants, who already have

limited access to health coverage, experience poorer health outcomes. This is especially noted in the vulnerable pregnant population, who experience neonatal low birth weights and shorter gestational periods as compared to non-immigrants. Adequate prenatal care may serve to address these neonatal insufficiencies and FQHCs may be a recourse for undocumented immigrants who are otherwise excluded from traditional Texan hospitals and clinics. Therefore, the purpose of this comprehensive literature review was to examine how prenatal care deliverance, and corresponding birth outcomes, could be improved for undocumented immigrants. Current methods of prenatal care were found to result in modest improvements in birth weight and increase in gestational ages; however, these increases were poor when applied to Mexican undocumented immigrant populations. Concurrently, it was found that anti-immigrant rhetoric and resulting fears of deportation may result in high levels of stress amongst the Mexican undocumented population. High stress from publicized nativist sociopolitical rhetoric was found to potentially lead to reductions in health seeking behaviors for Mexican undocumented immigrants, as well as reduce general physical health. A potential recourse for the negative effects of stress were explored in the formation of community bonds and conscious promotion of stress relief measures. Current tactics for health service towards Mexican undocumented immigrants was then examined and recommendations for increased social support groups and group prenatal sessions in FQHCs to increase post-birth neonatal health outcomes, were then provided.

Felix Mensah

Discipline: Computer Science

Authors:

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Abstract Name: Revisit SHAP-based Explainable AI Framework for Multi-Class DDoS Attack Detection

Distributed Denial-of-Service (DDoS) is one of the major threats to computer networks. It can cause system users to temporarily lose access, or even for a prolonged period. Previous studies primarily focused on applied Machine Learning (ML) models such as Random Forest and K-Nearest Neighbors to address it. The focus of this research is to create an explainable AI system for detecting different forms of DDoS attacks, such as UDP Flood, SYN Flood, HTTP Flood, and so on, using advanced machine learning models and SHapley Additive exPlanations (SHAP) for interpretability. We aim to improve detection accuracy while providing transparency in model decisions. At first, the system was trained on the CSE-CIC-IDS2018 dataset (i.e., 500,000 network flows, 400,000 DDoS, and 100,000 benign) for binary classification, and XGBoost, LightGBM, and Neural Network models achieved accuracy and precision very close to 1. Even though these results were outstanding, binary detection does not show the complex nature of real-world attacks, which will often involve multiple DDoS variants. Later, we utilized multiclass detection using the ACI-IoT-2023 dataset (i.e., over 1,000,000 network flows). The methodology involved preprocessing network flows, feature engineering, and training SHAP-based models for multiclass classification. SHAP values were computed to provide feature-level explanations, enabling transparency, and aiding us in understanding model decisions, where consistently high importance of features are 'Fwd Pkt Len Mean', 'Init Fwd Win Byts', and 'Init Bwd Win Byts'. XGBoost achieved a model accuracy of 99.85%, with precision and F1 scores being 1 across nearly all attack classes, and LightGBM achieved an accuracy of 99.95% and precision and F1 scores being the same as the XGBoost model. Future work will focus on deploying the system in a cloud environment for real-time monitoring and scalability, reinforcing its practical relevance in securing IoT networks.

Selasie Mensah

Discipline: Business

Authors:

Abstract Name: Sustainability Orientation of Firms in Ghana and its Impact on Financial Performance

This study investigates the central research question: How does sustainability orientation, across environmental, social, and governance dimensions, affect the financial performance of firms listed on the Ghana Stock Exchange, and what role does regulatory compliance play in this relationship? Although sustainability has become integral to corporate strategy worldwide, scholarship on its financial implications in emerging markets remains limited, with existing findings often inconsistent due to uneven regulation, resource constraints, and varied interpretations of ESG practices. This project addresses these gaps by examining the Ghanaian context, where sustainability adoption is increasing but its strategic value is still debated. Guided by Institutional Theory, the study employs a quantitative research methodology using secondary data drawn from corporate annual reports, assessing firms' ESG orientations based on Global Reporting Initiative indicators alongside documented measures of financial performance. Partial Least Squares Structural Equation Modeling is applied to assess the relationships between sustainability orientation components, regulatory compliance, and financial performance. The analysis shows that environmental, social, and governance orientations each have a positive and significant effect on firm financial performance, with governance orientation emerging as the strongest predictor. Regulatory compliance is found to strengthen the relationship between environmental orientation and financial performance, while exerting minimal moderating influence on the social and governance dimensions. These results are discussed in relation to debates on ESG value creation in emerging markets and the role of institutional pressures in shaping corporate sustainability outcomes.

Anirudh Mepperla

Discipline: Health and Human Development

Authors:

- #1 Jeremy Via
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Abstract Name: THE INFLUENCE OF SOCIAL ISOLATION ON BLOOD PRESSURE IN YOUNG SEXUAL AND GENDER MINORITY ADULTS

BACKGROUND: Sexual and gender minority (SGM) adults experience more cardiovascular risk factors compared to their heterosexual cisgender counterparts. Social and cultural oppression exerts a weathering effect that contributes to cardiovascular health disparities. Evidence suggests that proximal minority stress is associated with the development of hypertension in SGM adults. However, limited information exists regarding proximal minority stress and blood pressure such as nocturnal dipping and morning surge in normotensive SGM adults. **METHODS:** SGM adults aged 19-30 (n=14, 79% female) participated in this 24-hour ambulatory blood pressure (ABP) monitoring study. Measurements were taken every 20 minutes during waking hours and 30 minutes during sleep. Nocturnal dipping was calculated as the ratio of average sleep to wake systolic and diastolic pressure. Morning surge was reported as the sleep trough, pre-awakening, and surge for systolic and diastolic pressure. Participants completed the Daily Heterosexist Experiences Questionnaire (DHEQ) to assess minority stress subscales including isolation, vigilance, and vicarious trauma. A median split used to group participants in low versus high minority stress. An independent t-test

was used to assess differences between low and high proximal minority stress. RESULTS: Isolation was the only proximal minority stress demonstrating significant differences in ABP measurements. Systolic morning sleep trough (11.86 ± 9.15 vs. 23.05 ± 9.93 mmHg, $p=0.049$) and pre-awakening systolic surge (7.14 ± 9.17 vs. 21.43 ± 10.03 mmHg, $p = 0.017$) were significantly higher in the high isolation group. This was observed in the absence of differences averaged systolic and diastolic blood pressure during waking and sleeping times. CONCLUSIONS: These data indicate that young SGM adults who report higher social isolation have a more pronounced morning surge, an indicator of cardiovascular risk often observed in hypertensive individuals. Future studies are needed to investigate strategies to improve blood pressure regulation through positive health behaviors, such as exercise.

Solomon Meraz

Discipline: Biology

Authors:

#1 Honey Peters

#2 Dana Lee

Abstract Name: Flying Under the Radar: A Study of Adenovirus Prevalence and Genetic Variation in Oklahoma's Bat Populations

Bats carry more zoonotic viruses per species than any other mammal, making it necessary to identify the viruses' bats are carrying to track or prevent the spread of potentially harmful diseases. Mastadenovirus, a relatively stable adenovirus genus exclusive to mammals, is commonly found in many species of bats, making our goals of this study to estimate the frequency bats in Oklahoma carry adenovirus and compare their viral genetics to published viruses. Intestinal tissue was collected from 44 *Eptesicus fuscus*, 23 *Lasiurus borealis*, and 14 *Nycticeius humeralis* bats submitted for rabies testing in Oklahoma between 2023 and 2024. Of the 81 tested samples, a portion of the Adenoviridae DNA polymerase gene was successfully amplified in 14 *E. fuscus*, 5 *L. borealis*, and 3 *N. humeralis* samples respectively (27.1% positive). These samples were sequenced and compared to documented adenovirus sequences found on GenBank, followed by a phylogenetic analysis to study evolutionary relationships among our experimental samples. Analysis confirmed our samples create 3 distinct groups belonging to the Mastadenovirus genus: Group A containing 13 samples with identical amino acid sequences, most closely related to canine adenovirus found in *Eptesicus serotinus* (8% difference); Group B containing 8 samples with varying nucleotide sequences coding for identical amino sequences, most closely related to adenovirus found in *Nyctalus noctule* (11.4% difference); and Group C containing 1 unique sample, most closely related to adenovirus found in *Myotis ricketti* and an unclassified virus found in *Myotis yumanensis* (both 19.3% difference). The International Committee on Taxonomy of Viruses requires a 10-15% difference in amino acid sequence to designate a Mastadenovirus species, criteria that both groups B and C fit, warranting further investigation. This study is relevant to better understand how viruses are evolving, and its application can help identify how viruses become zoonotic and prevent further outbreaks across the nation.

Renee Mercer

Discipline: Biology

Authors:

Abstract Name: Application of the MiSeq FGx™ Next-Generation Sequencing System for the Deconvolution of DNA Mixtures in Simulated Sexual Assault Kits

Victims of sexual assault or rape may choose to have a sexual assault kit (SAK) collected to preserve any forensic evidence that remains on their person. Often, samples that are collected in these kits contain uneven mixtures of male and female DNA, with the female DNA being present in much higher quantities. These mixtures can complicate profile generation, especially if the male and female contributors have shared alleles in their profiles. Massively Parallel Sequencing (MPS) presents a potential alternative to DNA mixture testing, compared to the traditional Capillary Electrophoresis (CE) method. This research aims to utilize MPS to generate more robust DNA profiles that can be used for the identification of the male participant in contrived SAK samples. Continuing to explore and understand the use of MPS in relation to DNA mixtures could lead to a faster and more accurate method of mixture deconvolution and identification of the perpetrator's profile in relation to SAK testing. This could ultimately help to decrease the SAK backlog and give more victims justice. Various sample types will be collected to create two different contrived mixture types: known mixtures and casework-like mixtures. The known mixtures will be made with male and female buccal swabs that will be extracted and quantified before being combined in different ratios. The casework-like mixtures will be made by adding seminal fluid to vaginal swabs in varying dilutions. Each mixture type will undergo extraction, quantification, amplification, detection, and interpretation for both CE and MPS using appropriate kits and instruments. Data from both DNA methods will be compared. It is expected that MPS will produce data that is easier to interpret and more comprehensive than CE across all sample types.

Meredith Meredith

IN - Franklin College

Discipline:

Authors:

#1 Meredith Clark-Wiltz

#2 Katie Streit

Katie Streit

Abstract Name: Past Skills, Future Paths: Integrating Research and Professional Development for History Majors

Undergraduate research courses provide avenues for the intentional cultivation of professionalism, mentorship, and community. The Franklin College History Department has revised its core research sequence of classes to include more robust integration of professional development that emphasizes connections between academic competencies and professional growth. We piloted a selective linking of the sophomore public history course and the senior research seminar this fall. Sessions on creating personal brands, online professional engagement, resume and cover letter writing, alumni networking, and vocational exploration all produced greater connectivity among our majors. While providing important models of professionalism for sophomores, seniors also inspired sophomores to envision themselves as scholars and researchers.

Simultaneously, sophomores challenged the seniors to reflect on and articulate their learning and experiences over the past four years, helping seniors connect their scholarship to their professional identity. Outcomes for this model included augmenting the professional development of seniors about to enter the workforce and sophomores seeking opportunities for internships and undergraduate research. Additionally, viewing the contrast between professional development in the sophomore and senior classes allows faculty to map student growth, assess teaching effectiveness, and provide individualized coaching to students. In this presentation, we will share the learning outcomes, successes and failures from this initial pilot, and plans for improvement in future iterations. This session will hopefully provide inspiration for mentors of undergraduate research who share our commitment to fostering a community of student-scholars who see their research as integral to their professional growth.

Mia Meredith

Discipline: Psychology

Authors:

#1 Alan Franklin

#2 Mya Porche'

#3 Belle Woodward

Ameris Parks

Brianna Dominey

Abstract Name: PromptPilot: Ethical and Socratic Prompt Design for Human-AI Dialogue

Large-language-model (LLM) chatbots such as ChatGPT are reshaping education and everyday communication, but poorly framed prompts can unintentionally reinforce bias, escalate conflict, or generate emotionally unsafe content. The PromptPilot project explores how undergraduates can learn to design prompts that model empathy, clarity, and critical reasoning in human–AI dialogue. Drawing from frameworks in moral psychology and computer ethics—specifically Paul and Elder’s (2006) model of Socratic questioning, the APA Ethics Code (2017), and Schraw and Dennison’s (1994) theory of metacognitive awareness—this classroom-based pilot trained students to apply ethical and Socratic design principles when revising flawed AI prompts. This study builds on Costello et al. (2024), who demonstrated that GPT-4 can reduce conspiracy beliefs when it engages users in respectful, Socratic-style dialogue. Rather than relying on AI-generated responses, PromptPilot tests whether students can learn to prompt high-quality, empathetic dialogue themselves—positioning prompt design as a teachable ethical literacy skill. In this study, seven undergraduates (five from computing, two from psychology) revised a curated set of thirty flawed prompts about misinformation and emerging technology using structured Socratic tags ([C] Clarification, [A] Assumption, [E] Evidence, [R] Reflection, [Con] Consequences). Revised prompts were tested in GPT-4 conversations and scored using a binary rubric for tone (yes/no), logic (yes/no), and clarity (yes/no). Quantitative results showed that 100 percent of revised prompts produced respectful AI tone, 91 percent met Socratic logic criteria, and 86 percent encouraged reflective dialogue. Findings demonstrate that ethical prompting can be introduced and practiced as a metacognitive communication skill bridging psychology and computer science. By positioning students as “ethical designers” rather than passive AI users, the project reframes prompt engineering as a form of applied digital ethics. Future work will validate rubric reliability, expand sample size and prompt diversity, and integrate Natural-Language Processing metrics to assess semantic alignment and emotional balance.

Anya Merriman-Mix

Discipline: Psychology

Authors:

Abstract Name: Assessing Psychological Safety in University Classrooms: Students' perceptions vs. instructors' behavior

Psychological Safety (PS)—one's perception of personal inclusion, contribution, and engagement—has been studied in various industrial settings but has yet to be studied systematically in educational settings. Initial research examined students' perceptions of PS in various college classes with a 51-question survey taken after the evaluated class had been completed. A total of 208 students completed that survey for various classes, and the findings of that initial study of PS suggested that both peer connections and classroom experiences were critical in determining students' average psychological safety (APS) scores. That survey included eight questions specific to APS that had been adapted from those previously used in industrial settings. However, it could not be determined if their APS scores were affected by a lack of recall or hindsight bias. This new study consists of two 8-question surveys distributed at the beginning and at the end of the semester to compare students' PS expectations with their PS experiences for the selected class. In addition, a behavioral check sheet will be completed in the class by undergraduate research students multiple times throughout the semester. This check sheet will record occurrences of behavioral predictors of PS and experiential learning to determine if aspects of each can be observed behaviorally. The predictors observed during class include professor and student interactions as well as the type of activities occurring during that class period. Classes of different topics, sizes, and modalities are being studied, but currently, most of the classes evaluated are taught through lectures with little interaction between the students and the instructor. It is expected that students' APS scores will be higher in classes with instructors who utilize experiential learning techniques and encourage student engagement.

Perihan Gamze Mert

Discipline: Education

Authors:

#1 Perihan Gamze Mert

Abstract Name: Exploring Parents' Journeys in Dyslexia Identification and Support

Dyslexia is a neurodevelopmental learning disability characterized by difficulties in decoding, single-word reading, and spelling. Early identification of dyslexia and timely reading interventions are essential for children with dyslexia. When support is delayed, students may struggle academically and psychologically, withdraw socially, or lose interest in school; which can affect graduation, future opportunities, and overall well-being. Parents are often the first to notice their children's reading difficulties. They observe their children individually, following their progress through assessment, tutoring, and interventions within and outside school, as well as witnessing their development, setbacks, and achievements. However, scant research has investigated parents' perspectives on their children's experiences with identification, assessment, and intervention around dyslexia, especially in the United States. Parents in prior studies have expressed frustration with barriers to school-based identification and greater satisfaction with support received from therapists or other interventionists outside of school. Past research has not examined factors that influence parents' satisfaction with school-based interventions to address reading difficulties; therefore, this aspect of the survey will be exploratory in nature. The study seeks to answer how parents of school-aged children with reading difficulties describe their experiences with identifying and meeting the academic, social-emotional,

and behavioral needs of their children. A survey was developed with mixed-method questions to gather information on the experiences, struggles, advances, and setbacks parents face when seeking support and services for their children with characteristics of dyslexia. This study hypothesizes that parents will report higher satisfaction levels when their child's reading difficulty is identified by their school sooner, and parents will report more positive emotions if they have access to any type of social-emotional support. The data will be analyzed through NVivo. Ultimately, the goal is to inform more effective, family-centered approaches to dyslexia identification, intervention, and support, within schools, family bonds, and through broader community networks.

Audrey Mertens

Discipline: Interdisciplinary

Authors:

Abstract Name: Preventing, Preparing, and Practicing for Active Shooter Events in Higher Education Institutions through Social Cognitive Theory and Mitroff's Management Model

Since the 1999 Columbine High School shooting, more than 394,000 students have experienced gun violence at school, a staggering indicator of how deeply mass shootings have affected the educational system (Cox, Rich, Trevor, Muyskens, & Ulmanu, 2025). While national attention often focuses on primary and secondary schools, recent tragedies, including the April 2025 shooting at Florida State University, underscore the vulnerability of colleges and universities. Active shooter incidents on college campuses continue to rise, yet a gap exists in the research on how campus community members perceive their own preparedness for responding to such an event. This phenomenological study explores how students, faculty, staff, and administrators at a private Southeastern university perceive prevention, preparation, and practice for the unlikely event of an active shooter situation. Guided by Bandura's (1977) Social Cognitive Theory, Mitroff's (2005) Crisis Management Model, and Witte's (1992) Extended Parallel Processing Model, the study focuses on the environmental, cognitive, and behavioral factors that shape an individual's self-efficacy and decision-making during an active shooter situation. Eight semi-structured focus groups will be conducted with 10 participants each. To reduce the influence of power differentials in the focus groups, two will be conducted with only students, two with only faculty members, two with only staff members, and two with only university provosts and deans. Participants will also complete pre- and post-surveys to assess shifts in perceived preparedness using the General Self-Efficacy Scale (1995). Preliminary findings suggest that participants value active shooter training but report varying levels of confidence in their ability to respond. Themes include uncertainty about institutional procedures, inconsistent exposure to training programs, and a desire for clearer communication and support from university leadership. This study aims to inform higher education administrators seeking to strengthen prevention, preparation, and practice initiatives for active shooter situations.

Archibald Meskhidze

Discipline: Political Science

Authors:

#1 Archibald Meskhidze

#2 Michael Matthews

Abstract Name: New Indigenous Politics: The Role of Andean Indigenous Communities in Contemporary Peruvian Political Change

Indigenous communities across the Andean region have long been utilized by political leaders as a force for change, yet this has rarely manifested in meaningful political incorporation. Over the past two decades, however, countries like Bolivia and Ecuador have seen increasing indigenous participation within formal political institutions, exemplified by the rise of Evo Morales's Movimiento al Socialismo (MAS) party and Ecuador's Pachakutik movement. Unlike the other Andean nations, this phenomena would not be seen in Peru, who remained an outlier throughout the 2000s and 2010s, where indigenous political participation remained both disconnected and unable to generate national political power. This trend shifted dramatically with the 2021 election of Pedro Castillo, whose unexpected victory reflected unprecedented indigenous and rural mobilization. This study argues that the delayed nature of Peruvian indigenous political participation (in comparison to the other Andean nations) was a result of: [1] the corruption of the Peruvian state, [2] the dominance of the Fujimori family since the start of the 1990s, and [3] a long history of state violence against indigenous communities: from early colonial repression to modern military massacres; as well as third party violence, such as the internal conflict with the Sendero Luminoso guerilla group. This study also posits theories as to how this mobilization has come about in contemporary Peru, and the potential implications for the future of indigenous politics in Peru.

Elli Metoyer

Discipline: Gender, Ethnicity, Diversity, or Cultural Studies

Authors:

Abstract Name: "They Say I Won't Last Too Long on Broadway:" The State of African American Representation within University-Level Theatre Arts Programs

Contemporary Black representation exists within the ebbs and flows of cultural trends. Throughout different periods, the quantity of Black people featured within entertainment and the quality of roles available for Black entertainers have fluctuated wildly. In an entertainment-focused society, the role of performance becomes increasingly important as a means for societal influence. The most visible and commonly accessible mediums for artistic influence are those that rely heavily on the talents and skill sets built upon within university programs for theatre arts. The histories of the theatre, film, and television industries are marked with deep disenfranchisement, misrepresentation, and the absence of Black perspectives. This (mis)representation (or lack thereof), in turn, contributes to a continuation of societal stereotyping, mistreatment, and structurally racist ideals, which work for the mass disempowerment of African Americans. Only through gaining insight into the current state of collegiate-level educational practices for theatre arts students can the effect and depth of racially charged factors inhibiting effective Black representation in the United States be investigated, and eventually rectified. To what extent are Black university students underrepresented within theatre arts programs as compared to other students, and what consequences does this underrepresentation have for their participation and influence as Black creatives within media at large, like television, film, and theatre? Our research intends to show the lack of positive Black representation in these programs contributes to industry-wide disenfranchisement, a stagnation in healthy portrayals, and a cultural perception of African American inadequacy.

Madison Metrick

WV - West Virginia University

Discipline: Biology

Authors:

#1 Madison Metrick
#2 Alejandro Sánchez Alvarado
#3 Christopher Arnold

Abstract Name: The planarian Hox gene post2b limits body size and preserves allometry

The molecular and cellular basis by which the size and patterning of body forms across the tree of life is the fundamental focus of developmental biology. However, the mechanisms by which body plan allometry —the scaling between the size of a body and its parts —is still poorly understood. I utilized the planarian species *Schmidtea mediterranea* (Smed), a flatworm capable of regenerating its entire body form from a small piece. We identified the Hox gene post2b as a restrictor of planarian body size, and genetic interference of post2b enables animals to grow more than six times their natural size limit. This presents a unique opportunity to study the interrelationship between changes in the size of a body and its parts. Through brightfield imaging and morphometric analysis, we resolved the differences in whole-body and photoreceptor region, axes, and growth/degrowth in normal Smed and post2b RNAi animals. Our findings support a model in which the growth differentials of body parts are either maintained or exaggerated as size is delimited. Studying developmental allometric signaling processes in this simple model can provide a better understanding of the shared pathways that regulate differential tissue and organ growth potentials underlying human development and disease.

Spencer Metz

Discipline: Physical/Occupational Therapy and Speech Language Pathology

Authors:
#1 Amit Sethi

Abstract Name: Investigation of Transcutaneous Spinal Cord Stimulation in Evoking Upper Extremity Muscle Response in Stroke Survivors

An estimated 795,000 people in the United States annually experience stroke. Up to 80% of stroke survivors have resulting upper extremity (UE) impairment; UE impairment results from a reduced corticospinal excitability, which significantly impairs the brain's ability to activate arm/hand muscles, leading to chronic, moderate-to-severe UE impairments. Stroke patients experience significant quality of life reduction with impaired UE function, including inability to self-finance, participate in social activities, and loss of independence in daily tasks. The corticospinal tract is a critical pathway for conveying motor commands from the brain to the spinal cord, enabling voluntary movement of the UEs. Little is known about the integrity of the connections between the spinal cord and UE muscles after stroke. Electrical stimulation of the spinal cord could potentially offer a means to increase motor signals from the brain reaching the UE muscles. Therefore, the study of minimal threshold for muscular response and the latency from electrical stimulus to muscular response in stroke survivors could reveal mechanisms previously not targeted for treatment. Several novel rehabilitation interventions have been developed based on this principle to improve UE function after stroke, including non-invasive brain stimulation (NIBS). NIBS, currently the focus of stroke rehabilitation, aims to increase plasticity and improve UE function through electrical stimulation of the brain, but the propagation of the signal through the tract is not easily assessed. Non-invasive spinal cord stimulation, often termed transcutaneous spinal cord stimulation (tSCS) is a prospective treatment offering a safer, inexpensive, and non-invasive method of stimulating the UE pathway, ensuring the integrity of connections between spinal cord and UE muscles. This investigation aims to measure the reliability of muscular evoked responses while delivering tSCS to stroke survivors, as a preemptive investigation, to establish tSCS as a treatment method with task practice to improve long-term outcomes post stroke.

Discipline: Engineering

Authors:

#1 Eric Rodarte

#2 Maximo Failla

#3 Miguel Delgado

#4 Josh Shuster

#5 Jackson Schuler

#6 Daewon Kim

Abstract Name: Project Chimaera: Development of a Tessellated Tetrahedral Truss Structure for Adaptive Multi-Regime Morphing Wing Technology

Modern aircraft aerodynamic efficiency is currently limited by fixed-wing geometries designed for a single optimal flight regime. This has resulted in compromised performance due to the various maneuvers and speeds aircraft utilize during flights. This limitation is addressed by developing scalable modules of tessellated tetrahedron truss structures capable of dynamic structural reconfiguration, resulting in small surface deformations across the wing. This morphing wing is contrary to traditional wings since this design can modify the wing's planform, altering sweep, twist, span, and airfoil cross-section through the extension and retraction of internal feedback linear actuators. Additionally, this morphing-wing design will enable aircraft to go between subsonic, supersonic, and hypersonic speeds due to the alteration of the wing geometry during flight. The research methodology integrates kinematic and dynamic modeling in CATIA and MATLAB, along with physical prototyping to produce a morphing wing. A physical structure allowing for movement within the internal wing structure has been designed. This model wing is currently in the manufacturing stage of research. The wing's electrical design, along with the control logic, is being analyzed and validated to confirm that the linear actuators can communicate and alter their movement to different linear positions. The study anticipates demonstrating a fully functional prototype capable of controlled morphing. The study proposes that this internal design for morphing wing technology is a viable pathway for the next generation of aircraft, allowing for increased aerodynamic efficiency and capabilities of multi-regime flight. This morphing technology will create a more viable option to utilize aircraft at higher speeds, such as supersonic and hypersonic speeds, making high-speed travel more feasible within aviation.

Allison Michalski

Discipline: Education

Authors:

#1 Sudha Swaminathan

Haleigh Thibodeau

Abstract Name: Math Learning Difficulties in Primary Grades and Effective Intervention Strategies

The goal of our study was to examine the math learning difficulties of primary grade children. Specifically, our two objectives were to identify the math difficulties of students and to determine supportive teaching strategies. Previous research has analyzed developmental math and specific learning disorders regarding math, but there is minimal research about what falls in between: math difficulties. This study collected survey data from elementary school teachers and interventionists (n=42), gathering quantitative and qualitative data on difficulties and interventions. The survey included 8 demographic questions, 23 Likert scale questions on math behaviors, 3 multiple response questions, and 5 open ended questions. Specifically, the questions pertained to frequency of difficulties within math behaviors, access to training, and strategies to support math

skills. Math difficulties were categorized by 1) number sense and computation, 2) geometry and measurement, 3) patterns, algebra and data analysis, and 4) general math behaviors. Findings indicated that number sense and computation difficulties were the most common, followed by difficulties with patterns, algebra and data analysis. Teachers reported that they lacked formal training in identifying and supporting math difficulties. Teachers felt they had a lack of time, resources, staff, and space to provide support to students who struggle with math while also staying on pace with curriculum. Teachers recognized that online programs may not be sufficient in remediating the difficulty and may only be beneficial for progress monitoring. Future research needs to identify effective training and strategies for supporting students with math difficulties. Further, online programs should be developed that not only help with progress monitoring but can also act as an intervention to promote math skills.

Natalie Mikula

Discipline: Biology

Authors:

#1 Lynne Beaty

Abstract Name: Examining Predator and Round Goby (*Neogobius melanostomus*) Response to Varying Eyespot Positions in Round Goby

The round goby (*Neogobius melanostomus*) is an invasive species that was first caught in Lake Erie in 1994 and has been increasing in population size ever since. Gobies negatively impact the ecological integrity of Lake Erie by out-competing native benthic fish and consuming the fry and eggs of lake trout (*Salvelinus namaycush*) and smallmouth bass (*Micropterus dolomieu*). Part of the round goby's success in Lake Erie is due to the reduced predation pressure they experience here relative to their native range. This reduction in predation risk may be aided by their eyespots—markings that mimic the eyes of a larger vertebrate predator. According to a recent study done by Penn State Behrend, round goby caught in the main waters of Lake Erie were more likely to have eyespots on their dorsal fin, while individuals caught in the tributaries were more likely to have pectoral eyespots. The objective of this study is to determine how potential native goby predators (i.e., smallmouth bass, rock bass (*Ambloplites rupestris*), freshwater drum (*Aplodinotus grunniens*), and yellow perch (*Perca flavescens*)) and other round gobies in Lake Erie respond to round goby's eyespots on their dorsal and pectoral fins. To test this, round goby models with different eyespot positions were made and attached to an underwater camera to examine the predators' and round gobies' attack and avoidance responses. Once data analysis is complete, we will be able to better understand the mechanisms enabling round goby success in Lake Erie.

Bailey Milde

Discipline: Health and Human Development

Authors:

Abstract Name: The Impact of Parental Limited English Proficiency (LEP) on U.S.-Born Latin American Children

The specific challenges faced by U.S.-born children of Latin American immigrant parents with limited English proficiency (LEP) remain understudied. One such challenge is the role that these children often assume as an English interpreter for their parents. Although prior research has examined the consequences of LEP on adults, it is equally critical to understand how their English-speaking children are impacted. This

literature review synthesizes current research on how Latin American parental LEP affects the physical, mental, and academic outcomes of children who are the sole English speaker in their household, and the unique burdens they carry. This review includes studies that examine overall language proficiency in immigrant households, community involvement of immigrant families, healthcare access and utilization, school engagement among immigrant children, and acculturation stressors these children face. The main trends across the literature reveal that the responsibility of acting as a linguistic broker creates mental, physical, and academic obstacles that are not typically found in children of English-speaking households. As children of immigrant families continue to represent a quickly growing proportion of the U.S. population, these studies are increasingly relevant. The goal of this review is to illuminate the ways in which parental LEP shapes child well-being and to emphasize the need for targeted supports that can improve outcomes for these children.

Maggie Milhorne

Discipline: Biology

Authors:

#1 Ersilia Mirabelli

#2 Caleb Mast

#3 Katelynn Castagnola

Abstract Name: Persistent increase in mechanical pain sensitivity in mice following formalin injection: novel neuropathic pain animal model

Neuropathic pain is a chronic pain condition resulting from nervous system damage, characterized by hyperalgesia and allodynia. While inflammatory pain can be resolved with medications, neuropathic pain does not respond to current pharmacological treatments, creating a significant clinical concern. Rodent models are commonly used to study pain mechanisms. Formalin is used in the context of inflammatory pain research as a chemical irritant, inducing tissue injury and producing reproducible pain-related behaviors. Previous research in rats demonstrated that formalin injections can induce chronic pain states and molecular changes within the spinal cord comparable to those of spinal nerve ligation, an established surgical model of neuropathic pain. This study aimed to determine whether a subcutaneous injection of 5% formalin is sufficient to induce chronic pain in mice, providing a simple and less invasive model to study chronic pain mechanisms. Because pain cannot be directly measured in rodents, behavioral assessments are used to quantify “pain-like” behavior. Mechanical pain sensitivity is assessed using the von Frey filament test, in which a series of calibrated filaments is applied in ascending order of force to the plantar surface of the paw, and the withdrawal threshold is recorded as an indicator of mechanical sensitivity. Reduced thresholds indicate heightened pain sensitivity. Mice were tested on days 3, 7, 10, and 14 post-injection and terminated on the day of the last observation. Brains and spinal cords were collected for histology to determine molecular and cellular changes. Mice receiving formalin exhibited a significantly lower withdrawal threshold compared to the vehicle-treated group, indicating heightened mechanical sensitivity and suggesting the development of chronic formalin-induced hyperalgesia. These findings suggest that a single subcutaneous injection of 5% formalin provides a reproducible, less invasive method to study chronic pain in mice. Further studies are necessary to define long-term molecular and cellular changes in the nervous system.

Brooklyn Miller

Discipline: Biology

Authors:

#1 Brooklyn Miller
#2 Donna Haworth-Ward

Abstract Name: The Cycle Within the Game: How Hormones Shape Mobility and Lower Limb Injury Risk in Female Athletes

Female athletes sustain up to a ten fold increase in musculoskeletal injuries compared to males, with ACL tears being one of the most common injuries (Raj et al.,2023). The menstrual cycle is associated with cyclic changes in the hormones proestrogen and estrogen, which could have an impact on mobility of the knees and hips in female athletes. This study directly assesses changes in both joint mobility and hormone levels in female collegiate athletes in an attempt to determine increased risk of injury associated with different phases of the menstrual cycle. Under an approved IRB protocol, consenting participants were asked to complete a physical and menstrual health background survey and then track their menstrual cycle daily for 3 months in a provided form. Participants were also asked to provide saliva samples and undergo knee and hip measurements via goniometer on days 3, 13, 22, 23, and 24 of each cycle. Bilateral joint measurements were taken in the supine (knee and hip) and prone (only knee) positions included flexion (knee and hip) and abduction (hip only). Following data collection, saliva samples will be assessed via ELISA assays for estrogen and progesterone levels. Data will be analyzed for correlations between changes in joint mobility and fluctuations in hormone levels over the course of the menstrual cycle. Findings could lead to better predictions of when a female is at an increased risk of injury during their cycle and could lead to adjustments in training programs to better decrease the incidence of injury in female athletes over males.

Miriam Miller

Discipline: Health and Human Development

Authors:

Abstract Name: Evaluating the Efficacy of the Search, Treat, and Prevent Model: A Comprehensive Approach to Tuberculosis Eradication

Tuberculosis (TB) remains the world's leading infectious disease killer, disproportionately affecting marginalized communities despite the availability of effective treatment for decades. Global progress toward TB elimination has stalled, particularly in low- and middle-income countries where socioeconomic instability, stigma, and limited healthcare infrastructure hinder early detection and treatment adherence. The COVID-19 pandemic further reversed years of progress, exacerbating resource shortages and widening global health disparities. To address these challenges, this study evaluates the efficacy and sustainability of the Search, Treat, and Prevent (STP) model—an emerging, proactive approach that expands upon Directly Observed Therapy (DOT) by integrating active case finding, patient-centered treatment support, and preventive therapy for latent TB infection. Using a mixed-methods cross-sectional design, this project analyzes TB infection trends, treatment success rates, and treatment barriers across the United States, Kenya, and Peru. Primary data collection will include the administration of the WHO-validated Knowledge, Attitudes, and Practices (KAP) survey to clinicians at partnering health facilities, documenting their perceptions of current treatment models, adherence challenges, and resource limitations. Additionally, in-depth qualitative interviews will be conducted with selected healthcare professionals—including clinicians from the United States involved in TB diagnosis and treatment, *Socios en Salud* in Lima, and hospitals and clinics in western Kenya—to explore systemic factors influencing TB care, implementation challenges, and the practicality of the STP model in resource-limited settings. The project will culminate in a documentary film and academic manuscript, with the overarching goal of advancing equitable standards of TB care and reducing global TB mortality.

Melissa Miller

Discipline: Art History

Authors:

Abstract Name: Visual Silence: Art Censorship in the Viceroyalty of Peru, the Onganía Regime, and Nazi Germany

This research examines art censorship in 1600s Viceroyalty of Peru (later becoming Argentina) and in Nazi Germany. The examination will begin with a discussion of art censorship in the respective societies. Then, the study will analyze how the Spanish Inquisition censored the indigenous culture of the Viceroyalty of Peru by examining the artwork of Guaman Poma, a Quechua nobleman, who denounced this mistreatment of the native Andean people with his drawings from 'The First New Chronicle and Good Government'. Following, the discussion will introduce Argentina under its dictatorship of General Carlos Onganía from the 1960s to the 1970s, and examine the work done by the Tucumán Arde in communicating opposition of the dictatorship. Next, the study will discuss how the art group Die Brücke was targeted by the Nazi's 'degenerate art' campaign. The comparative conclusion demonstrates that in either case, censorship was used to support the power structure, but in different ways. Viceroyalty of Peru used censorship to maintain religious catholic orthodoxy, Argentina targeted the art that opposed the government, while Nazi Germany used art censorship to create a new 'cultural agenda'.

Nayeli Miller

Discipline: Sociology

Authors:

#1 Cynthia Emami

Abstract Name: Exploring Campus Sexual Assault Through Photovoice

This study explores how students perceive campus safety within the broader context of campus sexual assault. While much research focuses on the prevalence of sexual assault, prevention programs, and Title IX compliance, less attention has been given to how students interpret safety in the environments they inhabit. This project addresses that gap by centering on student perspectives and examining the factors that influence whether they feel secure or vulnerable on campus. Thus, the central research question asks: What protective and risky cues shape students' sense of safety on a college campus, and how do these perceptions compare to institutional narratives about safety and support? Using Photovoice, three University of Kentucky students photographed spaces and features on campus that made them feel either safe or unsafe. Participants collected eleven photos and provided short captions describing their interpretations. These photos and reflections were analyzed thematically to identify patterns in how students understand campus safety and how their experiences align, or fail to align, with institutional messaging around sexual misconduct resources and prevention. Three themes emerged: visibility and environmental design, community and familiarity, and institutional presence and trust. Students highlighted well-lit, open, and maintained areas as places that increased their comfort, while darker or isolated spaces evoked unease. Familiar academic settings provided reassurance, showing how routine and belonging contribute to a sense of safety. Institutional features such as security cameras and emergency towers were interpreted in mixed ways, signaling protection and doubt depending on their functionality. Notably, no participant photographed formal campus resources related to sexual misconduct, suggesting a disconnect between institutional infrastructure and students' lived experiences. Overall, the project shows that student perceptions of safety are shaped by environment, routine, and institutional trust and play an important role in understanding how campus communities experience issues tied to sexual assault and campus security.

Hannah Miller

Discipline: Biology

Authors:

#1 Hannah Miller

#2 Marieke Burleson

Abstract Name: Flavonoids as a novel therapeutic strategy for luminal androgen receptor triple negative breast cancer

Breast cancer remains a leading cause of mortality among women, affecting approximately one in eight over their lifetime. Triple-negative breast cancer (TNBC), a particularly aggressive subtype, lacks expression of estrogen, progesterone, and HER2 receptors thereby rendering most targeted therapies ineffective. As a result, there is an urgent need for novel treatment strategies. One distinct TNBC subtype, Luminal Androgen Receptor (LAR) breast cancer, expresses the androgen receptor (AR). Previous work from our lab and others has demonstrated that AR interacts with GLI3, a key transcription factor in the Sonic Hedgehog (SHH) signaling pathway, to promote tumorigenesis in androgen-independent prostate cancer. Notably, clinical data reveal that patients with LAR TNBC and elevated GLI3 expression exhibit poorer prognoses, a correlation not observed in other TNBC subtypes. We thus hypothesize that GLI3-mediated SHH signaling is aberrantly activated in LAR TNBC via its interaction with AR, and that targeting GLI3 will offer a subtype-specific therapeutic approach. To investigate this, we performed quantitative PCR on LAR TNBC cells, confirming upregulation of GLI3 target genes in these cells. Next, we performed MTT screening assays to identify novel therapeutic compounds capable of selectively targeting TNBC LAR cells. This study focused specifically on flavonoids, a class of compounds known for their broad anti-cancer properties. Through our screening efforts, we identified several flavonoids that selectively inhibit LAR TNBC cell growth and, importantly, that treatment with these compounds leads to a reduction in GLI3 signaling. These findings thus highlight a promising avenue for the development of targeted therapies for the LAR subtype of TNBC by targeting the GLI3 signaling pathway with flavonoid compounds.

Abigail Miller

Discipline: Biology

Authors:

#1 Abigail Miller

#2 Emma Carrier

#3 Lynne Beaty

#4 Samuel Nutile

Abstract Name: A New Approach to Mystery Snail Collection: Bait Preferences in Passive Sampling as a Control Strategy

The Chinese mystery snail (*Cipangopaludina chinensis*) is an invasive freshwater gastropod that has established itself across North America, posing a threat to native aquatic ecosystems, including Lake Erie's Presque Isle State Park. Traditional active sampling methods for mystery snail populations are labor-intensive and ineffective, particularly in deep or turbid waters. However, the efficacy of passive sampling (i.e., trapping) has not been extensively researched. My study investigated passive sampling as a potential alternative for capturing mystery snails and aimed to determine whether the type of bait affects capture success. Field

experiments were conducted from June to August 2025 at Presque Isle State Park, Pennsylvania, using modified cylinder traps with five bait types: moist cat food, cucumbers, algae pellets, boiled spinach, and an unbaited control. Traps were set up at five locations: Feather Point, Lily Pond, The Bridge, Graveyard Pond, and Thompson Bay. Across trials, the average snail captures were low, with algae having the highest mean (0.083 snails/trap), followed by moist cat food (0.042), boiled spinach (0.042), control (0.042), and cucumber (0.028). These results suggest that bait type had little effect on snail capture, potentially because the baits were not strong enough, the traps were not left in the water long enough, or because the snails preferred different food sources. Despite low capture rates, passive sampling was able to capture snails, indicating that it may be a useful method for monitoring snail populations. Testing more aromatic baits and using alternative trap designs could improve capture efficiency and inform future sampling strategies.

Emmit Miller

Discipline: Environmental Science and Sustainability

Authors:

#1 Derek Straub

Abstract Name: Evaluating Fog Liquid Water Content Through Capacitive Sensing to Assess Fog Harvesting Potential

Fog water harvesting has emerged as a potential supplementary water source for communities facing increasing water scarcity, yet its reliability depends heavily on the amount of liquid water present in fog events. Current fog-collection systems mainly rely on passive mesh structures and do not directly measure fog liquid water content (LWC), making it difficult to predict water yield or assess long-term productivity. This project investigates whether capacitive sensing can be used as a practical method to quantify the LWC of fog, with the broader goal of determining whether fog harvesting can serve as a sustainable water resource in water-limited regions. The experimental design consists of a parallel plate capacitor with polypropylene filter material as the dielectric. As air is drawn through the capacitive sensor, fog droplets accumulate on the filter material, increasing its capacitance. By monitoring the change in capacitance over time, LWC can be derived. Background research on fog formation, droplet behavior, and moisture-responsive sensing technologies provides the foundation for exploring this approach. Over the course of the project, relative humidity tests revealed slight increases in measured capacitance, suggesting that ambient moisture influences the sensor more than expected. Additional tests using incremental droplet deposition, simulating fog collecting on a surface, produced consistent and measurable increases in capacitance, demonstrating that the system is highly responsive to changes in surface water content. By analyzing these trends, this study aims to determine whether capacitance data can be reliably correlated to fog LWC and, ultimately, to the volume of water that could be harvested during fog events. If successful, this approach could offer a low-cost, low-energy tool for evaluating fog density and predicting water yield, supporting efforts to develop sustainable fog-harvesting technologies for regions experiencing chronic water shortages.

Kaiden Miller

Discipline: Computer Science

Authors:

#1 Joey Wagner

Abstract Name: JayWing Academy: An AI-Powered Student Learning System Leveraging GPT in Cloud

Over the past few years, Large Language Models (LLM) such as ChatGPT, Gemini, and Claude have become widely used tools for academic assistance in college settings. However, students frequently use these tools as shortcuts for quick answers, rather than as supports for meaningful learning. While LLMs offer insights based on extensive training data, they often fail to align with the instructor's pedagogical learning path and lack the interactive guidance provided by human tutors. This project asks how AI tutors can support deeper learning with JayBot, a college-level AI Tutor that generates responses grounded in course-specific materials uploaded by instructors. Research results show that reliant LLM users show lower brain engagement and perform below other people in their ability to analyze information. However, using it as a tool to revise work showed positive results and improved the users work drastically. JayBot aims to emulate the conversational, reasoning-based guidance of human tutors that promotes student learning as a scholarly assistant. To return responses from JayBot that encourage critical thinking from students, the project employs retrieval-augmented generation (RAG) and few shot prompting. RAG is a technique that grounds responses in instructor-provided materials by retrieving external documents and few shot prompting helps prevent instructional dilution, where prompt instructions for JayBot are lost. These methods help students work through problems with a socratic questioning approach instead of immediately providing answers. Experiments in computer science courses show that JayBot enhances instructional alignment by reducing premature exposure to advanced topics, limiting solution over-disclosure, and preserving pedagogical intent.

Alexandra Miller

Discipline: English and Literature

Authors:

Abstract Name: Women, Tradition, and Cosmopolitanism in Mira Nair's Monsoon Wedding

This research analyzes how Mira Nair's film *Monsoon Wedding* (2001) portrays women's agency within the setting of a wealthy Indian family preparing for a large, traditional Punjabi wedding in a globalizing India. The film follows several intertwined storylines during the days leading up to the ceremony, and this research focuses on how two central characters, Aditi and Ria, navigate the tension between long-standing cultural expectations and the influence of global, modern values. Aditi struggles with the pressure to uphold family honor while also trying to define her own desires, and her choice to proceed with an arranged marriage reveals how tradition can shift when supported by class privilege. Ria's story confronts a different barrier when she chooses to speak about past sexual abuse in order to protect a younger cousin. Although her courage challenges patriarchal silence within the household, the film ultimately contains her resistance within the authority of the family patriarch. By comparing these women's experiences with those of working-class characters whose lives exist outside the comforts of the Verma family home, this project also analyzes the links between female empowerment and class position. Overall, this project argues that *Monsoon Wedding* reflects a broader moment in India where globalization influences women's lives, yet traditional structures adjust themselves in ways that allow the upper middle class family to stay intact rather than be transformed.

Jimmy Miller

Discipline: Interdisciplinary

Authors:

Abstract Name: No Rhymes With A Reason: Defining Abstract Hip Hop

This research seeks to define and analyze abstract hip hop and its stylistic characteristics as a counter-culture

movement within hip hop. Formal research addressing abstract hip hop as a stylistical movement is lacking. Research on abstract hip hop has been explored with Pil Ho Kim and Wonseok Lee, while horror-core, an abstract hip hop adjacent style, has been analyzed by Dana Horton in *Global Hip Hop Studies*. How historically non-white styles of music are studied have brought into question social and methodological connotations of music analysis. This was a prominent point in “Music Theory and the White Racial Frame” by music theorist Phillip Ewell, influencing the methodology of this research. Other scholars like Kofi Agawu and his use of hermeneutic analysis equally informed the prime approach used for primary source analysis. The case studies “Sheesh” by Homebody Sandman and “Hacker” by Death Grips are interpreted through three main analyses: metric, syllabic, and literary, proving how abstract hip hop artists set themselves apart from mainstream rappers. Metric analysis takes place in transcribing the instrumental or “beat” and interpreting what artistic message may be conveyed. Syllabic analysis, akin to poetry, takes the stressed and unstressed syllables of the rapper’s lyrical excerpts and analyzes them through interpretation. Literary analysis takes lyrics or other direct artistic choices (outside of syllabic or metric) and uses hermeneutics as a form of analysis. Through these case study analyses, techniques like rhythmic subversion, cosmic braggadocio, unorthodox samples, generative flow, prominent use of micro time, and metric obscurity are identified. Themes of distance from this counter-culture in terms of sound, presentation, and language are known and defineable, separating this specific style from hip hop. In other words, abstracting it.

Gianna Miller

Discipline: Biology

Authors:

#1 Meghan Gardiner

#2 Gianna Miller

#3 Jeremy Sellers

#4 Jeremiah Winter

Meghan Gardiner

Abstract Name: The Effects of Natural Products and Food Additives on Lysosome Function

Gastric disorders, such as gastroesophageal reflux disease (GERD) affect at least 20% of the United States population. The most common pharmacological intervention is the use of Proton Pump Inhibitors (PPIs). These drugs are converted into their active forms upon entry into acidic environments, and while their intended function is to inhibit parietal proton pumps in the stomach and reduce gastric acid secretion, there may be off-target effects in other areas with low pH, such as lysosomes. These organelles mediate the recycling and degradation of cellular materials. The current research seeks to examine the effect of PPIs on lysosomal function. Previous scientific studies have shown that PPIs such as lansoprazole and omeprazole can inhibit lysosomal enzyme activity. Decreased lysosomal activity has been implicated in impaired immune function and the development of neurodegenerative disorders including Alzheimer’s disease, amyotrophic lateral sclerosis (ALS), and other diseases. Preliminary experimental results demonstrate the successful isolation of active lysosomes from multiple murine tissue types including brain, liver, lung, kidney, and spleen. Lysosomes were also extracted from cultured cell lines, specifically COS-1 cells derived from monkey kidneys. These lysosomal fractions were obtained via differential centrifugation, and their activity was confirmed using an acid phosphatase assay, the standard method for assessing lysosomal function. Finally, COS-1 cells were treated with PPIs, and the lysosome activity was measured, clearly demonstrating altered enzymatic function due to the presence of the PPI. Future experiments will extend this analysis by testing the effects of PPIs on another lysosomal enzyme, β -N-acetylglucosaminidase (β -NAG), and on other cell lines, such as Caco-2 and A549 cells. This experimental procedure also allowed for the examination of the effects of additional compounds, including natural products and food additives, on proton pumps and overall lysosomal function.

Ava Millien

Discipline: Architecture, Construction Management, and Interior Design

Authors:

#1 Ava Millien

#2 Namrata Dhobeker

#3 Suzanne Frasier

Abstract Name: Case Study of Sewing Joinery Technique

For over 20,000 years, sewing has been a vital joinery technique. In the beginning stages, people used animal sinew for thread and bones or horns as needles. What started as a technique that is done by hand, has greatly evolved and is now mainly taken over by a simple machine. In these designs, the cross stitch sewing method is predominantly used to show joinery and texture within the space or artifact. This study examines the sewing joinery technique to determine how it can be applied at multiple scales in interior design so that it can be diagrammatically and visually documented on this research poster. For this research, the joinery has been studied at increasing spatial scales from a small artifact level to enclosure, personal, and social spaces. The research shows sewing, a commonly used joinery technique that uses a needle and thread to interlock things together. This method closely relates to the interlocking spatial relationship, because it forces two spaces to come together and perform as one cohesive space. The plans of personal and social spaces show the same interlocking relationship through the arrangement of walls and the circulation pattern. In conclusion, after researching and learning about sewing as a joinery, sewing can be used in a small joinery scale as well as in a larger spatial scale. Analyzing the cross-stitch thread patterns helps easily translate this joinery into interior design spaces to help display spatial relationships in design.

Malaika Minhas

Discipline: Political Science

Authors:

Abstract Name: Project 2025 and the Politics of Fear: How Far Right Organizations Use Emotional Appeals to Consolidate Power

In recent decades, particularly under the Trump administration, there has been significant debate over the constitutionality of the actions taken by conservative groups. This paper aims to examine how conservative political actors have intentionally mobilized public support through fear-based and morally charged rhetoric with the intention of exploiting social divisions around race and gender. Drawing on journal articles informed by policy, psychology, and case studies, the paper analyzes how conservative movements cultivate racial resentment, reinforce traditional gender roles, and appeal to religious and national sentiment. These groups have created a political environment where the conservative populace are especially and increasingly susceptible to emotional manipulation. As a result, this susceptibility, alongside ideological polarization and the strategic breaking down of democratic integrity has allowed conservative movements to reshape American democracy in their interests, leading the way for the consolidation of authoritarian power layered under the guise of moral and national restoration. Understanding these dynamics is critical for recognizing how identity-based rhetoric and strategic polarization function to erode citizens' capacity for informed democratic participation and operate as mechanisms for restructuring democratic norms and institutions.

Jonah Minkoff

Discipline: Computer Science

Authors:

#1 Siri Reddy Patlannagari

#2 Derek Chiou

#3 Thang Dinh

Abstract Name: Solving Sudoku with Quantum Annealing: A QUBO Formulation Approach

Sudoku encodes constraint satisfaction structures underlying real-world scheduling, logistics, and resource allocation problems, making it an ideal benchmark for evaluating quantum optimization against classical methods. We investigate whether quantum computing delivers practical advantages for this class of combinatorial problems. We developed a one-hot encoded QUBO formulation mapping Sudoku constraints into energy penalties compatible with quantum annealing hardware. Each cell-digit assignment becomes a binary variable in a Hamiltonian where valid solutions achieve zero energy. We tested this approach using classical simulated annealing and QAOA across 2×2 to 9×9 grids. Classical simulated annealing achieved 99% success on 4×4 puzzles and 10% on 9×9 instances (459 variables after incorporating givens). QAOA demonstrated proof-of-concept on 2×2 instances but hit exponential memory limits beyond 8 qubits, confirming current gate-based quantum approaches cannot scale to practical sizes. Our QUBO formulation directly targets quantum annealing architectures like D-Wave, where dense constraint handling may reveal computational advantages. Future work will benchmark this formulation on D-Wave hardware. This work establishes methodology and baseline metrics for determining when quantum optimization surpasses classical methods for structured combinatorial problems with real-world applications.

Elizabeth Minneci

Discipline: Psychology

Authors:

#1 Ruth Walker

Abstract Name: Narratives of Calling: Catholic Sisters on Culture, Community, and Continuity

The number of Catholic Nuns within the United States has dropped by 72% between 1965 to 2014. Although the number of men entering religious life has recently increased, the number of women entering religious life has continued to decline to less than 150 in 2024. Amid these trends, many nuns have voiced concern about attracting women to religious life. Catholic nuns have long dedicated their lives to the service of their communities as nurses, teachers, social workers, and spiritual leaders. These vocational contributions have had a profound impact on their communities. Despite their continued presence in ministries across the country, there is limited research exploring how the sisters themselves understand and approach the modern challenges of recruitment, retention, and talent development for this unique vocation. This research aims to explore the current recruitment strategies, development opportunities, and benefits of nunship largely unknown by the general population. With concerns of declining interest in nunship in America, it is important to identify current barriers and explore possible solutions. This research follows my thesis work with semi-structured interviews with Catholic nuns as they identify the culture of the convent and give their perspectives on the future of nunship in America. These interviews will be interpreted through reflective thematic analysis to identify themes and patterns between the participants' interviews. Based on participant responses, I will offer recommendations to support Catholic sisters and shape future recruitment strategies that are responsive to the realities of religious life today.

Alexander Minnich

Discipline: Exercise Science and Nutrition

Authors:

#1 Ardalan Vahidi

#2 Randolph Hutchison

Abstract Name: Characterizing Individualized Maximal Power-Cadence Relationships at Various Fatigue Levels for Recreational Cyclists

Human performance during exercise reflects the delicate balance between energy availability, fatigue, and recovery. Understanding this balance is key to optimizing training, enhancing race performance, and preventing overexertion. Our long-term goal is to create individualized models of fatigue and recovery that predict an athlete's power output as a function of time, cadence, and prior exertion. Such models could ultimately guide adaptive training programs and personalized pacing strategies for both recreational and competitive cyclists. This study examines one element of that model: how fatigue affects the well-known parabolic relationship between maximal cycling power and pedaling cadence. Four recreational cyclists completed six testing sessions, each separated by at least one week for full recovery. The first four sessions determined each participant's Critical Power (CP) and Anaerobic Work Capacity (AWC) by fitting a hyperbolic relationship between sustained power and endurance time. The final sessions assessed maximal power and cadence at different fatigue levels. Fatigue was induced in stages by cycling for two minutes at each subject's CP8 (the power expected to cause exhaustion in eight minutes), followed by five sprints at varying resistances to establish the power-cadence curve for that fatigue level. Paired t-tests compared results between fresh and fatigued states, with significance set at $p < 0.05$. Across all participants, the power-cadence relationship remained parabolic, with coefficients of determination (R^2) above 0.9, indicating excellent fits. Fatigue significantly reduced maximal cadence ($p = 0.039$) and cadence at maximal power ($p = 0.039$) but did not significantly affect maximal power ($p = 0.101$). These findings show that fatigue predictably alters the shape of the individual power-cadence curve. This work represents progress toward data-driven, individualized fatigue and recovery models to guide intelligent training and pacing strategies.

Grace Minson

Discipline: Interdisciplinary

Authors:

Abstract Name: A.I. Chatbots and the Tradition of the American Technological Sublime

This study explores how particular individuals in the contemporary United States interpret their frequent interactions with artificially-intelligent Social Chatbots as a Sublime experience. I define "Sublimity" in relation to emergent communication technologies using the combination of frameworks developed by Rudolph Otto, Keltner and Haidt, David E. Nye, James Carey and John Quirk. Drawing on a variety of case studies documented by scholars, researchers and journalists (as well as the self-reported), I examine the ways in which these contemporary encounters are described and received by the general public, and compare this to related case studies of the eighteenth through the early-twentieth centuries. Importantly, I focus on similar cultural patterns that emerge: the phenomenon of the American Technological Sublime, increased public concern about the users' mental health and possible disassociation from reality, the anthropomorphizing of media technology and a heightened sense of cultural Imagination. My sources repeatedly return to the question: How does our current relationship to A.I. reflect past human relationships to new technologies? By situating these encounters within the longer held tradition of symbolically-associated modes of technological experience, this paper aims to illuminate how our relationship to communication technologies continue to

shape our understanding of connecting with the Sacred in the context of our allegedly “secularized” Modernity. I focus heavily on the framework developed by Josephson-Storm to describe this latter term. Ultimately, there is a rich history of how we discuss and experience new technologies in America—recognizing this pattern helps to explain the emergence of spiritual A.I. chatbot interactions in this particular historical moment.

Jake Miranda

Discipline: Computer Science

Authors:

#1 Md Shirajum Munir

Abstract Name: Quantifying Multi-Modal Generative AI-Driven Cyber Risks in Cyber-Physical Systems Using Conditional-Value-at-Risk

Artificial Intelligence (AI) introduces cybersecurity risk in Cyber-Physical Systems (CPS) due to the capability of synthesizing sensory data. The goal of this research is to identify the risk of AI-generated attacks in CPS. This work creates a CPS testbed that consists of two occupancy sensors as well as an MQ2 Gas sensor that are installed on top of a raspberry Pi, which acts as a client while a computer plays the role of an asynchronous server to collect the real data. This work proposes a Multimodal Autoencoder (MMAE)-based generative AI model to generate poisoning attacks in CPS. The MMAE allows the system to have one autoencoder, with n encoders, one shared latent space, and n decoders (n , signifying the different types of data sets) to capture multi-modal sensory observation. The developed MMAE processes and trains on data from various sources which achieves a more accurate outcome than a model that only uses one type of data. This acts as the AI to simulate sensor values to then quantify Conditional-Value-at-Risk (CVaR) between the AI-generated and sensory captured values to measure the risk of cyberattacks in CPS. CVaR measures the average loss in the extreme tail beyond a specified confidence level, providing a clearer view of worst-case risk. The experimental results show that the occupancy sensor achieved 100% reconstruction accuracy within a 3 cm distance range. For the 95% and 99% confidence levels, the corresponding cybersecurity CVaR intervals were $(-1.80, 1.60)$ and $(-2.10, 1.90)$, respectively. The MQ-2 gas sensor similarly achieved 100% reconstruction accuracy within a 3-ppm concentration range, where 95% and 99% CVaR intervals were $(-0.040, 0.070)$ and $(-0.060, 0.080)$, respectively. As the use of AI increases, so does the potential for malicious activity within cyber-physical systems.

Varunika Miryala

Discipline: Health and Human Development

Authors:

Abstract Name: Subcutaneous and Sublingual Immunotherapy for Allergic Rhinitis

Allergic rhinitis (AR) is a chronic immunological disease that significantly reduces quality of life and imposes substantial physical and economic burdens. Allergen immunotherapy (AIT), delivered as subcutaneous (SCIT) and sublingual (SLIT) treatment, is the only disease-modifying treatment that targets the underlying cause of AR. However, adherence to both forms of AIT remains low, with most patients failing to complete the minimum treatment duration of 3 years needed to achieve long-term benefits. This review evaluates the efficacy, safety, and convenience of SCIT and SLIT to determine which approach is most advantageous for managing AR. Studies show that both treatments effectively reduce symptom severity and

improve quality of life across adult and pediatric populations, with no major differences in overall efficacy. However, safety profiles differ: SCIT carries a higher risk of serious systemic reactions, while SLIT is primarily associated with mild, localized effects. In terms of cost, SLIT tends to be a more economical alternative, largely due to reduced clinic visits. Nevertheless, both treatments are more effective and financially advantageous over treatment with only medication. Despite clear clinical and economical benefits, persistence and compliance rates remain low for both immunotherapies, emphasizing the need for improved patient education and support. Ultimately, the choice between SCIT and SLIT should be guided by patient preference, convenience, and clinical direction within a shared decision-making model. Aligning treatment with patient values can improve long-term adherence and overall health outcomes, especially for management of chronic diseases.

Carley Mitchell

Discipline: Social Work and Human Services

Authors:

#1 Catherine Earley

Abstract Name: Cost Barriers to Adoption: A Call for Change

Over a hundred thousand children sit in the adoption and foster care systems waiting to be given a home, but the staggering cost of private adoption to families deters many. A study by the Dave Thomas Foundation found that over a third of adults in the United States have considered adoption, but only about 2-4% of adults actually adopt (Adoption Network, 2022). There are thousands of families with a desire to adopt and thousands of children wishing for a permanent home, yet the low rates of placement suggest that there are factors preventing families from adopting. While there are studies researching adoption and its effects, there is a paucity of research examining the relationship between cost and adoption rates. Thus, we decided to undertake a study inspecting the role that cost plays in the private adoption process. This project will be a qualitative phenomenological project, analyzing qualitative interviews of those who have seriously considered adoption or have adopted. Our research investigates the following: Does the high cost of private adoption deter families from adopting children? We hypothesize that there will be a significant relationship between financial barriers to adoption and adoption outcomes.

Carley Mitchell

Discipline: Social Work and Human Services

Authors:

#1 Packiaraj Arumugham

Joanna Estrada

Louisa Barrick

Abstract Name: The Relationship between Spiritual Well-Being and Mental Health of Commuter and On-Campus College Students

The purpose of our study is to examine the relationship between the spiritual well-being and mental health of students living on campus and that of commuter students. Mental health struggles are a prevalent issue among college students according to Emmerton et al. (2024). The college experience can be vastly different between commuters and residents; consequently, there may be a difference in these students' mental health. The empirical study of Kharameh et al. (2016) has revealed that religiosity has improved mental health in

students. However, there is very limited research exploring the relationship between the spiritual well-being and mental health of college students. Hence, we decided to undertake this study. Mental health setting is one of the major settings in which social workers are employed at and our profession requires social workers to undertake spiritual assessment of our client populations. Thus, this study will help us understand the mental health issues of our future client populations and whether spiritual well-being has any bearing on their mental health which might enable us to serve them better. Our research question is as follows: What is the relationship between the spiritual well-being and mental health of college students living on campus and commuters? We hypothesize that there is a statistically significant relationship between the spiritual well-being and mental health of college students. We also hypothesize that there is a statistically significant relationship between the mental health of commuting students and on campus students.

Jordyn Mitchell

Discipline: Biology

Authors:

Brooklynn-Lear Norman

Kristan Johnson

Abstract Name: Genomic Analysis of Cold-Adapted *Sulfitobacter pontiacus* from Antarctica

The Antarctic region is described as a frigid, oligotrophic environment. During a November 2009 expedition, phytoplankton were observed in the bottom 5 cm of the sea ice cores collected from Ross Sea, McMurdo Sound Station, Antarctica. This study focuses on understanding which type of heterotrophic bacteria are associated with these algae/phytoplankton and whether they have the genomic capacity to utilize these carbon sources. To test this, we used an enrichment culture approach using laminarin and cellobiose as the sole carbon source. The resulting microbial growth was serially diluted and plated on seawater-complete media (SWC), from which four well-isolated colonies (01DW25, 04NG25, 01KJ25, and 01JM25) were selected for pure culture. The 16S rRNA gene was amplified and sequenced. The phylogenomic analysis identified these isolates as *Sulfitobacter pontiacus*. Growth rate estimates on SWC and defined media showed that these isolates did not utilize beta-glucan, suggesting that other microbes had broken down algal polysaccharides into oligo- and monosaccharides (public goods) before isolation. Whole-genome shotgun sequencing and comparative genomic analysis with ANVIO confirmed that the Average Nucleotide Identity (ANI) between the *S. pontiacus* isolates and their closest relative, *S. pontiacus* (GCF_022788675.1), is 97.9%. CAZyme screening showed 22 glycoside hydrolase genes and 37 glycosyltransferase genes. These findings suggest that these psychrotrophic strains have the capacity to break down complex carbohydrates and adopted an energy-conserving strategy called carbon catabolite repression in the lab, which implies that these isolates represent a cheating strain of *S. pontiacus* that likely uses cross-feeding to sustain itself within Antarctic microbial communities, given the inherent costs of resource acquisition in a cold, oligotrophic environment. Future proteomic analyses will investigate specific proteins involved in carbon utilization and environmental responsiveness.

Madeline Mitchener

Discipline: Social Work and Human Services

Authors:

#1 Madeline Mitchener

#2 Judy Folmar

Abstract Name: Unseen and Unsupported: The Experiences of Non-Nuclear Family Students in Higher Education

Societal definitions of family are typically limited to a heteronormative, white, never-divorced, two-parent household. Despite the diversity of family structures among students, higher education continues to uphold the traditional nuclear family model. University structures and processes—from application language, mailings, and tuition payment to campus family weekend(s), academic breaks, and mental health resources—have been developed without fully considering students from non-nuclear families, creating a gap in support and inclusion. Between 25% and 35% of today's college students come from divorced families. Additionally, students come from grandparent-led families, queer families, foster families, and guardianless households. The persistence of an outdated societal ideal of the nuclear family continues to shape university policies and practices, reinforcing exclusionary assumptions. Yet, how these biases, along with the lack of intentional acceptance of diverse family structures, impact students' college experiences remains largely unexamined. To address this lack of exploration, the researchers gathered qualitative data from thirteen interviews with students from non-nuclear family structures. In addition to this, two interviews and two focus groups were conducted with university faculty and staff who engage with this population. This qualitative data was coded and analyzed, allowing for emerging themes to be presented and discussed at NCUR. Dominant themes reveal patterns of parent-student conflict, feelings of isolation from peers, financial strain, and other impacts on college student well-being. This research has already begun to inform practices at the researchers' home institution, sparking conversations and policy shifts in supporting this underserved and understudied population. Furthermore, it has the potential to impact best practices across higher education, encouraging institutions to more intentionally recognize and support the full diversity of students' family experiences.

KIDEST MITIKU

Discipline: Political Science

Authors:

#1 kideest mitiku

Abstract Name: No Childhood at Arms: Why DDR Fails Former Child Soldiers in Ethiopia

Children recruited into armed groups face lifelong harm, yet Disarmament, Demobilization, and Reintegration (DDR) programs are typically designed for adults. This study investigates why Ethiopia's DDR efforts fail former child soldiers and what child-centered reforms are needed. The research combines policy analysis with qualitative data from thirty former child soldiers (twenty-three men and seven women) aged nineteen to sixty-eight, now living in Ethiopia (forty percent) and the United States as asylum seekers (sixty percent). Participants represent two cohorts: an older generation recruited at ages nine to twelve during earlier civil conflicts, and a younger generation recruited at ages fifteen to seventeen during the 2020–2022 Tigray war. Using semi-structured interviews and short surveys analyzed through thematic coding, the study evaluates reintegration across four areas: education, livelihoods, psychosocial recovery, and social acceptance. Findings reveal persistent gaps. Only forty percent of participants are enrolled in school or training, while seventy percent of the remainder wish to return but lack support. Just thirty-one percent report stable employment. About three-quarters experienced stigma in their communities, and two-thirds received no counseling. Women reported layered stigma and fewer opportunities to return to school or work. Participants attributed poor outcomes to short program timelines, limited child-specific services, and weak coordination among government and nongovernmental actors. Comparing Ethiopia with child focused DDR models in Sierra Leone and Uganda suggests practical remedies: guaranteed educational re-entry, trauma-informed counseling, mentored livelihood programs, and community reconciliation initiatives. Ethiopia's DDR model stops at demobilization and fails at reintegration for children. This project proposes a child centered DDR framework aligned with the Convention on the Rights of the Child and regional African norms, outlining policy steps for education, mental-health care, economic reintegration, and community acceptance.

Discipline: Biology

Authors:

#1 Patricia Estes

Abstract Name: Effects of Intermittent Fasting and Diet on Longevity in Flies with Silenced Single-minded Neurons

With the rising prevalence of diabetes and obesity, the need to understand the genetic and physiological causes of these conditions is paramount. The single-minded gene has been shown to regulate appetite, energy balance, and lifespan in animals. We have found that silencing single-minded neurons in *Drosophila* increases the feeding rate of larvae and shortens lifespan. Two effective approaches for reducing weight and mediating the effects of diabetes are intermittent fasting and low carbohydrate diets. In this study, we subjected both flies with silenced single-minded neurons and wild type flies to intermittent fasting and low sugar diets and monitored their lifespans relative to continuously fed controls. Surprisingly, we found that females outlived males under all conditions and that a combination of a low sugar diet together with intermittent fasting was more harmful than continuous eating and intermittent fasting alone. These results suggest that the combination of intermittent fasting and low sugar diets does not increase lifespan in the flies, and suggest that single-minded activity affects lifespan and energy regulation during periods of starvation.

Kouei Mizuno

Discipline: Mathematics

Authors:

#1 Kouei Mizuno

Abstract Name: Optimization of Marine Debris Collection Considering Environmental Factors

In Tokyo Bay, large amounts of marine debris are having a serious impact on the natural environment and ecosystems, and there is an urgent need to establish methods that can address this problem efficiently under limited resources. In this study, we propose a method for optimizing marine debris collection routes in Tokyo Bay based on a mathematical model that explicitly incorporates dynamic natural conditions. Conventional collection strategies have not sufficiently accounted for dynamic environmental factors such as tidal currents and wind direction, resulting in inefficient route planning. Although predictive technologies considering environmental factors have been partially introduced by agencies like the Ministry of the Environment, mathematical route optimization utilizing such data has not yet been implemented. To overcome this limitation, we construct a detailed mathematical model of the distribution and movement characteristics of marine debris, using multifaceted information including historical meteorological and oceanographic data as well as observed drifting patterns of debris. Based on this model, we design collection routes by applying an optimization approach based on the Traveling Salesman Problem. The objective of the optimization is to minimize the travel distance of collection vessels while maximizing the total amount of debris collected. To reflect operational realities, we impose constraints that prioritize “high-density regions,” ensuring that the selected collection points meet a predefined target volume. Furthermore, this model enables more precise route planning by incorporating the realistic factor that debris positions drift due to environmental factors such as wind and tidal currents, thereby causing dynamic changes in travel costs between locations. Numerical simulations conducted to validate the effectiveness of this model confirmed that routes reflecting drift predictions enable debris collection via the shortest path while achieving the target collection volume.

Payton Mlakar

Discipline: History

Authors:

Abstract Name: The Coal Seams at the End of the World: Early Industrial Coal Mining on Svalbard

The Arctic Archipelago Svalbard occupies a unique place in global industrial history. In 1899, a Norwegian sealing captain, Søren Zachariassen, became the first person to commercially mine and sell coal on Svalbard. This inaugurated a rush of prospecting and industrial mining activity on the archipelago as industrialists from across Europe and the United States sought to locate and freely exploit coal seams across Svalbard. Those seeking to exploit this opportunity dealt with two primary concerns that, when combined, generated a unique set of operational challenges to mining on Svalbard. First, mine operators leveraged Svalbard's international status as *terra nullius* (no man's land) to conduct operations outside of industrial and labor regulations that drove up costs elsewhere in Europe and the United States. Second, mine operators had to contend with the natural challenges of working in an Arctic environment with ever-shifting sea ice and weather conditions, as well as the long, dark polar winter. This project explores how two mining companies, the American-owned Arctic Coal Company (ACC) and the British Spitsbergen Coal and Trading Company, developed mining operations in this unique environment on Svalbard in the early 20th century. The research supporting this endeavor represents a focused synthesis of robust scholarship and archeological analyses of the ACC's operations at Old Longyear City and the British Spitsbergen Coal and Trading Company operations at Advent City produced by the Large-Scale Industrial Exploitation of Polar Areas (LASHIPA) project. Using the insights from the LASHIPA project, this analysis focuses on understanding the material and social history of the mining operations of these two companies at Old Longyear City and Advent City and how Svalbard's international legal status and Arctic environment impacted the conduct, and ultimate demise, of these operations.

Pasant Moanes

Discipline: Exercise Science and Nutrition

Authors:

Abstract Name: Objective Measurement of Post-Stroke Activity Levels: A Longitudinal Evaluation Using the McRoberts Monitoring Belt

Stroke is a leading cause of long-term disability, often resulting in reduced mobility and difficulty completing daily activities. Traditional clinical assessments provide only brief snapshots of functional ability, making continuous monitoring useful for understanding a survivor's real-world activity patterns. This study used the McRoberts Stroke Monitoring Belt, a wearable device that tracks posture, step count, and energy expenditure, to evaluate daily functional engagement in a stroke survivor over a fifteen-day period. Adult stroke survivors were recruited from rehabilitation centers and instructed to wear the device continuously while maintaining their usual routines. The belt recorded posture classification, movement type, steps taken, total energy expenditure, and Physical Activity Level (PAL), allowing for an ecologically valid assessment of activity outside clinical settings. The participant, SRS01, wore the device for 99% of the monitoring period, providing comprehensive data. Results demonstrated a highly sedentary lifestyle, with 87.9% of the day spent inactive, including 38.7% lying and 49.2% sitting. Only 8.4% of the day was spent standing, and a combined 2.8% involved walking, shuffling, or stair climbing. Energy expenditure reflected similar patterns, as sitting accounted for 50.2% of total energy expenditure, followed by lying at 31.1%. Although stair walking required the most energy per minute, it occurred only 0.2% of the time. The participant averaged 1,797 steps per day and recorded a PAL of 1.28, both well below clinical recommendations for stroke recovery. These findings

highlight significant limitations in daily movement despite preserved capacity for brief, energetically demanding activity. Continuous monitoring provided detailed insight into real-world behavior, offering valuable information for clinicians to tailor rehabilitation strategies, identify barriers to mobility, and develop individualized recovery goals.

Cameron Mobley

Discipline: Biology

Authors:

#1 Dean Tantin

#2 Zuolian Shen

Abstract Name: TCF1 Represses the Expression of Pou2af1/OCA-B in JurKat cells

The advent of immune checkpoint inhibitors (ICIs) has revolutionized cancer therapy by reactivating T cells against tumors. However, this potent anti-tumor immunity often triggers immune-related adverse events (irAEs) due to excessive immune activation. A critical goal is to identify molecular regulators that can uncouple potent anti-tumor responses from pathological autoimmunity. The transcriptional coactivator OCA-B, encoded by Pou2af1, is essential for memory CD4+ T cell development, a population vital for durable tumor control. As these cells may also drive irAEs, OCA-B represents a therapeutic double-edged sword. Intriguingly, OCA-B expression is inverse to that of the transcription factor TCF1: TCF1 is high in naïve T cells and declines upon activation, while OCA-B is low in naïve cells and increases. This pattern suggested TCF1 might directly repress Pou2af1 to regulate OCA-B. We investigated this using a luciferase reporter assay. The Pou2af1 control region was cloned upstream of a luciferase gene. We designed three constructs: a wild-type sequence, a variant with a mutated canonical TCF1 binding site, and a variant with an additional mutation at a downstream putative site. These were transfected into JURKAT and SUPT1 T cell lines. In two out of three independent experiments, the presence of wild-type TCF1 binding sites significantly reduced luciferase activity compared to mutated sites. This supports a model where TCF1 acts as a transcriptional repressor of Pou2af1. Our findings establish a novel repressive relationship between TCF1 and OCA-B. This TCF1-OCA-B axis presents a promising therapeutic target. By understanding how to selectively modulate this pathway, we may engineer T cell responses that enhance ICI efficacy while constraining irAEs, aiming to separate anti-tumor immunity from its toxic side effects.

Samantha Mock

WI - University of Wisconsin-Platteville

Discipline: Biology

Authors:

#1 Samantha Mock

#2 Ian MacKenzie

#3 Mark Levenstein

Abstract Name: Enhancing Agrochemicals to Combat Pesticide Resistance

The agricultural industry relies on the use of pesticides to produce high yielding crops to feed the nation. It is estimated that 10-23% of crops grown yearly are lost to fungal infections, and the slow pace of new or modified agrochemicals entering the market is contributing to rising levels of pesticide resistance. The element fluorine is broadly biologically active and remains active longer than other elements, making it an

element of interest in modern day agrochemical synthesis. The goal of this project is to determine the effectiveness of modified agrochemicals as well as any potential toxicity they may pose toward end consumers. The candidate antifungal drug Griseofulvin was used to establish a baseline concentration of toxicity to *Microsporum gypseum* followed by toxicity assays on RAW 264.7 and C2C12, macrophages and myoblast cell lines respectively. Activity of the antifungal on *M. gypseum* was determined by disk assays measuring zones of inhibition created by the fungi. Toxicity towards mammalian cells was then analyzed at the determined concentrations. Through collaboration with UW-Platteville's agriculture department, we hope to determine if modified griseofulvin is a candidate pesticide for corn and/or soybeans, common crops grown in Wisconsin. We anticipate that modifying agrochemicals will help combat issues of pesticide resistance for the agricultural industry.

Diya Modi

Discipline: Economics

Authors:

#1 Diya Modi

Abstract Name: Does Childhood Financial Instability Influence Financial Solvency in Adulthood?

This research studies the relationship between childhood financial instability and how that correlates to their financial solvency as an adult in the United States. While there are several studies that discuss the effects of one's childhood financial instability on their academic outcomes, there are few that consider their effect on their financial solvency in adulthood. Data from the National Longitudinal Study of Youth (NLSY) will be used to study the correlation between childhood financial instability and adulthood financial solvency. Through which the research aims to understand the long-term effects of growing up in a financially instable household. The expected result of this research is to have a broader and deeper understanding of how these variables can affect the long-term chances of individuals' success in life. This topic has important policy implications that will encourage policy changes that can prioritize support for underprivileged children, along with highlighting the importance of education and financial literacy.

Advika Modi

Discipline: Computer Science

Authors:

#1 Advika Modi

#2 Diptendu Giri

Diptendu Giri

Abstract Name: Predicting the Overall Stability of Airplanes Using AI Machine Learning Techniques

AI and machine learning (AI/ML) techniques are now widely used to develop predictive models across medicine, engineering, and other scientific disciplines. Despite this broad adoption, their integration into aerospace engineering remains comparatively limited. One of the primary reasons is the scarcity of accessible, high-quality experimental data, as aerospace companies often withhold proprietary information due to commercial, security, and competitive constraints. Consequently, researchers face challenges in training and validating robust AI/ML models for aerospace applications, underscoring the need for open datasets. Currently our work involves a dataset on Kaggle, an open-source website. In this work we utilize IBM Watson and a 90:10 split for training and testing data, with two models created per variable. For weight

efficiency and vibration damping, IBM Watson created a Snap Decision Tree Classifier (~41% accuracy) and a Snap Random Forest Classifier (~40% accuracy); for durability, IBM Watson created a Snap Logistic Regression (~48% accuracy) and Snap Random Forest Classifier (~48% accuracy). E (GPa) and Optimization were the two most important factors in predicting each of the three target variables. The low accuracies of each model gave insight to the complexity of predicting each target variable, as each was affected by a combination of other factors. In order to investigate the impact of split ratio for the treating and testing data, current work is dedicated to using the same dataset with few more algorithms. New results are comparatively encouraging and are being compared to our previous results. Our presentation will include full details on various algorithms employed to develop these predictive models and will provide a detailed discussion on results.

Niya Mogheeth

Discipline: Psychology

Authors:

#1 Niya Mogheeth

Abstract Name: From Transfer to Triumph: Institutional Support and Faculty Relationships as Catalysts for Black STEM Students' Achievement at HBCUs

Black students who transfer to Historically Black Colleges and Universities (HBCUs) often seek cultural affirmation and institutional support after racially hostile or unwelcoming experiences elsewhere. Yet Black transfer students can face gaps in onboarding and faculty engagement that threaten persistence. This study examines how institutional support and student–faculty relationship quality influence academic motivation and achievement among Black transfer students at HBCUs. We hypothesize that students who perceive high institutional support and faculty warmth will report greater motivation, persistence, and improved course performance. Using data from a larger NSF-funded project, we analyze surveys from 267 Black undergraduate transfer students in introductory STEM courses across 32 HBCUs. Literature indicates that students transfer seeking psychological safety, cultural belonging, and stronger mentorship. We will use hierarchical linear modeling to test links among institutional support, student–faculty dynamics, motivation, and achievement. We expect stronger perceived institutional and faculty support to be associated with higher motivation and course achievement. Thematic analysis of open-ended responses should show that cultural affirmation and negative prior institutional experiences drive transfer decisions. This study addresses a critical gap by focusing on Black transfer students at HBCUs, an often-overlooked population in transition research. Ultimately, we aim to advance equity in higher education by clarifying the structural and relational conditions that foster success for Black students navigating transfer pathways.

Reem Mohamad

Discipline: Psychology

Authors:

#1 Sonjia Kenya

#2 Ashley Gray

Abstract Name: The Relationship Between Anxiety Symptoms and Hypertension Among Adults in the U.S.V.I

Hypertension is a major health concern in the United States Virgin Islands (U.S.V.I.), affecting a large portion

of adults. Moreover, community health assessments report rising stress levels and limited access to mental health services. Despite the increase in these conditions, little is known about how these conditions potentially overlap and interact in designated health professional shortage areas, such as the U.S.V.I. While participating in a research fellowship addressing cardiovascular health in the USVI, the prevalence of anxiety and hypertension among USVI adults was examined and the relationship between anxiety symptoms and self-reported hypertension was evaluated. From July 8th to July 12th, 2025, surveys were administered to 105 USVI adults at various community locations. The 15-item survey combined specific items from the Generalized Anxiety Disorder 7-item Scale (GAD-7) and the WHO STEPS survey instrument. Demographics were determined by five questions adapted from the Behavioral Risk Factor Surveillance System (BRFSS). Data was entered into the IBM SPSS software, where independent sample t-tests and a Pearson correlation test were performed. No relationship was found between anxiety and hypertension. Participants with diagnosed hypertension who were adherent to medication were much older than those without diagnosed hypertension. Given the small sample size and convenience sampling, coupled with the context as a research training activity, significant outcomes were not expected. Further limitations include a lack of variability due to a small sample size and the inherent biased nature of self-reporting; however, there were notable strengths as well, such as addressing the gap in research, utilizing well-established scales with good psychometric properties, and being conducted amongst an underrepresented population. As for future studies, researchers may want to conduct this study in a qualitative manner to gain better insight, pool participants from the other U.S.V.I. islands (St. Croix, St. John, and Water Island), or investigate other moderating factors.

Lina Mohamedhaj

Discipline: Chemistry

Authors:

Abstract Name: Using Aromaticity to Design Single-Molecule Electronics

Single-molecule electronics utilizes molecular components to reach miniaturization limits for electronic devices. They offer several advantages, including extremely small size, high efficiency, and low material costs. Furthermore, they provide a unique opportunity to explore how a molecule's chemical properties influence its electronic behavior. Understanding the specific effects of molecular design on electron transmission through individual molecules is central to progress in this field. Aromaticity refers to the stability found in cyclic, planar, conjugated π -electron systems. In contrast, antiaromatic molecules are destabilized due to the arrangement of π electrons within their cyclic structures. These variations significantly affect a molecule's electronic structure, energy level distributions, and electron transport behavior. We have used computational chemistry to investigate structure-property relationships in molecular design based on structural features and aromaticity in single-molecule junctions. We have extended this study to investigate the role of aromaticity in the function of single-molecule photoswitches. Our results can be used to guide the design of single-molecule electronic devices and may offer new insight into nanoscale devices and confined molecular systems.

Sundus Mohamoud

Discipline: Biology

Authors:

#1 Sundus Mohamoud

#2 Sarah Mclarnan

Abstract Name: Evaluating the Effects of Environmentally Relevant PFAS Mixtures on Human Cell Viability and Mitochondrial Density

Per- and polyfluoroalkyl substances (PFAS) are synthetic, long-lasting compounds widely used since the 1940s in commercial and industrial products. Because of their strong carbon–fluorine bonds, PFAS persist in the environment and accumulate in living organisms, leading to contamination and health risks such as cancer, immune disruption, and hormonal imbalance. While most toxicological studies focus on individual PFAS, real-world exposure occurs as mixtures. This study aims to evaluate the toxicity of environmentally relevant PFAS mixtures on human cells, focusing on cell viability and mitochondrial density to better understand combined chemical effects. Human colorectal carcinoma (HCT 116) cells were exposed for 24 hours to seven treatment groups: two PFAS mixtures and five individual compounds (PFOA, PFOS, PFBA, PFBS, PFHxS) at environmentally relevant concentrations ranging from 0.1 nM to 1 μ M. Mixture 1 consisted of equal proportions of the five PFAS, while Mixture 2 reflected realistic blood-level ratios from Minnesota biomonitoring data. Cell death and mitochondrial density were quantified using fluorescence microscopy and analyzed with CellProfiler software to assess dose- and compound-specific toxicity. Preliminary analyses showed variability in cellular responses across all exposures. Mitochondrial density differed by compound and concentration; PFOS and PFBS produced the highest increases at 100 nM, while PFHxS caused reductions at higher doses. Both mixtures decreased mitochondrial density, with Mixture 2 exhibiting a stronger effect at 10 nM. While results were not significant, the variation in effects by compound mixture is indicative of the importance of studying biologically relevant exposure in addition to individual compounds and equimolar mixtures. Understanding these effects is critical for assessing potential risks to human health, particularly during sensitive periods of neurodevelopment.

Ria Mohan

Discipline: Health and Human Development

Authors:

#1 Jolie Black

#2 Mythili Batchu

#3 Shruthika Senthilkumar

#4 Cynthia Tschapl

Abstract Name: Mapping illness: Historical redlining injustices' impact on tuberculosis transmission

Tuberculosis (TB) remains a persistent public health challenge in the United States, with most jurisdictions suffering an outbreak in 2024. Historic discriminatory lending practices, including neighborhood letter grades assigned by the Home Owners' Loan Corporation (HOLC) in the 1930s, may contribute to TB transmission due to resulting poor housing conditions. This pilot study examined the association between the extent of “D” grades, what we call redlining today, and TB incidence rates in California, Florida, Massachusetts, and Washington. We downloaded historical HOLC data from diversitydatakids.com. We then converted the census-tract level data (2010 tracts) into the county-level average of the geographic area graded “D” for the four states. Using bivariate linear regression analysis in R, we explored the association between this average percent and CDC-reported TB incidence rates from 2010 and 2023. We found each additional percent of area graded “D” was associated with a 17% increase in 2010 TB incidence rate for the county, as well as an 11% increase in the 2023 TB incidence rate. Furthermore, the two models produced an adjusted R^2 of 0.134 and 0.161, respectively, suggesting that 13-16% of the variation in TB rates is explained by the single variable of average area graded “D.” Counties without any redlining data and no TB incidence were not considered in the models. We found a statistically significant relationship between the extent of redlining in a county and its 2010 and 2023 TB incidence rates in four states, despite the passage of over 70 years. This relationship remaining significant in the model using 2023 data may underscore how the COVID-19 pandemic emphasized many persisting health disparities. Our next steps are to account for additional control variables and incorporate redlining and TB incidence data for more states. The results suggest the need for structural changes to help achieve TB elimination goals.

Sarah Imani Mola

Discipline: Psychology

Authors:

#1 Sarah Imani Mola

Abstract Name: Associated Psychological Factors in Political Behaviors of First- & Second-Generation Immigrants

A common problem in psychology research is that it has largely favored the WEIRD population and uses broad cultural groups when analyzing data. This culturally insensitive view can affect how research is used in the application or understanding of behavior. A lack of a multicultural perspective was clear in the analysis of 2024 election research. This election was historic in many ways. It had the 2nd-highest voter turnout rate since 1908 and was one of the most polarizing in recent history. The increased voter turnout is understandable given that education levels and political participation rose at both the state and national levels throughout the 2020s. One of the biggest deciding issues in this election was immigration. Researchers often used broad (often racial) categories to analyze political decision-making and attitudes, particularly those of American immigrants. Inaccurate predictions and misinterpretations of behavior and attitudes are the result of using such overgeneralized categories, which ignore the subtleties of smaller group differences in behavior. This study aims to use a multicultural perspective to examine differences in political behavior across multiple immigrant groups living in Southern California. Using Berry's level of acculturation model, we investigate cultural differences in political behavior between first- and second-generation immigrants from various ethnic groups. Two dimensions from Hofstede's dimensions of culture, power distance and uncertainty avoidance, are used to gauge attitudes toward an immigrant's culture of origin.

Discipline: Biology

Authors:

#1 Akshay Molakalapalli

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Saketh Majeti

Abstract Name: Establishment of a Conditionally Replicating Guinea Pig Cytomegalovirus Model for Molecular Characterization of Latency

Human cytomegalovirus (HCMV) is a member of the Herpesviridae that establishes life-long latent infections that pose risks of life-threatening disease upon reactivation in immunocompromised individuals. Understanding the molecular mechanisms that govern the latent state is critical for developing effective treatments. However, molecular characterization has been impeded by the scarcity of latently infected cells in vivo and the inability of current in vitro models to support the expansion of clonal latent cell lines. To address these limitations, we developed a novel cell culture model utilizing a conditionally replicating guinea pig cytomegalovirus, a relative of HCMV that mimics HCMV pathology and provides a valuable animal model. We engineered a recombinant guinea pig cytomegalovirus, GP56/52-DD, in which two essential viral replication proteins are fused to a destabilization domain. This genetic modification creates a molecular switch controlled by the synthetic ligand Shield-1. The presence of Shield-1 stabilizes these proteins, permitting normal viral growth, whereas in sister cultures lacking Shield-1, the fusion proteins degrade, preventing lytic replication. Thus, in the absence of Shield-1, GP56/52-DD-infected fibroblasts are forced into a latent state. Preliminary studies demonstrate that infections lacking Shield-1 result in long-term viral persistence without lytic replication. Addition of Shield-1 up to 84 days post-infection triggers reactivation to lytic replication, confirming the establishment of bona fide latency and suggesting that creation of clonal latent cell lines may be feasible. Three specific aims will be undertaken: (i) determine if latently infected cells can be propagated, (ii) establish if latently infected cells can be cloned to produce homogeneous cell lines, and (iii) identify viral proteins that are expressed during latency. Development of a similar latency system based on HCMV is in progress. Such conditionally replicating latency models may provide novel platforms for molecular characterization of latency, potentially revealing new targets for preventing HCMV disease.

Gabriela Molina

Discipline: Engineering

Authors:

#1 Gabriela Molina

Abstract Name: A3.M.P.: The future of cost-effective rehabilitative devices.

The goal of A3.M.P. (Affordable, Accessible, and Automotive Mechanical Prosthetic) was to improve the overall design and objectively improve the functionality of the previous prosthetic arm made, while taking into consideration what most amputees deem necessary in an upper rehabilitative device and remaining cost-effective. The construction of the elbow-disarticulation-focused upper rehabilitative device was dependent on optimal sensory detection (EMG Signal Recognition), proper movement of the prosthetic arm in its different poses during testing, and cost-effectiveness. This was done by collecting the most accurate readings from the three EMG muscle sensors. The graphs titled "EMG Signal Recognition" show, by pose (fist, rest, stretch, and

peacesign) the individual samples taken by the three sensors used. This time around, a significantly smaller set of values compared to previous research was used to facilitate device programming. The data would be compiled to form distinguishable ranges that could be identified as the poses. Furthermore, the table detailing the cost comparison of a generic prosthesis and the one in this investigation aims to check for the cost-effectiveness variable in this research. The prosthesis made in this investigation cost around \$287.44 to make, while a generic upper limb device can range in costs from 3,000 to 30,000 dollars. This shows that the production cost of the investigation is significantly lower than that of a generic prosthetic, complying with the cost-effective objective. Overall, the test hypothesis was corroborated, and the research was a success: all data points to optimal sensory detection and autonomous functionality in A3.M.P.

Christian Molina

Discipline: History

Authors:

Abstract Name: The Visible and the Invisible Empires: Analyzing the Klan Through the Lens of Officiality

The Ku Klux Klan of the 1920s, regarded as the 2nd incarnation of this organization, was a dominant, nationalist group that held between 3-6 million members at its peak. The Klan was a political machine, retaining hundreds of politicians in its ranks, and sponsoring even more. It was also responsible for horrendous acts of violence against Black people, Jewish people, Catholics, and any other minority they deemed un-American. The Klan was made up of seemingly regular members of society turned hateful and led by demagogues who profited from the hate they propagated. There has been much literature on the Klan, mostly on different local branches and their actions, and sometimes on the national scope of the Klan, but this paper looks at both. Using stories recovered from archives that have never before been seen in the field, this paper details the rise of the Klan and the pushback against it in the 1920s, including brief adventures into Mexico and the reluctant acceptance of women into the Klan. This paper then seeks to analyze the organization through the lens of "officiality." That is, it seeks to separate the official actions of the Klan (those which were sanctioned by official leadership) and unofficial actions of the Klan (those which Klan officials pretended to denounce). This paper differentiates these facets so that individuals may recognize, both in historic and contemporary times, the patterns of nationalist movements, both on the ground level and the organizational level. Ultimately, this paper finds through anecdotes and analysis that the official Klan was essentially a gift, created and expanded to capitalize on hatred as a means of profit and power. And the unofficial Klan was the truly violent side of the organization that came as a result of the artificially-created hatred spread by the official Klan's words.

Xander Molina

Discipline: Biology

Authors:

Abstract Name: Tension-Dependent Analysis of Marine Sponge Extract's Impact on Myofibroblasts affected by Dupuytren's Contracture Using OCT

Dupuytren's contracture is a condition where the tissue beneath the skin of the palm and fingers thickens and forms nodules, causing the fingers to bend inward. Over time, this can limit hand mobility and make it difficult to fully extend the affected fingers. It is propagated through over contraction of myofibroblasts. Prior experiments have been performed to provide preliminary data that supports the efficacy of inhibition of

myofibroblasts exposed to marine sponge extract (02PD1L). Preliminary data suggests that 02PD1L inhibits cell migration, furthermore through curvature measurements of 2D cross sections of collagen lattices have shown a significant decrease in tension generation by myofibroblasts treated with 02PD1L in comparison to non-treated cells. This project assesses the characteristics of 02PD1L. First, through 2D and 3D measurements of tension generation of myofibroblasts treated with extracts in high and low-tension environments utilizing optical coherence tomography. Secondly, through comparisons with current known microtubule inhibitors. Finally, coverslip analysis of microtubule characteristics through confocal laser microscopy. This data will define the effects of 02PD1L and will provide future valuable information to help explore the mechanisms and pathways of this experimental drug.

Frances Molitor

Discipline: Biology

Authors:

#1 Natalya Zinkevich

Abstract Name: β 1.2 Modulates Cellular Responses to Physiological Lactate Exposure in Kv1.5-Expressing HEK293T Cells

Lactate was traditionally viewed as only a metabolic waste product, but emerging cardiovascular research shows that cells can use it as both an energy source and a signaling molecule during cellular stress. During conditions such as ischemia, hypoxia, or accelerated glycolysis, lactate levels in tissues can rise to physiologic concentrations between 5-10 mM. These elevations can influence ion channel behavior, oxidative stress responses, and cell survival. Kv1.5, a voltage-gated potassium channel expressed in atrial cardiomyocytes and vascular smooth muscle cells, interacts with auxiliary beta-subunits such as β 1.2. However, it remains unclear whether β 1.2 changes how cells respond to metabolic stress signals like lactate. To address this, we conducted a study investigating whether β 1.2 alters cell survival rates under physiologic lactate exposure. HEK293T control cells expressing neither Kv1.5 channel nor β 1.2 subunit, HEK293T cells expressing Kv1.5 channel only, and HEK293T cells expressing both Kv1.5 and β 1.2 subunit were grown under the same growth conditions (37°C and 5% CO₂). All three groups underwent exposure to physiological concentration of lactate (8mM) for 30 minutes. For each trial (n=4), four “before” and four “after” images were collected for both the no-treatment control and lactate conditions. ImageJ software will be used to analyze these images and quantify changes in cell density. Preliminary imaging results showed a consistent pattern across all trials. In both control HEK293T cells and Kv1.5-only cells, 8mM lactate caused a decrease in cell density after 30 minutes. In contrast, Kv1.5+ β 1.2 cells did not show a decrease in cell density following lactate treatment. No changes occurred in the no-treatment conditions for all three groups. These preliminary findings suggest that β 1.2 may confer protection against lactate-induced metabolic stress. Future studies will advance our understanding of β 1.2’s role in pathological conditions where lactate accumulates.

Sama Monjaze

Discipline: Psychology

Authors:

#1 Sama Monjaze

#2 Norhan Botrous

#3 Rabia Imran

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Norhan Botrous

Abstract Name: Exclusive and Polysubstance Use Associations with Mental Health and Social Support Among Undergraduate Students

Introduction: Though substance use is highly correlated with mental health and social support, there is more limited data regarding these relationships with polysubstance use. This secondary analysis aimed to explore associations between exclusive and polysubstance use, mental health symptoms, and social support. Methods: In Spring 2025, undergraduates at a large Central Virginia university (n=336) completed an online survey. Participants reported demographics, past 30-day alcohol, cannabis, and tobacco use, mental health symptoms (DASS-21), and perceived social support. Individuals were grouped by substance use behaviors (no substances, alcohol-only, alcohol+cannabis, alcohol+tobacco, all three substances). Due to limited sample size, cannabis-only, tobacco-only, and cannabis+tobacco groups (n=20) were excluded. ANOVA and t-tests compared mental health and social support between groups. Correlations between mental health symptoms and social support were assessed. Results: Participants were on average 20.2 years old, 81.8% female, 30.1% White, 24.7% Black/African American, and 14% Asian (remainder identified as other groups). Alcohol-only use was most prevalent (21.5%) followed by use of all three substances (14.0%), alcohol+tobacco (12.2%), and alcohol+cannabis (9.0%). The highest depression and stress symptoms were observed for those who used alcohol+cannabis and/or tobacco which were significantly higher than those using no substances or alcohol-only ($p < .05$). For anxiety symptoms, use of alcohol+tobacco or all three substances was associated with the highest levels which were significantly higher than those using no substances or alcohol-only ($p < .05$). Social support did not differ significantly between groups, but mental health symptoms were negatively correlated with social support ($r = -0.26$ to -0.29 ; $p < .001$). Conclusions: Findings highlight the prevalence of polysubstance use among undergraduates and associated mental health symptoms. Substance use prevention and intervention efforts should leverage protective social factors and provide mental health support.

Samantha Montague

Discipline: Psychology

Authors:
#1 Lauren Myers

Abstract Name: I Love You but I Don't Like You: Intergenerational Ambivalence and Grandparent-Grandchild Emotional Closeness

Older generations influence their grandchildren through child care and emotional connection. For grandparents, relationships with grandchildren provide a second chance at parenting and a sense of pride in continuing the family line. High intergenerational solidarity (family cohesion and sense of connection) strengthens relationship quality between children, parents, and grandparents. However, this only characterizes positive aspects of relationships, such as trust and affection, and excludes how family members may feel simultaneously positively and negatively towards the other (intergenerational ambivalence). High intergenerational ambivalence has negative effects on psychological well-being and is associated with increased stress levels. It is also possible that ambivalence in the relationship between parent and grandparent would affect the interaction quality between the adults and child. Therefore, in this study, I also examine sensitivity which encompasses the observed warmth, connection, and responsiveness between the adult and child. Specifically, I address the gap in the research on effects of intergenerational ambivalence, sensitivity, and emotional closeness. A total of 186 families engaged in 11 triadic (parent-child-grandparent) video chat sessions; for this study I will only be examining the baseline and final sessions. The parent and grandparent also completed self-report measures, including measures of intergenerational solidarity and emotional

closeness. Intergenerational ambivalence will be derived from these measures by computing the Griffin formula. Emotional closeness will also be measured in a self-report measure, and parent and grandparent sensitivity will be measured from observational coding of behaviors seen in video chat interactions. This study will examine whether higher levels of intergenerational ambivalence between parents and grandparents is negatively correlated with emotional closeness and observed sensitivity between grandparents and grandchildren. It is critical to analyze how parent-grandparent relationships subsequently affect grandparent-grandchild relationships and interactions for young children and this study is a first step in this important work.

Ariana Montano

Discipline: Health and Human Development

Authors:

#1 Joshua Gold

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Marisol Ramirez

Abstract Name: Bridging Healthcare Gaps: Evaluating Access, Service Utilization, and Barriers to Care at a Southern California Community Clinic

Access to quality healthcare remains a critical barrier for underserved communities, particularly racial and ethnic minorities and individuals without health insurance. These populations often face compounded challenges, such as language barriers, cultural stigma, limited transportation, and economic instability, which contribute to delayed care and poorer health outcomes. A Southern California free clinic aims to bridge this healthcare gap through a volunteer-driven model offering a variety of free services to low-income populations across Ventura County. To ensure high levels of care, the clinic performs an annual program evaluation. This study examined service utilization, patient outreach, and barriers to accessing healthcare. A total of 100 patient responses were collected across two locations. Responses were collected through a Google Forms survey with in-person interviews in order to accommodate for low literacy levels and limited internet access. Findings revealed that 64.3% of participants do not have access to healthcare outside of these clinics. 81% identified money as the biggest barrier to healthcare access, followed by fear (32.1%). 81% of participants reportedly learned about the clinic through friends or family. 93% of participants sought primary medical care and 70% used the food and clothing distribution. Meanwhile, 63% expressed a strong interest in accessing dental care. Additionally, 66% of participants expressed interest in TeleHealth options if unable to attend in person. These findings highlight the clinic's critical role in the community, supporting the need for continued free services. However, findings also point to key areas for future development, underlining outreach and expansion of services.

Luis Montenegro Calla

Discipline: Biology

Authors:

#1 Daniel Clark

Abstract Name: Organelle Target Discovery in *Naegleria fowleri*: Drug Pockets, Serum Free Medium, and AI Triage in a Warming World

Naegleria fowleri is a thermophilic freshwater amoeba that causes primary amoebic meningoencephalitis, a

rapidly progressive brain infection with a case fatality rate exceeding 97%. As surface waters warm and recreational exposure increases, risk is expanding into regions that previously reported few cases. Current therapies rely on empiric multidrug regimens not designed for this organism and often initiated late in the disease course. This project integrates four components into a single pipeline that seeks mechanistic weak points in *N. fowleri* and links them to earlier clinical decision making. First, protein structure models and open structural biology tools such as PyMOL mapped candidate drug binding pockets on endoplasmic reticulum and mitochondrial proteins that diverge from human homologs. These analyses highlight secretory trafficking and mitochondrial metabolism as promising targets at the organelle level. Second, a simple serum free axenic culture medium (Montenegro's Medium) was developed and optimized to support robust *N. fowleri* growth at low cost while remaining stable during refrigerated storage, which facilitates routine culture in laboratories with limited resources. Third, this medium enabled a 96 well organelle targeted screen that combined endoplasmic reticulum stressors with metabolic modulators in amoeba only plates and in co culture with human cells. Across 24–72 hours, readouts included amoebic cell counts, a necrosis marker, and mitochondrial membrane potential. The NCUR presentation will illustrate drug combinations that drive *N. fowleri* into organelle stress while limiting early injury in the human cell layer, which suggests a tractable window for selective therapy. Finally, a prototype web application (Amoebanator) encodes published case series into a transparent 16 point primary amoebic meningoencephalitis risk score and produces printable summaries plus comma separated value logs suitable for future machine learning analyses. Together, these components outline an early pipeline that connects bench work and bedside decision support for a neglected but highly lethal infection.

Elizabeth Montgomery

Discipline: Chemistry

Authors:

#1 Stephen Hobson

Abstract Name: Evaluation of the Selectivity and Sensitivity of a Novel Molecularly Imprinted Polymer for Detection of Perfluorooctanoic Acid (PFOA)

Molecularly imprinted polymers (MIP) are synthetic molecules that are useful for detection of target analytes in a solution. They are synthesized by polymerizing functional monomers in the presence of a template molecule to form a specific binding site; the template molecule is then removed. We report herein the characterization and preliminary analytical performance of MIPs designed to absorb perfluorooctanoic acid (PFOA) in aqueous environments. Perfluoroalkyl substances are ubiquitous environmental contaminants resultant from both industrial and consumer products and have been implicated in a variety of human diseases. Initial evaluation of the success of molecular imprinting was performed by quartz crystal microbalance (QCM), in which a piezoelectric crystal is coated in the polymer and solutions are passed over the oscillating crystal. Mass deposition was quantified according to the Sauerbrey equation using the change in frequency of the resonating crystal. Using QCM, the binding capabilities of the MIP were assessed for the target perfluorooctanoic acid (PFOA) as well as acetic acid and octanoic acid to account for non-specific or functional group-driven binding. Finally, the performance of the MIPs as binding sites with other sensor architecture will be reported. When successful, the MIP may be incorporated as a critical component for PFAS detection in aqueous environments.

Kamauri Montgomery

Discipline: Health and Human Development

Authors:

Abstract Name: Diet- Related Stress and Coping Behaviors Among Latin* Adults Living with Chronic Conditions in Rural Southwest Virginia During the COVID-19 PAndemic

Latin*adults living with chronic conditions are at heightened risk for poor COVID-19 outcomes and worsening disease management. Rural communities often face additional barriers, including limited healthcare access and economic constraints. Diet-related stress and coping behaviors are particularly important, as disruptions in food access and changes in eating patterns during the pandemic may directly affect chronic disease management. From May 2020 to February 2023, Latin* adults in rural southwest Virginia were invited to participate in an online survey administered via REDCap in English or Spanish. The survey included 80 questions, but this substudy focused on sociodemographic characteristics, chronic disease status, and diet-related sources of stress and coping behaviors during the COVID-19 pandemic. Data analysis was limited to descriptive statistics for sociodemographic characteristics overall and according to diet-related stressors and coping behaviors. One hundred and two Latin* adults were recruited, with the majority aged 30 or older (66.7%), female (67.6%), and earning less than 24,999 (54.9%). Less than a quarter(22.5%) reported living with a chronic condition (diabetes and/or hypertension). Among this subgroup, 30% identified access to food and 21% identified access to water as sources of stress during the pandemic. Slightly over a quarter (26.0%) coped by consuming comfort foods such as chips and candy, whereas 17.4% coped by eating healthier. These findings provide an snapshot of diet-related stress and coping behaviors among Latin* adults with chronic conditions in rural southwest Virginia during the COVID -19 pandemic. Reliance on comfort foods as a coping strategy may affect chronic disease management, highlighting the need for interventions that support access to healthy foods and culturally appropriate dietary coping strategies. Future research should examine how these behaviors influence long-term health outcomes and identify approaches to mitigate diet-related stress in rural Latin*communities.

Erika Monzon-Martinez

Discipline: Psychology

Authors:

#1 Monica Lawson

Abstract Name: Division of Labor and Children's Outcomes During the Pandemic

The COVID-19 pandemic significantly disrupted the daily lives of families. Caregiver demands increased, and household dynamics were reshaped, creating a unique stressor that potentially influenced children's psychopathological development. This study examines the correlation between the division of household labor and children's psychological well-being, with a particular focus on internalizing and externalizing outcomes. In this study, parents (N = 363) of 4- to 10-year-olds living in the United States completed online questionnaires regarding demographics, children's strengths and difficulties, and caregiving hours. It was hypothesized that a greater imbalance in childcare responsibilities would be associated with higher levels of internalizing and externalizing behavioral outcomes in children. However, the labor difference was not significantly correlated with either externalizing ($r = -.044$, $p = .403$) or internalizing ($r = -.051$, $p = .330$) outcomes. In contrast, external and internal outcomes were strongly and positively correlated ($r = .685$, $p < .001$). The findings from this study suggest that the unequal distribution of childcare alone may not be a key predictor of children's psychological outcomes during times of crisis. Implications will be discussed.

Braelynn Mooney

Discipline: Communications

Authors:

#1 Claire Youngnyo Joa

Abstract Name: Emotional Engagement and Student Learning in Social VR

This research investigates how social virtual reality (VR) can enhance students' emotional engagement in college classrooms and its relationship to learning. As higher education integrates immersive digital technologies, questions about their usability and effects on engagement have grown (Marks & Thomas, 2022). Social VR—interactive environments where participants communicate through avatars—offers new opportunities to support engagement through a heightened sense of co-presence (Ahn et al., 2024). This study focuses specifically on emotional engagement, an often-overlooked aspect compared to cognitive and behavioral engagement. When students feel emotionally connected to their peers and learning environment, they are more likely to take creative risks, share original ideas, and collaborate meaningfully. The COVID-19 pandemic increased social anxiety and reduced students' sense of belonging (Ifenthaler et al., 2023), emphasizing the need for emotionally supportive learning spaces. Prior research suggests Social VR can provide alternative social channels that foster emotional engagement by offering immersive, expressive experiences not available in traditional classrooms (Scavarelli et al., 2021). The central research question examines how Social VR experiences influence emotional engagement and learning. A 2 (avatar personalization: low vs. high) $\times$ 2 (types of social interaction: guided collaborative vs. open informal) repeated-measures experiment will be conducted in FrameVR, a browser-based social VR platform. It is expected that personalized avatars and collaborative tasks will increase enjoyment, confidence in expression, and perceived connection. After each session, students will complete surveys assessing emotional engagement and learning, complemented by the researcher's observations and brief written reflections. Pending IRB approval, the study will be implemented in a Spring 2026 Mass Communication course. Results aim to deepen understanding of Social VR's role in fostering emotional connections within classrooms.

Grace Moore

Discipline: Biology

Authors:

#1 Grace Moore

Abstract Name: Understanding Vaccine Hesitancy in Veterinary Medicine: A Review of Client Attitudes

Uncertainty toward vaccination, long recognized as a public health concern in human medicine, is increasingly emerging within veterinary contexts, posing risks to both animal and community health. This literature review and survey-based study examine the development, causes, and implications of reduced vaccine confidence in veterinary medicine, with emphasis on small animal and some large animal practices. The review combines historical and current research to explore how vaccination perceptions have evolved among veterinarians and clients, and how factors such as the COVID-19 pandemic have shaped current attitudes. The literature highlights recurring themes surrounding vaccine reluctance in veterinary settings. Client perceptions of safety, efficacy, and necessity are often influenced by misinformation, social media, and mistrust of professional recommendations. The overlap between human and veterinary vaccine discourse has contributed to skepticism toward both core and non-core vaccines in companion animals. Veterinarians increasingly report that these discussions require enhanced communication skills and empathy to address diverse client concerns. Differences in vaccination rates across regions and species further suggest that socioeconomic and cultural factors significantly influence vaccination behavior. The ongoing survey component assesses vaccine awareness, confidence, and communication practices among veterinarians and animal owners in Cache Valley, Utah. It examines factors such as perceived risk, information sources, and trust in veterinary expertise, as well as the influence of human vaccine attitudes on animal health decisions.

Although data collection is ongoing, anticipated findings aim to inform outreach strategies that strengthen education and rebuild client trust. Overall, this research emphasizes the importance of evidence-based messaging, transparency, and proactive communication in promoting vaccination as a foundation of preventive care, animal welfare, and One Health initiatives. Keywords: vaccine hesitancy, veterinary medicine, communication, public trust, vaccination uptake, One Health

Anna Moore

Discipline: Biology

Authors:

#1 Nuria Vendrell-Llopis

Abstract Name: Characterization of the Early Spread of Alpha-synuclein in a Mouse Model of Parkinson's Disease

The neural dysfunction observed in neurodegenerative diseases has been linked to the misfolding of naturally occurring proteins. One of these proteins, Alpha-synuclein, is a hallmark of Parkinson's disease and Dementia with Lewy Bodies. Due to the ever-increasing rate of Parkinson's diagnoses, the pathology of Alpha-synuclein has been well studied to better understand the various stages of the disease. However, there is one critical gap in our understanding of the pathology: spreading in very early stages, which is crucial for timely diagnoses and treatment. To bridge this knowledge gap, I use a newly developed specialized mouse model that expresses Alpha-synuclein, linked to a green fluorescent protein. I inject this mouse line with a synthetic version of the naturally occurring Alpha-synuclein fibril aggregate, commonly used to explore the pathology of misfolding alpha synuclein, PFFs. The fluorescent marker in these mice, combined with the PFFs, allows me to track how aggregates spread between neurons and what percentage of the neuron they occupy. I will also use two-photon microscopy and a red-shifted calcium indicator to monitor calcium signaling activity. With this approach, I will monitor neuronal aggregation on either side of the cortex while simultaneously monitoring the calcium signaling activity of the same neurons daily for several weeks. Our results will show the day-to-day progression of Alpha-synuclein aggregation and the effects of aggregation on neuronal functioning, in comparison to that of neurons without fibrils. Developing a better understanding of the order and consequences of the early spreading of this protein could allow for a greater understanding of how to develop better early-stage treatment plans for diseases such as Parkinson's.

Kaylee Moore

Discipline: Criminology/Criminal Justice

Authors:

#1 Steven Keener

Abstract Name: Peer Support Specialists in Virginia's Therapeutic and Behavioral Health Courts

This qualitative analysis will explore the role and benefits that peer support specialists serve for both court personnel and participants within behavioral health and therapeutic court dockets. Peer support specialists are certified professionals with a lived experience of criminal justice involvement, serious mental illness, and/or substance use disorders. These individuals serve a unique role within the criminal justice system as liaisons between legal actors and defendants. Peer support specialists facilitate communication by helping court personnel understand defendants' experiences and by translating complex legal requirements and treatment stipulations for those they assist. Many individuals struggling with serious mental illness and/or substance use

disorder report feeling a stronger sense of kinship with peer support specialists and generally feel more comfortable revealing to them if they have relapses in their treatment. In the context of Virginia's therapeutic and behavioral health courts, my research examines the various roles that peer support specialists play in advocating for defendants, interpreting and communicating defendants' conditions to legal actors, facilitating assistance to those with structural challenges, and maintaining confidential, trust-based relationships within diversionary dockets. Additionally, I will explore recent tensions between organizations producing best practice guidance and peer support specialists, including debates surrounding their efficacy and calls in some jurisdictions to restrict them within alternative courts. The data for this research will be drawn from participant observations conducted across therapeutic and behavioral health courts, as well as semi-structured interviews with various team members, including docket coordinators, attorneys, probation officers, and peer support specialists themselves. Peer support specialists are a relatively contemporary addition to diversionary courts therefore inquiry into their position and any potential resistance is imperative in navigating the future of therapeutic and behavioral health courts and criminal justice diversion overall.

Katelyn Moore

Discipline: Biology

Authors:

#1 Farrah Bashey-Visser

#2 Morgan Familo

Abstract Name: Dead end? Alternative Life Strategies for Nematodes Who Lose Their Symbiont

Symbiotic relationships can range from flexible to extremely specific, with some organisms becoming so dependent on their partners that they can't survive or reproduce without them. In the obligate mutualism between insect-pathogenic nematodes (*Steinernema* spp.) and their bacterial partners (*Xenorhabdus* spp.), the nematodes typically associate with one bacterial strain. However, the bacteria can and will often associate with multiple nematode hosts. This asymmetry raises an important question: what happens when a nematode loses its bacterial partner? There are no barriers for coinfection and once inside the insect, the symbiont bacteria and the associated nematodes separate creating an opportunity, where the nematode may lose access to its native symbiont. In previous work, *Steinernema* affine nematodes grew and developed on non-native bacterial symbionts equally well as when on their own but were more likely to leave the host environment without a bacterial symbiont over carrying out a non-native symbiont. In this study, we are seeing if there are alternative strategies for nematodes that lose their bacterial partner and how these strategies affect reproductive success and virulence. We tested three hypotheses: first, the nematodes who have no bacteria will be faced with a "dead end" and won't be able to reinfect an insect essentially ending their line, secondly the nematodes that carry no bacteria can be "rescued" if exposed to their bacterial symbiont and reproduce successfully. Lastly, bacteria-free nematodes will be able to co-op a non-natively infected insect host, but at lower levels of success compared to those carrying a native symbiont. The nematodes with no bacteria and that had no opportunity to find a new bacterial partner didn't infect a new host therefore unable to reproduce. The nematodes without bacteria who were placed with their native and non-native bacterium were able to reinfect a host which potentially means they were "rescued".

Alani Moore

Discipline: Biochemistry

Authors:

#1 Daniel Lee

Abstract Name: The Impact of Ornithine Decarboxylase 1 in Animal Models of Tauopathy

Alzheimer's disease (AD) is a progressive neurodegenerative disorder characterized by memory impairment, synaptic dysfunction, and neuronal loss, with abnormal aggregation of the tau protein serving as a major pathological hallmark. Polyamines are small aliphatic cations essential for cellular processes including growth, differentiation, and stress responses. Prior in vitro studies suggest that higher-order polyamines, such as spermidine and spermine, may reduce tau aggregation, indicating a potential therapeutic mechanism. However, we do not know how polyamines effects different forms of tau like P301L in vivo. In this study, we investigated how increased polyamine synthesis affects tau biology by targeting ornithine decarboxylase 1 (ODC1), the rate-limiting enzyme in polyamine production. Polyamine levels were enhanced through adeno-associated viral (AAV)-mediated overexpression of ODC1, with AAV-green fluorescent protein (GFP) serving as a control. rTg4510 transgenic mice expressing P301L mutant tau were used as a model of tauopathy. Tau expression and phosphorylation were evaluated using western blotting and immunohistochemistry with antibodies recognizing total and phosphorylated tau, including HT7, AT8, PHF1, and pSer199/202. Quantitative analyses were performed across multiple brain regions, including the hippocampus, entorhinal cortex, striatum, dentate gyrus, and CA fields. Western blotting revealed that ODC1 overexpression significantly increased levels of high-molecular weight phospho-tau and total tau compared to GFP controls. Consistent with these findings, immunohistochemical analyses demonstrated elevated tau accumulation across all regions examined. These results indicate that induction of polyamine synthesis through ODC1 overexpression exacerbate tau pathology in vivo, promoting the accumulation of oligomeric tau species. Collectively, these findings suggest that polyamines may differentially influence tau depending on tau conformation and disease context. Ongoing studies aim to define the balance between beneficial and detrimental polyamine signaling, with the goal of identifying novel therapeutic strategies to modulate tau pathology in AD.

Zarek Moore

Discipline: Biology

Authors:

#1 Wisler Charles

#2 Samantha Williams

#3 Dwann Davenport

Abstract Name: RNA Sequencing of Leishmania donovani: Differential Gene Expression to Identify Protein Targets

Leishmania donovani is a species of intracellular human blood parasite that causes visceral leishmaniasis, which is the most severe form of leishmaniasis. Current treatments for visceral leishmaniasis have significant side effects and emerging resistance. As a result, *L. donovani* is a target for several experimental treatments that aim to elicit programmed cell death, more specifically apoptosis, in the protozoan without damaging the host cell. Studies have shown that hydrogen peroxide (H₂O₂) causes apoptosis in *Leishmania* promastigotes. However, proteins, potential targets for treatment, involved in the pathway are currently unknown. In this project, we aim to use RNA sequencing to identify genetic differences in untreated and H₂O₂-treated *L. donovani* promastigotes. Cells were treated for 24 hours with various concentrations of H₂O₂ to determine the IC₅₀ concentration, the concentration required to inhibit cell growth by 50%. Next, cells were treated with the IC₅₀ concentration of H₂O₂. The mRNA was isolated from the treated and untreated populations at time 0 and 24 hours post treatment, mRNA was converted to cDNA, and cDNA will be sequenced. RNA sequencing will be used to analyze the transcriptome and identify differentially expressed genes. It is expected that the gene expression of *L. donovani* promastigotes treated with H₂O₂ should differ from those not treated.

Determining differential gene expression could help identify the proteins involved in the apoptosis pathway in *L. donovani* promastigotes treated with H₂O₂.

Gannon Moore

Discipline: Political Science

Authors:

Abstract Name: Policy Diffusion and NIL Reform: Why a Federal Framework Could Level the Playing Field

Name, Image, and Likeness (NIL) rights have changed college athletics by allowing student-athletes to earn money from their personal brands. While this has created new opportunities, it has also led to confusion because there is no federal policy guiding schools. Instead, states have passed their own NIL laws, creating uneven standards and competitive differences. This policy brief acknowledges how NIL policies spread across states and what this means for fairness and compliance in college sports. The focus is on Texas House Bill 126, which lets universities pay athletes directly and requires contract transparency, and compares it to laws in California and New Mexico. The paper uses Policy Diffusion Theory to explain states acting quickly after the NCAA allowed NIL compensation. Three policy options are considered: continuing state-based approaches, creating a federal NIL framework, and increasing regulation of NIL agents and collectives. After weighing benefits and drawbacks, the brief argues that a federal NIL framework would provide the most consistent and fair system for athletes and universities. This approach would set clear rules nationwide, reduce compliance problems, and include protections for student-athletes. The research paper also mentions basic criteria for evaluating this solution, such as fairness and simplicity. By exploring these options, the research explains why federal action may be needed to address the challenges of NIL and maintain competitive balance in college

Gabriella Moraglia

Discipline: Biology

Authors:

Carolyn Appleby

Abstract Name: Adaptation of an Invasive Tree Frog (*Osteopilus septentrionalis*) in Response to Hurricane Milton

In evolutionary biology, natural disasters, like hurricanes, have traditionally been thought of as genetic drift-inducing events that will remove individuals from a population at random. However, recent data have called this assumption into question, indicating that natural disasters can act as selective pressure events that can induce morphological changes in a population. However, research to date in this area has been limited to select taxonomic groups. For our project, we studied the invasive Cuban tree frog (*Osteopilus septentrionalis*), and its response to Hurricane Milton (October 2024). Specifically, we aim to determine if there are significant variations in key morphological characteristics in the same population pre- and post-Hurricane Milton. We collected frogs by hand from the New College of Florida campus in Sarasota, Florida (27.384586, -82.556209), approximately 6.9 miles from where Hurricane Milton made landfall. We collected 28 frogs before Hurricane Milton (08/09/2024) and 60 frogs after Hurricane Milton (10/25/2024). We used calipers to measure limb length and snout-vent-length (SVL) and used ImageJ to measure the toepad area and digit length. Once measurements have been completed, we will run analyses of covariance (ANCOVAs) for each morphological measurement to determine if there are any morphological differences between the pre-

and post-hurricane specimens. This data analysis will help to better understand the impact of hurricanes on the invasive species *Osteopilus septentrionalis*, and potentially provide insight into the role natural disasters play in facilitating natural selection, an important topic in the context of global climate change.

Nicolas Morales

Discipline: Biology

Authors:

#1 Anindita Das
#2 Rakesh Kukreja
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#11 Jonnel Edwards

Abstract Name: Novel Combination Therapy with Sildenafil and Rapamycin Potentiates Doxorubicin-induced in Breast Cancer Cell Death.

Background: Doxorubicin (DOX) is a cornerstone of chemotherapy regimens for breast cancer, but it leads to development of drug resistance and multi-organ dysfunction including cardiotoxicity. Our previous studies revealed that Sildenafil (Sild, Phosphodiesterase 5 inhibitor) potentiated antitumor efficacy of DOX, while ameliorating DOX-induced cardiotoxicity and Rapamycin (Rapa, mammalian target of rapamycin, mTOR, inhibitor) also protected heart against myocardial injuries. In the present study, we examined whether a novel combination therapy with Sild and Rapa can potentiate DOX-induced breast cancer cell death. Methods & Results: Murine breast cancer cells, 4T1, were treated with DOX (1mM), and/or Sild (10mM) and Rapa (100nM) for 24-hr or 48-hr. Cell viability was measured using CellTiter 96 Aqueous One Assay and a microplate reader by setting absorbance to 490 nm. After 24hrs of treatment, cells were trypsinized and stained with Trypan Blue (TB). Both alive and dead (TB positive) cells were counted under a microscope to calculate the percentage of dead cells. After 24hrs of treatment, proteins were isolated from frozen 4T1 cells using Lysis buffer. Then, Western blot analysis was performed to examine the mTOR signaling (using p-mTOR, total mTOR, p-AKT, total AKT, p-S6, total S6 primary antibodies) and apoptosis (cleaved PARP antibody). Combination of Sild and Rapa significantly suppressed cell viability with enhanced cell death as compared to DOX treatment alone in 4T1 cells. Western blot analysis showed Sild+Rapa in presence of DOX suppressed phosphorylation as well as total expression of mTOR, S6 (marker of mTOR complex 1) and AKT (marker of mTOR complex 2), but induced cleaved-PARP level in 4T1 cells. Conclusion: Cotreatment with Sild and Rapa may represent a novel strategy to enhance chemosensitivity of DOX in breast cancer cells, which would have a significant impact on breast cancer patients subjected to chemotherapy. Extramural Funding: NIH 1R01HL158951-1A1

Alexander Morales

Discipline: Psychology

Authors:

Abstract Name: Goal-Directed Predictors of Self-Esteem and Psychological Well-being

Self-esteem is widely recognized as an important part of psychological well-being, yet researchers continue to debate whether it actively shapes well-being or primarily reflects it. Prior work suggests that emotion regulation and self-control, which are both assessed in this study through self-report measures, may help explain how self-esteem relates to happiness and life satisfaction. The present project uses data from the Daily Sleep and Exercise Study, which follows 216 undergraduate students from George Mason University over the course of 29 days to examine their psychological experiences in everyday life and their daily health behaviors. Participants wore a smartwatch or fitness ring for eight consecutive days to track sleep and physical activity and completed brief morning and evening surveys during that period. They also completed three longer online surveys on Days 1, 15, and 29 that included measures of self-esteem, life satisfaction, happiness, perceived difficulties in emotion regulation, and trait self-control. This project examines whether self-esteem is linked to life satisfaction and happiness both directly and through its relationship with these self-reported regulatory traits, and whether these patterns remain consistent across the study period. Although the study does not assess objective life outcomes, previous research shows that self-esteem, emotion regulation, and self-control can influence academic, social, and health-related functioning, making it important to understand how they operate within subjective well-being. Both the Brief Self-Control Scale and the Difficulties in Emotion Regulation Scale have demonstrated strong reliability in clinical and research settings, which supports their use in examining psychological processes that are relevant to intervention and mental health treatment. The findings from this study aim to clarify how self-esteem and self-regulatory traits work together to support resilience, emotional balance, and positive self-perceptions among emerging adults.

Maverick Morales

Discipline: Psychology

Authors:

#1 Jennifer Robinette

Abstract Name: Neighborhood Cohesion and Psychosocial Well-Being: Differences by Race/Ethnicity

Perceived neighborhood cohesion, or the perception that one belongs with and can trust and rely on their neighbors, has been associated with greater psychosocial well-being, yet some research suggests the existence of racial/ethnic disparities in access to neighborhood cohesion. Furthermore, much of the existing research has investigated perceived neighborhood cohesion in relation to single aspects of psychosocial well-being, thus limiting the ability to assess it as a multidimensional construct. As such, the present study utilized an outcome-wide approach to investigate potential racial/ethnic differences in the associations between perceived neighborhood cohesion and four aspects of psychosocial well-being (i.e., life satisfaction, anxiety, perceived stress, and loneliness). Using data from the Health and Retirement Study, a U.S. nationally representative dataset of men and women aged 51 years or older, we tested the hypotheses that (1) higher perceived neighborhood cohesion would relate to higher life satisfaction and lower anxiety, perceived stress, and loneliness, and (2) that these associations would be stronger among non-Hispanic White participants ($n = 5,095$) compared to non-Hispanic Black ($n = 1,431$) and Hispanic participants ($n = 1,070$). Results from the present study supported both hypotheses: higher perceived neighborhood cohesion was significantly associated with higher well-being on all four psychosocial aspects adjusting for race/ethnicity, age, gender, and education level as well as the proportion of residents in the same neighborhood with a college degree or higher. Furthermore, perceived neighborhood cohesion was more associated with psychosocial well-being among non-Hispanic White participants compared to the racial/ethnic minority groups. These findings suggest both the potential benefits of perceived neighborhood cohesion in regard to psychosocial well-being, and that interventions to increase access to neighborhood resources should prioritize inclusivity to bridge cohesion across diverse U.S. populations.

Yeizlyn Morales

Discipline: Health and Human Development

Authors:

#1 Beatrice Lee

Abstract Name: Leveraging Character Strengths in Multiple Sclerosis Employment Journeys

Employment is a vital contributor to psychological well-being, independence, and quality of life among individuals with multiple sclerosis (MS). MS is a neurological disorder and its symptoms can make it difficult to sustain employment and perform work tasks effectively. While most existing studies have focused on clinical or environmental barriers to employment, few have explored how positive psychological resources, specifically character strengths, may help individuals with MS maintain or regain employment. This study aimed to (1) examine differences in character strength profiles between employed and unemployed individuals with MS, and (2) determine whether higher character strength levels were associated with greater likelihood of employment. A total of 257 adults with MS (average age = 45.39 years; 82.1% female) were recruited through the National Multiple Sclerosis Society. Welch's t-test and hierarchical logistic regression were conducted. Results showed that employed participants scored significantly higher in judgment, perspective, perseverance, zest, social intelligence, teamwork, leadership, self-regulation, and hope compared to the unemployed ones. Total character strength scores were also higher among employed individuals, and greater overall strengths predicted higher odds of employment, explaining 7% of variance. These findings show that character strengths could help protect and support people with MS in their employment journeys. Integrating strengths-based assessments and interventions into rehabilitation and vocational counseling may enhance self-efficacy, motivation, and long-term work success.

Amy Morales

Discipline: Psychology

Authors:

#1 Tammy Chung

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#3 Onumaraekwu Opara

Abstract Name: Examining the Effectiveness of Transcranial Direct Current Stimulation (tDCS) in Reducing Drug Craving Among Individuals with Methamphetamine Use Disorder (MUD)

Methamphetamine use disorder is a chronic condition that is associated with substantial cognitive and behavioral impairments and high relapse rates. Given the limited effectiveness of current treatments, there is growing interest in approaches that target neural circuits involved in craving and self-regulation. Transcranial direct current stimulation (tDCS) is a noninvasive neuromodulation technique that delivers low-intensity electrical currents to modulate activity in brain regions implicated in decision-making. TDCS is thought to enhance prefrontal control over reward circuits, potentially reducing craving. Across studies, stimulation intensity commonly ranged from 1–2 mA and targeted the dorsolateral prefrontal cortex for 20–30 minutes per session. This literature review evaluates evidence on the effectiveness of tDCS for reducing drug craving among individuals with methamphetamine use disorder. A search was conducted using one electronic database (PubMed) for studies published between 2020 and 2025. Five studies met inclusion criteria. Several studies reported reductions in craving following both single-session and multi-session tDCS protocols.

However, other studies observed comparable decreases in both active and sham conditions, limiting conclusions about the causal effect of stimulation. Differences in study design, stimulation parameters, and sample characteristics contributed to these mixed findings. Inconsistencies may reflect variability in craving measures, abstinence periods, and follow-up durations. Current evidence suggests that tDCS may have potential for craving reduction, but the research remains limited and inconsistent. Additional studies with larger samples, repeated-session designs, and standardized protocols are needed to clarify its clinical utility and inform future treatment development.

Laney Moreno

Discipline: Biology

Authors:

Abstract Name: The Prelimbic (PrL) to Dorsomedial Striatum (DMS) Circuit Differentially Encodes Punishment versus Effort in a High-Cost Cocaine Self-Administration Choice Test:

Substance use disorder (SUD) is marked by continued drug use despite escalating costs, such as increased effort or the risk of punishment. The prefrontal cortex (PrL) and dorsomedial striatum (DMS) are key regions involved in goal-directed decision-making, but it remains unclear whether this circuit differentially evaluates types of cost—such as physical effort and aversive outcomes like punishment. To test this, animals were trained to self-administer cocaine, followed by bouts of punished and effortful self-administration. We used this task to test the hypothesis that the PrL-DMS circuit may differentially encode punishment and effort, reflecting separate neural processes for evaluating aversive versus physically demanding options. We found that PL-DMS activity was significantly elevated in the 5 s period following cue delivery in the high conflict period only, confirming our hypothesis that this pathway is involved in high conflict self-administration. These findings will help clarify how this circuit contributes to cost-based decision-making and may offer insight into mechanisms underlying the persistence of drug use in the face of negative consequences. To address this, we developed a choice procedure in which rats selected between two cost-based options to obtain a reward: (1) a static, punished nose poke cue that delivered a mild fixed histamine catheter infusion upon reward delivery, and (2) an effortful nose poke cue that required a variable number of responses, allowing us to determine the effort level at which the animal values each type of cost (punished or effortful). This design enabled us to examine how animals weigh qualitatively different costs and adapt their behavior accordingly.

Kaitlyn Morgan

Discipline: Exercise Science and Nutrition

Authors:

#1 Divya Bhaskaran

Olivia Tobin

Nevaeh Barnd

Abstract Name: Shoulder Mobility Imbalances between Division III Gymnasts and Track Throwers

In order to reach their full potential, college athletes train to be precise with each particular movement requiring high overall mobility, including their shoulders. In many sports, shoulders face immense strain but not all schools share the same resources to prevent mobility loss due to funding such as Division III. In this study, we set out to investigate the mobility differences between a typical overhead sport that is unilateral,

track and field throwers, and a bilateral sport, gymnastics. Both of these sports have athletes who focus on a dominant arm, however gymnasts also have movements that require equal usage of their shoulders compared to a typical thrower who focuses on their dominant arm. Due to the bilateral shoulder use, gymnasts do not fit the typical dominant side focused overhead sports, creating a gap in current knowledge that supplies ground for future testing. Using a goniometer, we assessed a sample of Division III gymnasts and track throwers between the ages of 18 to 22 for their internal rotation, external rotation, and total rotation of both shoulders. Initial findings show that gymnasts have a significant difference between their dominant internal and non-dominant internal rotation as well as between their shoulders on total rotation. There were also findings that gymnasts and track throwers have a significant difference between their dominant shoulder internal rotation and their dominant total rotation. These results align with research showing the dominant arm usage does impact internal rotation. However, typically the unilateral usage of the dominant shoulder use would show an imbalance, but these initial results show that there is a concern within bilateral sports such as gymnasts. This research helped to show that bilateral sports also require further research into shoulder mobility due to their unique set of movements and within the Division III college athletes population.

Kaleb Morgan

Discipline: Biology

Authors:

#1 Jill Bouchard

William Stewart

Abstract Name: Investigating the Role of Different Microbial Environments on Growth and Development of *Brachypodium distachyon*

Soil microbes play an important role in plant growth, nutrient uptake, and stress tolerance. Interestingly, studies have shown that a more diverse community of microbes can more effectively support plant growth. In this project, we tested how microbial communities from three different soil types in Contra Costa County (arid, suburban, and San Joaquin Delta) affected the growth of *Brachypodium distachyon*, a small grass plant used to study biofuels, compared to a nutrient growth medium control. Seedlings were grown hydroponically for four weeks in fabricated ecosystems called EcoFABs filled with soil filtrates made from each type of soil. We measured root and shoot growth weekly and analyzed the data using an image analysis software program called ImageJ. We predicted that bacteria from arid soil would promote the most growth because they are adapted to harsher environmental conditions. However, our results did not support this hypothesis. Instead, the delta soil filtrate produced the strongest root growth, with roots growing three times longer than those in the other treatments. Shoot growth was similar among all groups, with only small differences. Preliminary data suggests that the microbial communities are different across each soil sample and future studies will be aimed at quantifying this difference. Our results suggest that microbes from nutrient rich, water adapted delta soils may better support root development than those from arid or suburban soils. Overall, this study shows that soil origin plays a major role in how microbial communities influence plant growth and highlights the potential of soil microbes to support sustainable agriculture and reduce reliance on chemical fertilizers

Talia Morgenstern

Discipline: Biology

Authors:

#1 Joshua Corrette-Bennett

Abstract Name: The Effect of Neuropeptide Y on Staphylococcus aureus Biofilm Production

Biofilm is a substance produced by many bacteria that protects those cells and provides them with nutrients. Bacteria that secrete biofilms can contribute to a form of bacterial antibiotic resistance, which is a growing public health concern and challenge to the field of medicine. As antibiotic resistance increases, it is critical to find alternative treatment options for bacterial infections. Staphylococcus aureus is an opportunistic pathogen and a main cause of community-acquired, nosocomial biofilm infections. S. aureus that enters the body via wounds or medical devices can cause severe infections. After entering the body, S. aureus cells progress through a series of stages that lead to the production of biofilm, making them less sensitive to the host immune system and more resistant to antibiotics. Antimicrobial peptides (AMPs) are an emerging factor of interest because of their size, accessibility, and capacity to prevent microbial growth. This research studies the effect of a specific AMP called neuropeptide Y on S. aureus biofilm production and bacterial survival. Following growth of S. aureus and treatment with neuropeptide Y, crystal violet staining and viability assays were used to measure biofilm production and bacterial survival. Our results so far indicate that neuropeptide Y has an effect at reducing biofilm at low production levels; however, it has no effect at decreasing survival rates of S. aureus.

Stephanie Morinia

NY - Guttman Community College

Discipline: Chemistry

Authors:

#1 Stephanie Morinia

#2 Chulsung Kim

Abstract Name: Effects of Steeping Temperature and Time on the Antioxidant Capacity of Cold Brew Coffee

Coffee is a major dietary source of antioxidants in North America and accounts for a substantial portion of daily antioxidant intake. While previous studies have shown that roasting conditions affect antioxidant availability, most investigations have focused on hot brewing methods. In contrast, limited research has examined how cold brew preparation influences antioxidant capacity, despite the beverage's increasing popularity. Because antioxidants are linked to reduced oxidative stress and lower chronic disease risk, understanding how preparation and storage conditions impact their availability is essential. In this study, cold brew coffees were prepared from roasted Arabica beans at 4 °C and 23 °C, with steeping periods up to 9 days. Total antioxidant capacity was measured using the Trolox Equivalent Antioxidant Capacity (TEAC) assay. Experimental results showed that significant amounts of antioxidant capacity were extracted from all coffee samples, and the TEAC values were independent of steeping temperature and duration. Future work should examine antioxidant solubility under varying water-to-coffee ratios to determine normalized solubility.

Eric Morris

Discipline: History

Authors:

Abstract Name: Pragmatic Non-Alliance vs International Solidarity: A Study of Swedish Neutrality

In the opening of his memoirs, lifelong diplomat Gunnar Hägglöf wrote about how Swedish neutrality had originated not from a Swedish-born statesman or king, but from the Frenchman Jean Bernadotte—a former

Marshal under Napoleon—who had ascended to the Swedish throne as Karl XIV Johan; Hägglöf further noted that at first the policy was merely non-alliance, and only later developed into the longstanding policy of neutrality which Sweden would champion yet pursue in very pragmatic terms. Hägglöf’s insightful musing planted a question in my mind: when did Sweden’s foreign policy shift from non-alliance into a neutrality—one which would intertwine with domestic cultural identity, and define Sweden’s place on the world stage? To answer this question, I analyzed scholarly works covering the beats of modern Swedish diplomatic history (the Crimean War, World War 1, the Interwar Period, World War 2, and the Cold War) to compare and contrast the ways in which Sweden’s government acted—based on internal factors, such as public attitudes and cultural feelings, and external factors, such as the geopolitical environment and the degree of freedom of action or constricting pressure which Sweden faced therein—using primary sources for corroboration.

Alex Morris

Discipline: Gender, Ethnicity, Diversity, or Cultural Studies

Authors:

#1 Alex Morris

#2 Melina Packer

Abstract Name: Environmental Injustice: Connecting Cancer Alley Louisiana to the Democratic Republic of Congo

Louisiana’s Cancer Alley and the Democratic Republic of Congo (DRC) provide interconnected examples of ongoing environmental injustices. Cancer Alley is an 85-mile stretch, from Baton Rouge through the River Parishes to New Orleans, heavily polluted by petrochemical plants. This industrial pollution generates high rates of cancer and other health issues for the residents, who are predominantly African American. Additionally, recent U.S. federal action has increased the numbers of detainees being sent to U.S. Immigration and Customs Enforcement (ICE) facilities in or near Cancer Alley. The DRC is rich in cobalt, a core component of electronics, batteries, and petrochemical refining processes. Multiple social, political, and economic interests contribute to the exploitation of the Congolese laborers who are forced to mine cobalt in unsanitary, abusive conditions. This paper uses the theoretical lens of critical environmental justice to argue that these phenomena (Cancer Alley, ICE, and cobalt extraction) are interconnected. Through qualitative methods, including content analysis of activists’ publications and in-depth interviews with activists in Cancer Alley and the DRC, I examine the intersecting racial and colonial histories, human rights violations, and carceral systems within Cancer Alley and the DRC. I aim to establish international solidarity and accountability by promoting current activists and organizations actively fighting for justice.

Jessica Morris

Discipline: Computer Science

Authors:

#1 Richard Leinecker

Abstract Name: E.A.G.L.E. Autonomous Vehicle Vision: Edge-Aware Guidance for Lightweight Evaluation

Unmanned Aerial Vehicles (UAVs) require efficient real-time perception systems for autonomous navigation and target tracking, but continuously running high-resolution detection algorithms incurs significant computational costs that reduce flight time and system responsiveness. This work addresses this challenge by developing a biomimetic dual-mode perception system inspired by the double-fovea vision of birds of prey,

which use separate foveae for low-effort environmental scanning and high-precision target fixation. The proposed system implements two cooperative processing modes: a lightweight peripheral mode using for continuous wide-area surveillance with minimal computational load, and a high-precision foveal mode augmented with optical flow and Kalman filtering for active target tracking. These modes are coordinated through a three-state finite state machine that enables intelligent switching between low-power and high-fidelity perception based on real-time sensory input. The system includes a reacquisition state that prevents oscillatory behavior when targets drift near detection boundaries, mirroring the micro-corrective behaviors observed in biological vision systems. Implementation in Unity using Barracuda for ONNX model inference demonstrates real-time performance suitable for embedded UAV platforms. Results show that state-machine modulation dramatically reduces overall inference load during periods without salient targets while enabling rapid escalation to high-precision tracking when needed. This architecture offers a flexible framework for resource-constrained autonomous systems, demonstrating that biologically-derived strategies can be effectively integrated with modern deep learning pipelines. The approach is applicable beyond UAVs to any robotic system operating under fluctuating computational budgets, including legged robots, autonomous ground vehicles, and augmented reality systems requiring context-dependent allocation of visual processing resources.

Jessica Morris

Discipline: Visual Arts

Authors:

Abstract Name: Reflection

Reflection explores humanity's overlooked relationship with the moon through an experimental bookbinding process that merges traditional craft with contemporary 3D printing technology. The central question driving this work asks: how can we create an object that embodies the moon's dependence on reflected light while encouraging viewers to reconsider celestial phenomena we encounter daily but rarely acknowledge? The project responds to a cultural paradox where we celebrate dramatic astronomical events like solar eclipses with collective awe, yet ignore the moon's nightly presence above us. This piece draws inspiration from the Japanese concept of tsukimi (moon-viewing) and the Romantic era's fascination with lunar symbolism, as well as contemporary concerns about our diminishing connection to natural cycles in an artificially-lit world. The work functions as both artist book and sculptural object, requiring viewer interaction to fully realize its meaning. Methodologically, this piece combines historical and emerging techniques. Each "page" was designed as a relief lithophane, a translucent image achieved through varied material thickness, and 3D printed in PLA filament on an Ender 3 printer. These plates were then handbound using Coptic-style multiple signature binding, allowing the book to stand independently and catch light from multiple angles. The construction deliberately requires the viewer to hold each page to a light source, mirroring how the moon requires sunlight to become visible. The most successful element is the experiential revelation, where viewers initially see subtle ghostly images, then the full image when holding pages to light. This mirrors my own renewed appreciation for looking up. Future work will explore color-filtered lithophanes to represent different lunar phenomena and experiment with alternative binding structures that allow more dynamic light interaction. This piece establishes a foundation for a broader series examining overlooked astronomical wonders through material processes.

Kalen Morrison

Discipline: Biology

Authors:

Abstract Name: Variation in Annonacin Concentrations in Pawpaw (*Asimina triloba*) Leaves Across North Carolina: Therapeutic and Neurotoxic Implications

Pawpaw (*Asimina triloba*) is a native North American fruit tree that has recently grown in popularity as an alternative medicine due to its anticancer potential. Like other members of the Annonaceae family, pawpaw produces annonaceous acetogenins, secondary metabolites known for their cytotoxic capabilities. These bioactive molecules inhibit complex I of the mitochondrial respiratory chain, disrupting ATP production, inducing apoptosis in various cell types. However, studies have linked the chronic consumption of other fruits in the Annonaceae family to neurodegenerative issues like atypical parkinsonism. Because secondary metabolite concentrations vary geographically, pawpaw's large native range across the eastern United States could contribute to differences in bioactive contents, causing unpredictable health effects. This study aims to quantify annonacin, a cytotoxic acetogenin, from pawpaw leaves and investigate potential regional differences in concentrations across North Carolina. To determine geographical variation in acetogenin concentrations, leaf samples were collected from populations of pawpaw in the mountains and piedmont of North Carolina. Samples were air dried, extracted with 80% methanol and filtered. Using a rotary evaporator and lyophilizer, a crude extract was collected and injected into a HPLC-PDA system for analysis. The extraction yields from this procedure were between 7.45% and 10.15%, consistent with published values, indicating a viable extraction method. The quantification of annonacin concentrations via HPLC-PDA is ongoing, and results will be compared with concentrations to known bioactivity ranges, evaluating the geographic variation in the neurotoxicity of our samples. With a rise in popularity of natural medicines, this research will provide insight into the potential health risks of the unregulated use of plants, such as pawpaw, for medicinal purposes.

William Morrison

Discipline: Engineering

Authors:

#1 William Morrison

#2 Nicholas Burtless

#3 Liam Bantasan

Nicholas Burtless

Liam Bantasan

Abstract Name: Affordable Hand Prosthesis Utilizing Common and Accessible Components

Assistive and prosthetic devices can be prohibitively expensive, limiting those below the poverty line. However, for many cases costly prosthetics are unnecessary to assist in one's quality of life. Our research presents an affordable alternative hand prosthesis for individuals missing any range of phalanges, while retaining the metacarpal region. To do so, the e-NABLE Statics Team engineered a general prosthetic finger that can be altered in length and ring size to be fitted to the client's hand as well as an adaptable hand. Components of the finger and hand include: Polylactic Acid (PLA), Thermoplastic polyurethane (TPU), fishing line, bungee cord, and gloves. The PLA filament is used to print the main finger structure, while TPU is used for the base attachment to the glove. The fingers are controlled through a mechanical tendon system, utilizing tensioned fishing line for contraction and bungee cord for retraction, all while being articulated with wrist movement. To adapt this idea to a whole hand, we engineered a base made of PLA and TPU, which is connected to a glove for optimal comfort. This hand prosthesis can be an optimal alternative for those with minor disabilities in need of an assistive device.

Robert Morrison

Discipline: Physics and Astronomy

Authors:

#1 Benjamin Gold

Abstract Name: Detecting Exoplanets in a Light Polluted Environment

Light pollution has become increasingly dominant as the developed world continues to expand, presenting greater challenges for ground-based astronomy (GBA) even in the most isolated observatories. The capabilities and limitations of conducting astronomical research in a light-polluted environment are ever-changing, and this project examines the feasibility of GBA in such an environment with an observatory-class telescope. This research was dedicated to the detection of extrasolar planets transiting across their host stars via a light-curve, in which the star's luminosity periodically dips as the planet crosses in front of it, blocking a portion of its light. The research focused on stars with known exoplanets where the parameters (area ratios, magnitude, etc.) were known, as well as the time of planetary transit. The method used to discern a star's periodic depression was differential photometry, in which the star's relative flux was compared to numerous others around it whose fluxes were assumed constant. Six systems with varying parameters were studied in which the acquisition of a light-curve, along with the quality of that light-curve, were compared to those of other systems to quantify the limits of the telescope under the conditions of skyglow. Data acquired was compared to exoplanet databases to evaluate the effect of light pollution on the accuracy of the data. Over the course of the research, two light-curves resulted where the transit was clearly distinguishable. The comparison of our data showed that, for successful transit detections, the transit depths were close to prediction, but transit durations were less precise. The successful acquisition of these light-curves presents the capabilities of scientific research and astronomy education via GBA, even at an amateur level, whereas inaccuracies or failure to detect some light-curves demonstrates the challenging effects of light pollution in an urban environment.

Hailey Morse

Discipline: Environmental Science and Sustainability

Authors:

#1 Caroline Gharibian

#2 Nicholas Metz

Abstract Name: Statistical and Synoptic Patterns of Drought Busts Associated with Atmospheric Rivers in the Northeast U.S.

Climatological drought in the Northeast U.S. is an important thing to understand and predict because of the high population density, tourism dependent economies (like skiing), and the drinking water supply (Agel et al. 2025). This study aims to observe the patterns associated with drought in the Northeast for the period spanning 1988 to 2017, focusing on the relationship between drought and atmospheric rivers (ARs). A similar study was conducted along the West Coast by Dettinger (2013) where it was found that between 33% and 74% of droughts were busted by ARs. To study this in the Northeast, the Palmer Drought Severity Index (PDSI) was used to indicate and categorize drought for the region. AR data was obtained from a 30-year climatology done by Kaminski et al. (2023). Overall, there are very clear relationships between PDSI and ARs that indicate a causal relationship between ARs and the cessation of drought in the Northeast. There is a positive relationship between the positive change in monthly PDSI and the percentage of monthly AR hours and AR-related precipitation (ARP). For the bust months specifically, the coastal region received more ARP. Despite having average to low percentages of AR hours, the bust months generally have high percentages of ARP. As for the synoptic conditions, the bust months feature zonal flow and a persistent trough

over the Great Lakes region that is favorable for a high frequency of surface low pressure systems, which provides a high amount of IVT in the Northeast for bust months.

Caitlyn Morton

Discipline: Nursing and Public Health

Authors:

#1 Leann Laubach

Abstract Name: Addressing Postpartum Depression Through Nursing Interventions: A Synthesis of Evidence-Based Approaches

AbstractBackground: Postpartum depression (PPD) affects up to one in five mothers and can impair maternal functioning, infant bonding, and overall family well-being. Many postpartum women decline pharmacologic therapy due to breastfeeding concerns, stigma, or personal preference, increasing the need for accessible, non-pharmacological nursing interventions. Evidence supports Cognitive-Behavioral Therapy (CBT) strategies and technology-based peer-support programs as effective, nurse-facilitated approaches to improve maternal mental health outcomes. **Aim:** This project aims to evaluate the impact of two nurse-facilitated interventions – CBT-informed nursing strategies and technology-based peer-support programs in reducing postpartum depression symptoms compared to standard postpartum care. **Method:** A two-part intervention model focused on CBT techniques and technology-based peer-support. CBT-informed nursing care would include helping mothers identify negative thought patterns, teaching cognitive reframing, reinforcing positive coping strategies, and integrating brief CBT-style check-ins during postpartum visits. For technology-based peer-support, mothers will be connected with trained peer supporters through secure digital platforms, monitor engagement, and provide ongoing follow-up for safety and emotional support. Both components would be paired with routine EPDS screening, education, therapeutic communication, and timely referrals when needed. This model reflects feasible, evidence-based interventions aligned with nursing scope and current literature. **Conclusion:** CBT-informed nursing strategies and technology-based peer-support programs represent accessible, non-pharmacologic interventions that nurses can realistically integrate into postpartum care. These approaches strengthen coping, reduce depressive symptoms, and increase social support, ultimately promoting maternal mental health and positive family outcomes. Findings highlight the importance of expanding nurse-facilitated mental-health interventions within postpartum settings. **Keywords:** Postpartum depression, nursing interventions, cognitive-behavioral therapy, peer support, maternal mental health.

Michael Moseley

Discipline: Biology

Authors:

#1 Cassandra Holbert

Yuri Singh

Abstract Name: The Effects of Polyamines on CD4+ T Cell Differentiation

Systemic Lupus Erythematosus (SLE) is characterized by an overactive immune system attacking the host body. Th17 cells, a subset of CD4+ helper T cells, are one such hyperactive immune cell associated with many autoimmune diseases including SLE. The primary role of the Th17 cell is to coordinate immune responses to bacterial and fungal infections through the production of IL-17, a pro-inflammatory cytokine; however, aberrantly overactive Th17 cells produce excessive IL-17 and are associated with SLE symptoms.

Our research focuses on the effects polyamines have on CD4+ T cell differentiation to better understand this hyperactivity. Polyamines are long-branched alkylamines that are known to affect the differentiation of many cell types, including CD4+ T cells, through mechanisms including post-translational modification, metabolic modulation, and epigenetic regulation. Our research further explores the link between polyamines and T cell differentiation through direct control of polyamine concentrations within naive CD4+ cells during Th17 polarization in vitro. Splenocytes were collected from murine spleens, and CD4+ T cells were magnetically isolated. In addition to Th17 polarization cytokines, CD4+ T cells were cultured under polyamine addition or depletion for five days. Polyamine addition included the three essential polyamines: putrescine, spermidine, and spermine, as well as their precursor ornithine. Polyamine depleting conditions were established via treatment with ivosipemin or difluoromethylornithine (DFMO), two drugs known to deplete polyamines. Th17 polarization was confirmed by measuring IL-17A production by RT-qPCR, flow cytometry, and ELISA. Our findings suggest that the presence of polyamines promotes differentiation into the Th17 cell type. This result, while limited by the in vitro nature of the study, may implicate a broad role for polyamines in autoimmunity and could be helpful in future research into the treatment of SLE.

Milo Moskovitz

Discipline: Psychology

Authors:

Abstract Name: The Research Deficit and Expert Disagreement Regarding Music Selection for Psychedelic Assisted Therapy

Prior research has determined that music plays a central role in psychedelic assisted therapy (PAT). There is a general consensus of the importance of music during PAT, so how are guides and researchers choosing this music? In my recently published paper, The Research Deficit and Expert Disagreement Regarding Music Selection for Psychedelic Assisted Therapy, I hold that it seems unreasonable for anyone at this point to claim guidelines for musical selection for PAT are firmly based on scientific evidence. With only three empirical studies published to date that directly investigate which type of music might best support PAT, each with important limitations, and disagreement amongst the experts in this field, I highlight the paucity of research and make suggestions of priorities for future studies. To summarize, there is a lack of research in this area and unclear guidelines due to expert disagreement. Because music has potential to greatly improve and drive the PAT process entirely, without empirically-based music selection, we risk neglecting one of its most important therapeutic elements. Additionally, I am currently conducting a follow up survey study that is investigating practitioner and patient experience and opinions regarding music selection. I am hopeful to have my data back and analyzed by January to potentially speak on as well. Thank you for your consideration

Siena Moskun

Discipline: Interdisciplinary

Authors:

#1 Siena Moskun

Abstract Name: The effect of accessible Montessori Education on political awareness and engagement in youth: a case study of la Scuola Primaria Montessori, Italy

Neoliberal economic policies have led to rising income inequality, limited access to critical resources, environmental degradation and growing political unrest. Young people have the most to lose if the current

trends continue, yet the very same social order youth seek to change robs them of the tools most necessary to do so. Compulsory education guided by the so-called 'banking model' trains youth to submit to authority and accept the truths offered to them by those in power. Critical pedagogies, such as the method developed by Maria Montessori in Italy in the early 20th century, have the potential to disrupt this pacification of youth if made universally accessible. The majority of institutions practicing the Montessori method cater only to the elite, but in Perugia, Italy, a public primary school seeks to make Montessori education available to middle and working class children in the city. Thus, I have elected to conduct this qualitative case study informed by critical pedagogy at la Scuola Primaria Montessori di Perugia. My research goal is to identify the theories and practices applied at the aforementioned primary school that suppress or foster the development of politically aware, engaged and empowered youth. I carried out semi-structured interviews with educators employed at the Scuola Primaria Montessori di Perugia, and spent three months collecting data via participant observation of daily activities in six classrooms of first to fifth graders in 2025. Findings indicate that a lack of adequate physical space, funding and standardized teacher training, the prevalence of normative bias and the imposition of national curriculum criteria foster an educational environment inhospitable to the Montessori methods' foundational principle of student autonomy and unsupportive of the cultivation of youth capacity to intervene in and transform their reality. These insights could inform policymakers and administrators aiming to institute critical methodologies in public education.

Alexandra Moss

Discipline: Psychology

Authors:

Abstract Name: Desensitization to Sexual Violence and Paraphilic Disorders: TikTok True Crime Content and Passive Hybristophilia-like Social Phenomena in Women Ages 18-35

Social media has been a way to share a user's thoughts and opinions about topics of the user's choosing. After the merger of TikTok and Musically from 2017 to 2018, TikTok became one of the top five most commonly used social media platforms in the world. TikTok's algorithm generates videos mainly based on the user's previous video and comment section interactions, potentially causing an echo chamber effect and leading to the intensification of societally stigmatized viewpoints and interests, like passive hybristophilia. A subspace on TikTok where passive hybristophilia can be witnessed is the True Crime TikTok community due to some of the community's glamorization and heavy editing of the criminal and the criminal's act. Previous research has explored the common themes presented in TikToks displaying hybristophilia-like qualities; however, the research did not explore how desensitization can lead to the creation of the examined themes. This study investigated the association between the desensitization to sexual violence driven by the True Crime TikTok community on women, aged 18-35, and the development of passive hybristophilia-like social phenomena among online audiences. The study examined TikToks from the True Crime TikTok community that displayed hybristophilia-like characteristics to determine if the consumption of hybristophilic-content can lead to a group-think mindset that is desensitized and less empathetic due to the characterization of the highlighted criminal.

Matilda Moss

Discipline: Biology

Authors:

#1 Amara Moss

#2 John Pellegrini

#3 Laura Gilchrist

Abstract Name: Chemotherapy-Induced Peripheral Neuropathy Leads to Long-Term Sensory Deficits in Pediatric Oncology Survivors

Chemotherapy-induced peripheral neuropathy (CIPN), the degeneration of nerves outside the central nervous system as a result of treatment, is a side effect of vincristine, a common chemotherapy drug prescribed to children with leukemia. Vincristine disrupts the formation of microtubules in cells, preventing cell division. This causes changes in the neuronal cytoskeleton, which can injure the axons, leading to impaired transmission along nerve fibers. The goal of this study was to determine if a difference was present between the nerve function of pediatric cancer survivors treated with vincristine (on average, 61.4 months post-last chemotherapy treatment) to controls never given vincristine, via pairs matched by sex and age. Three sensitivity tests were conducted (n=16 pediatric cancer survivors and 16 controls): 1) distinguishing between the blunt and sharpened ends of a Medipin; 2) threshold detection of touch with fine monofilaments (similar to fishing line); and 3) threshold detection of vibration applied to the skin. Analysis with t-tests showed statistically significant deficiency in thresholds for light touch and vibration on the lower extremities of the cancer survivors ($p < 0.05$), but not on the upper, suggesting that the longer axons in the legs may be more susceptible to long-term damage. These findings demonstrate there may be a correlation between receiving vincristine and sustained nerve damage in cancer survivors, particularly in the lower limbs. Further research into the axonal differences between upper and lower limb nerves that explains the discrepancy between the deficiencies, as well as reviewing surveys from cancer survivors to assess the clinical relevance of these results is needed.

Jackson Mossolle

Discipline: Art History

Authors:

#1 Jackson Mossolle

Abstract Name: Clementine Hunter's Artwork: Struggles of the American South

Clementine Hunter, a self-taught artist, lived on the Melrose Plantation in Natchitoches, Louisiana as a sharecropper from 1902-1988. Photos from the Farm Security Administration, an agency dedicated to photographing farmer's struggles, provide insight about what life may have been like for her on the plantation. As Hunter began to paint, her artwork revealed representations of hardships that African Americans endured after slavery, the role of women in society, and the nature of religion. An analysis of life histories collected in the Federal Writer's Project, an initiative to conduct interviews of everyday Americans throughout the country in the early 1940s, and FSA photographs offer a rich cultural context to understanding the inspiration behind her artwork. An analysis of her paintings, which some critics have called "primitive" due to the use of scrap paint and brushes, will reveal how her work is a unique portrayal of the struggles of African Americans in the south.

Sara Motz

Discipline: Biology

Authors:

#1 Matthew Persons

Abstract Name: Silk following behavior and mate competition in male Northern crab spiders *Mecaphesa asperata*

All spiders produce silk draglines as they move through the environment. This material may convey important information about spider identity including age, sex, and mating status. Silk could also be used by males to locate prospective mates or rival males. The Northern crab spider *Mecaphesa asperata*, is common in goldenrod fields, feeding on insects that visit blooming flowers. Using artificial flowers as Y-mazes, we measured the propensity of adult male spiders to contact and climb one of two stems containing silk deposited from different types of conspecific spiders. Six y-maze choice combinations were tested: 1) silk from an adult male v. silk-free control, 2) an adult female v. control, 3) a subadult female v. control, 4) a subadult female v. adult female, 5) an adult female v. adult female followed by an adult male's silk, or 6) a double control lacking silk. Preliminary results suggest that males show strong initial attraction to any conspecific silk (sericophily), climbing higher on silk-laden stems compared to control stems. For some behavioral measures, males showed a stronger preference for stems with subadult female silk compared to silk laid by other ages and sexes. Males may prefer subadult females that allow for pre-maturation mate guarding to avoid sperm competition since first-mated male spiders tend to fertilize the majority of eggs. Stems containing adult female silk followed by male silk showed no difference in attractiveness than female silk alone, suggesting that male silk is used by rival males as a cue for female presence, rather than a deterrent for male competitors.

Skyler Mounts

Discipline: Physics and Astronomy

Authors:

#1 John Makous

Abstract Name: Using a Student-Made Horn Radio Telescope to Map the Milky Way Galaxy

This research project proposed a goal of constructing a horn radio telescope to investigate and determine the structure of the Milky Way Galaxy. This project stemmed from the NSF-funded workshop "Science and Technology Applied to Radio Signals" held at Concord University in July of 2025. The student assistant who participated in this workshop was able to build a radio horn telescope, which was used in this experiment. These radio telescopes are used to detect radiation emitted from hydrogen atoms undergoing spin flip transitions at a frequency of 1420.41 MHz. Spectral data was gathered via conduction of galactic scans along the galactic equator. Measuring Doppler shifts in the spectral peak positions enabled the determination of the galactic velocities along the galactic equator. These velocities were used to construct a map of the spiral arms in the Milky Way Galaxy. This conducted research has proven that student-built horn radio telescopes can contribute to the scientific understanding of our galaxy's structure and dynamic behavior. This project provides the opportunity for undergraduate students to engage in STEM experiences, which can allow for a better understanding of the science behind West Virginia's Green Bank Observatory in order to advance students' education.

Alexis Moyer

Discipline: Communications

Authors:

#1 James Ndone

#2 Alexis Moyer

#3 Leilani Burroughs

#4 Kayleigh Anderson
#5 Erica Hoang
#6 Nathan Carpenter
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Erica Hoang

Abstract Name: AI and PR Practitioners

How PR Practitioners Talk About AI: Topic Modeling and Emerging Patterns on X Artificial intelligence (AI) is transforming communication work in profound ways; however, there is limited research on how public relations (PR) practitioners publicly discuss these changes in real-time. Previous studies highlight both the potential of AI to improve efficiency and creativity (Lai & Levy, 2023) and the challenges it introduces, including job insecurity (Petropoulos et al., 2024), ethical and fairness concerns (Haque et al., 2022), and questions about trust in automated decision-making (Lee & See, 2004). Scholars have also underscored the broader societal implications of AI, such as environmental and equity considerations that communication professionals must navigate (Heavens et al., 2025; Sheridan et al., 2025). Despite these important contributions, little is known about how PR practitioners themselves describe AI in their everyday professional discourse. This work-in-progress project examines how PR practitioners talk about AI on X. To address this gap, we are collecting a large dataset of tweets from verified or professionally identified PR accounts using AI-related and PR-related keywords. Accounts are verified through bio descriptions that contain terms such as “public relations,” “communications,” “PRSA,” or “CIPR,” ensuring the dataset reflects actual practitioners. Each tweet includes the post text, author metadata, timestamps, and engagement metrics, and will be analyzed in R using computational methods. Our next phase involves topic modeling and sentiment analysis to identify the main narratives practitioners use when discussing AI. Based on previous scholarship, we expect to observe conversations that reflect optimism, uncertainty, ethical tension, and questions about professional identity (Haque et al., 2022; Lai & Levy, 2023; Lee & See, 2004; Petropoulos et al., 2024). By the time of the conference, we anticipate presenting early visualizations and thematic patterns that illustrate how PR professionals are collectively navigating the opportunities and risks associated with AI in their daily work.

Molly Moylan

Discipline: Chemistry

Authors:
#1 Daniel Wright

Abstract Name: Hidden Dangers: Analysis of Trace Metals within Medicinal Herbs and Spices in the United States

Plants uptake valuable nutrients, but due to environmental conditions such as exposure to industrial pollutants and the effects of climate change, the accumulation of toxic metals is increasing. Recent studies in Asia and the Middle East show elevated levels of lead and mercury in herbs and spices used in traditional medicines. This may be due to two factors: 1) lack of regulation, and 2) herbs may be hyperaccumulators of metals. Interestingly, limited research on traditional herbs has been done in the US, specifically in Native American communities. The proposed research will analyze the metal accumulation in numerous medicinal herb and spice samples from six states (NM, OK, SD, MA, NC, ID) using X-ray fluorescence and inductively coupled plasma optical emission spectroscopies to generate a consensus survey documenting metal concentrations in select herbs. The specific metals quantified will be cadmium, chromium, copper, lead, mercury, and zinc. Analyses will be carried out on commercially packaged goods, pre-processed material, and herbs grown in metal-contaminated soil, and the following herbs will be selected from each region: basil, coriander, echinacea, elderberry, juniper berry, lavender, rosemary, sage, and yarrow. Preliminary results for OK

samples indicate that toxic metals are below EPA guidelines. Analysis for the remaining regions is expected to be completed late Spring 2026.

Sam Mrad

Discipline: Biology

Authors:

Abraham Tu

Abstract Name: A Data-Driven Approach to Evaluating Posture and Self-Efficacy in First-Time Mobility Scooter Drivers

Individuals with mobility limitations increasingly use Motorized Mobility Scooters (MMS), yet safety concerns for both drivers and pedestrians remain. This study introduces a data-driven approach to evaluating MMS driver safety by combining human pose estimation with self-efficacy assessment. By analyzing posture and movement patterns alongside drivers' perceptions of their own ability, we aim to identify risk factors and inform interventions that enhance safety outcomes. Our research involves 42 participants, each completing a self-efficacy survey and undergoing posture analysis during their initial MMS experience. Preliminary findings suggest that posture and body positioning are critical to maintaining stability and control, while self-efficacy scores provide insight into drivers' confidence and perceived proficiency. Leveraging advanced computer vision algorithms, we capture real-time pose data to quantify drivers' movements and correlate these with survey responses. This integrated approach allows us to examine both the physical and psychological dimensions of scooter operation. Although data collection and analysis are ongoing, early results highlight the potential of combining human pose estimation with self-efficacy measures to generate a comprehensive understanding of MMS driver safety. Insights from this study may inform evidence-based strategies for improving scooter design, training programs, and overall safety for users and the communities they navigate. By focusing on first-time drivers, our work sheds light on the challenges of initial MMS use and provides a foundation for interventions that support safer adoption of mobility technology.

Khushi Muddalli

Discipline: Psychology

Authors:

#1 Foster Mardigian

#2 Marcia Winter

#3 Jessica Greenlee

Abstract Name: Associations Between Broader Autism Phenotype Domains and Well-being in College Students.

The Broader Autism Phenotype Questionnaire (BAPQ) measures subclinical autism-related traits in three domains: social aloofness, pragmatic language differences, and rigidity. Although higher levels of overall BAP have been linked to mental health and social adjustment in college students, domain-specific associations are not fully understood. This study examines associations between each BAPQ domain and indicators of mental and social well-being. Identifying patterns across BAP domains could explain how autistic-like features are linked to emotional discomfort and social interactions, allowing for inclusive prevention and intervention strategies in university populations. Survey data were collected online from 621 students ($M_{age}=19.42$, $SD=1.21$; 74.7% female; 75% Caucasian; 76.7% in their first two years of college) at two U.S. universities, one in the northeast and one in the northwest. In addition to the BAP-Q, participants completed self-report measures of anxiety symptoms (GAD-7), depression symptoms (PHQ-9), college belongingness (SSFS), and rejection sensitivity (RSS). Higher anxiety symptoms were associated with higher aloofness, pragmatic language differences, and rigidity (r range= 0.255–0.411, $p \leq .001$). Higher

depressive symptoms were also associated with all three BAP traits (r range= 0.273-0.462, $p < .001$). Higher rejection sensitivity was associated with higher aloofness, language differences, and rigidity (r range= 0.264–0.346, $p < .001$). Higher college belongingness was associated with lower social aloofness, language differences, and rigidity (r range= -0.203 to -0.433, $p < .001$). Covariates were university/site, sex, gender, and sexual orientation. BAP domains are linked to markers of developmentally salient wellbeing – mental and social health – in emerging adults. Findings support the utility of conceptualizing autistic traits as existing along a continuum rather than a binary diagnosis, suggesting that support services could be scaled to meet varying levels of need across the BAP rather than limited to those with formal autism diagnoses.

Pooja Mudigonda

Discipline: Linguistics and World Languages

Authors:

#1 Christophe Smith

#2 Matthew Nelson

Abstract Name: Decoding Semantic Information from the Brain

Language-based brain-computer interfaces (BCIs) have, in recent years, shown promise in helping facilitate communication for those who are otherwise unable to do so due to various factors, such as motor impairment, paralysis, or communication disorders. However, most BCIs rely solely on activation in areas that process sensorimotor information to decode words and do not take into account the semantic information associated with each word: that is, information about a word's meaning. The objective of this project is to investigate methods to decode various types of semantic information from intracranial EEG recordings. Taxonomic semantic information is organized hierarchically (e.g., a dog and a cat are both mammals, so would be grouped under the same taxonomic category), while thematic semantic information is organized based on co-occurrence in a specific context (e.g., a nurse and a syringe both appear in a medical context, so would be grouped in the same thematic category). We have two aims for our study: first, to decode taxonomic semantic information by incorporating semantic models into our signal-processing code; and second, to establish if and how thematic semantic information can be cross-coded alongside taxonomic information. By examining these distinct means of decoding semantic information, we hope to find a way to integrate semantic decoding with existing phonetic or sensorimotor decodes used by other labs.

Fatima Muhammad

Discipline: Biology

Authors:

#1 Emily Abraham

#2 Navi Gill Dhillon

Maya Pasapuleti

Navya Mysore

Abstract Name: Bioactive Metabolites in Ganoderma Species and Their Anticancer Mechanisms of Action

The genus *Ganoderma* has been extensively studied for its medicinal and therapeutic potential in cancer prevention and treatment, with *G. lucidum* among the top-studied species. From 2010-2015, researchers have made significant advances in characterizing the structural diversity of *Ganoderma* mycochemicals, including polysaccharides, triterpenoids, phenols, and other secondary metabolites linked to anti-cancer activity.

Chromatographic methods (HPLC, LC-MS, GC-MS) enabled the separation of complex *Ganoderma* extracts into individual metabolites, while spectroscopic techniques (NMR, MS/MS) provided insight into the structure–function relationships of these bioactive molecules. Mechanistic studies of *Ganoderma*-derived compounds have revealed their capacity to modulate cancer activity through apoptosis induction, cell cycle regulation, angiogenesis inhibition, immunomodulation, and oxidative stress reduction. While cytotoxic benefits of *Ganoderma* seem promising, a key issue lies in the standardization and reproducibility for pharmacological application. Chemical composition varies markedly across species, strains, and environmental conditions; many metabolites also exhibit poor solubility, stability, and bioavailability. Future studies should combine gene sequencing with metabolomics to understand why different *Ganoderma* species produce distinct bioactive compounds and to generate reproducible preclinical data strong enough to justify any later movement toward clinical testing. Addressing these challenges will be essential to realize the full oncologic potential of *Ganoderma*-derived therapeutics.

Fatima Muhammad

Discipline: Biology

Authors:

#1 Emily Abraham

#2 Navi Gill Dhillon

#3 Rajendra P. Pangen

#4 Braham Dhillon

Maya Pasapuleti

Navya Mysore

Abstract Name: Comparative Genomics Across *Ganoderma* Species to Identify Secondary Metabolite Clusters with Cytotoxic Properties

Fungi in the genus *Ganoderma* have been widely studied in Chinese culture for their medicinal properties and promoting overall health and longevity. Our prior work on eight *Ganoderma* species showed that they contain Secondary Metabolite Clusters (SMCs) that code for multiple terpenes, betalactones, and ribosomally synthesized and post-translationally modified peptides (RiPPs). These compounds are well known for their cytotoxic and anticancer potential. Using the bioinformatics platform antiSMASH1, we previously identified and annotated the specific SMCs within these genomes that are predicted to produce such bioactive metabolites. To test the results obtained from the bioinformatics analysis, fungal extracts were prepared from *G. lucidum* and *G. zonatum* by air-drying and powdering the mushroom fruiting bodies, mixing them with 95% ethanol, followed by lyophilization. Different dilutions of these extracts were used for proliferation assays on two cancer stem cell (CSC) models, i.e. patient-derived glioma stem cells (GSCs); PN84 and GSC17 to assess the cytotoxicity potential of the fungal compounds. Proliferation was measured at 24, 48, and 72 hours, and survival analysis showed significant reductions in PN84 viability by 72 hours at 100 ppm for both extracts. Comparative transcriptomic analysis of both the fungi and the treated cancer cells will define the pathways/gene-expression changes associated with metabolite production and cytotoxic response, with qRT-PCR used for targeted validation. These findings provide experimental support for the anticancer potential of *Ganoderma* metabolites and justify continued investigation of these natural products for pharmacological and nutritional applications.

Spandan Mukherjee

Discipline: Biology

Authors:

Abstract Name: Elucidating the effect of Phthalates Plasticizer Family on Kaposi's Sarcoma associated Herpesvirus Infection

Kaposi's Sarcoma-associated Herpesvirus (KSHV) is an oncogenic virus that causes Kaposi's Sarcoma (KS), the predominant cancer in HIV infected untreated individuals with no known cure. KSHV has two stages: latency (low viral gene expression and no virions) and lytic replication (full viral gene expression and virion production). Plasticizers are additives found in nearly all flexible plastics. Exposure to phthalic acid-derived plasticizers (PPs), di(2-ethylhexyl) phthalate (DEHP), its metabolite Mono-(2-ethylhexyl) phthalate (MEHP) and Diisononyl phthalate (DINP), increases infectivity in Cocksackie B virus and Dengue viruses. As such, non-phthalate plasticizers (NPPs), like Dioctyl terephthalate (DEHT) and its metabolite terephthalic acid (TPA) are emerging PP replacements. We hypothesize that PPs will cause differential gene expression in KSHV-infected cells and affect virus production, while NPPs will not. To test this, we utilized iSLK.BAC16 cells, which maintain the KSHV genome, constitutively expresses GFP, and can be induced to lytic replication upon Dox treatment. We measured KSHV viral gene expression and viral production after pre-treatment with PPs (DEHP, MEHP, or DINP) and NPPs (DEHT and TPA) for 24hrs and then induced lytic replication for 48hrs. We extracted RNA to measure the expression of an early lytic gene (ORF59) and a late lytic gene (K8.1) via RT-qPCR, collected the supernatant to titer for virus production, and extracted DNA to compare the number of viral genome copies after lytic replication. Preliminary data show that DEHP significantly decreases late lytic gene expression and reduces infectious virion production. Similarly, DINP and MEHP decreased infectious virion production. Current work will characterize DINP and MEHP's effect on viral gene expression and NPPs effects on KSHV. Future work will elucidate the mechanism by which PP chemicals inhibit KSHV infection. Understanding how phthalates disrupt KSHV and host cells may reveal therapeutic targets, while highlighting plasticizer exposure as a toxicology concern for viral infections.

Devika Mukherjee

Discipline: Economics

Authors:

Abstract Name: The Economic Impact of Organic Farming in India

This paper explores the relationship between farming methods and agricultural wages in India. While conventional methods are associated with increased yields, organic farming is more ecologically sustainable and produces healthier food for consumers. The exact economic effects of both methods continue to be debated, as it is unclear if the increased input costs of conventional farming are offset by the lower yields of organic farming. State investment in agriculture also plays a key role in this relationship, as it is often linked with lowering food prices and rising incomes. This paper uses state level data to examine how trends in agriculture, agricultural wages, and state investment in agriculture in India have changed between 1980 and 2022. It then uses correlation tests to measure the strength of the relationship between both farming method and state investment and average agricultural wages. Finally, the paper uses multiple regressions to measure the combined effects of farming methods and state investment in agriculture on agricultural wages. From this analysis, the paper finds that, though the consumption of organic fertilizers has generally increased since the introduction of organic farming in India, several states show recent downturns in this consumption. Concurrently, chemical fertilizer consumption trends generally increase over time, even after the introduction of organic methods. As compared to these organic methods, this paper finds that the use of conventional methods is more closely, positively correlated with agricultural wages at the state level. However, state investment is also most strongly correlated with increasing wages across both farming methods. The findings of this paper have broader implications in examining the economic viability of agriculture in India and beyond, though it leaves room for further study, particularly in incorporating the ecological costs of conventional methods in a long-term economic analysis.

Tirumala Echampadi Mukundhan

Discipline: Engineering

Authors:

#1 Tirumalai Echampadi Mukundhan

#2 Abdellah Ait Moussa

Abstract Name: Design and Implementation of a Multipurpose Automation Control System for Sorting and Material Handling

This project investigates whether a low-cost, vision-guided robotic automation system can accurately sort and manipulate objects using a unified platform built around the Dobot MG400, OpenCV-based machine vision, and PLC-controlled actuation. The goal is to create an accessible training system that allows undergraduate students to gain hands-on experience with industrial automation workflows that are typically too expensive for university labs to replicate. Automation systems that integrate robotic motion, machine vision, and PLC coordination are central to modern manufacturing, yet most educational environments lack affordable versions of these technologies. Existing research often examines robotic sorting or PLC-based control separately, but rarely as a single low-cost system. By merging a real-time camera pipeline, robotic motion control, and synchronized hardware actuation, this project provides a practical model that fills a gap between academic instruction and industrial practice. The methodology centers on three coordinated subsystems: a Python/OpenCV module that performs object detection and coordinate extraction; a Lua-based control layer on the MG400 that executes motion sequences; and a PLC-driven actuation system that handles suction, gripping, and conveyor timing. Object data flows from the vision module to the robot through Modbus communication, while the PLC manages end-effector behavior and conveyor movement to complete the sorting cycle. The expected outcome is a fully functional, autonomous sorting system capable of identifying objects by color, shape, or size and accurately placing them through synchronized mechanical and electronic operations. These results will be discussed in the context of engineering education, demonstrating how low-cost automation platforms can provide meaningful preparation for Industry 4.0 environments and expand access to robotics, vision systems, and industrial communication training.

Padraig Mullen

Discipline: Business

Authors:

#1 Robert Boostrom

#2 Maxwell Hsu

#3 Ashley Giese

#4 Padraig Mullen

Ashley Giese

Abstract Name: From Risk to Flourishing: Rethinking AI-Driven Marketing in Digital Media Environments

This study examines how core dimensions of human flourishing, mental health, happiness, and close social relationships, are represented in scholarly research on artificial intelligence (AI) and digital media. Using a bibliometric analysis of 2,839 scholarly journal articles, we map how these technologies are framed in relation to flourishing outcomes. The findings reveal a dominant risk-oriented lens, with literature emphasizing depression, anxiety, stress, and addiction. In contrast, positive indicators such as happiness and

close social relationships remain underrepresented and weakly integrated. Although AI research is expanding rapidly, it has largely developed in parallel with, rather than integrated with, flourishing-based perspectives. Given that marketing plays a central role in shaping digital experiences through algorithmic systems, this imbalance presents both concern and opportunity. We advocate for integrating a flourishing-oriented framework into digital marketing strategy, arguing that such an approach may strengthen brand trust, loyalty, and long-term competitive advantage

Celine Muller

Discipline: Business

Authors:

Abstract Name: Assessing Student Buying Behavior: The Role of Marketing Strategies

I attend Life University, a private institution with a growing and diverse student body known for its specialization in Chiropractic education. As an international student, I quickly noticed that many universities in the U.S. offer a wider range of products and services in their campus stores than what is currently available at Life U. This realization prompted me to look more closely at the purchasing data from at our university shop to understand what students actually buy and where there may be gaps in the current offerings. As part of the research project, I examined patterns such as when students shop most often, which items are bought regularly, how purchasing changes during different times of the quarter, and whether certain student groups show different preferences. Instead of assuming what students want, the goal was to see what their behavior shows. Early observations suggested that students tend to focus on convenience, affordable everyday items, and products that match academic pressures like exam periods. Interest in school-branded merchandise also increases around major campus events. Based on these findings, the project proposes a selection of new product categories, small service improvements, and marketing approaches that feel more aligned with student routines (e.g. offering practical bundles, expanding wellness-related items, or running short-term promotions at times when students are most likely to need them). The overall aim of the research is to show how data-based decisions can help the campus store better support student life while making its operations more effective. By connecting actual purchasing behavior with realistic marketing ideas, the store could better meet the needs of the academic community preparing for demanding academic and professional paths.

Naveen Mundlapudi

Discipline: Environmental Science and Sustainability

Authors:

#1 Pranau Narasimhan

#2 Naveen Mundlapudi

#3 Sujun Neupane

#4 Madhu Gyawali

Naveen Mundlapudi

Abstract Name: Nitrogen Dioxide and Ozone Trends in Major Cities in the U. S. Cities During 2024 Using Pandora Spectrometry

Nitrogen oxides ($\text{NO}_x = \text{NO} + \text{NO}_2$) are formed through the emission of fossil-fuel combustion and are subsequently oxidized in the atmosphere to form nitrogen dioxide (NO_2). Ozone (O_3) is a pollutant primarily formed through photochemical relations involving volatile organic compounds (VOCs), sunlight, and

nitrogen oxides. While O₃ in the stratosphere plays a critical protective role by absorbing ultraviolet radiation, elevated levels of NO₂ and O₃ near the surface are detrimental to our health and air quality. Because NO₂ is a key precursor to the formation of ozone, the two often exhibit an inverse relationship. This trend varies seasonally and is influenced by sunlight intensity and meteorological conditions. This research investigates NO₂ and O₃ trends during 2024 across multiple major cities in the United States to evaluate how changes in air quality reflect atmospheric process. The data was taken from the Pandonia Global Network, a collaboration between NASA & European Space Agency (ESA), through the collection of hundreds of spectrometers across the globe. These instruments provide high-resolution, real-time measurements that were processed and analyzed using Python-based data analysis techniques.

Josya Mungara

Discipline: Engineering

Authors:

#1 Connor Neifert

#2 Seth Hays

#3 Erina Shahriear

Abstract Name: Developing a Treatment for Chronic Pain Using Vagus Nerve Stimulation and Pharmacologics

Radial nerve injury (RNI) often results in the development of allodynia or hypersensitivity to touch, which leads to chronic pain. Vagus Nerve Stimulation (VNS) has been successful in improving sensory perception after loss of tactile sensation. However, earlier studies that administered VNS to treat chronic allodynia have failed to restore the pre-injury perception. Recent findings suggest that VNS, which modulates neurotransmitter release, combined with beta-adrenoceptor blocking drugs, improves rehabilitative outcomes. The goal of this study is to test whether Beta-Blockers, combined with VNS, can be used to enhance recovery in cases of allodynia. We hypothesize that VNS combined with beta-blockers and rehabilitation will restore typical sensory thresholds and paw preference. To test this, we performed the radial nerve injury (RNI) in order to induce allodynia. The animals were then organized into 4 sets of groups that underwent rehabilitative therapy paired with and without VNS, and were administered either the beta-blocker propranolol or a vehicle injection. To assess sensory improvement, an automated von Frey assessment was conducted throughout the experiment to observe mechanosensory withdrawal thresholds. To evaluate paw preference, rats were placed in an acrylic cylinder, and their spontaneous paw touches to the wall were counted. As expected, rats in our preliminary findings had a significant decrease in the withdrawal thresholds and in the use of the injured paw in exploratory behavior immediately after the injury. Surprisingly, neither VNS alone nor VNS paired with propranolol during rehabilitation improved the outcomes. Taken together, VNS did not restore sensory function in rats with allodynia, nor did manipulating the neuromodulatory mechanism involved. Our next steps are to further explore additional nociceptive mechanisms that are preventing recovery and causing hypersensitivity. Findings from this study may provide insight into future neurorehabilitative sensory therapies and pave the way for a fundamentally novel strategy for treating chronic pain.

Nejwa Munir

Discipline: Nursing and Public Health

Authors:

Abstract Name: Connecting Pesticide Overuse and Malaria in Uganda: A Public Health Perspective

Malnutrition and malaria severely burden public health systems in low-income countries, causing nearly 10 million annual deaths. These concerns are also worsened by climate change through increased food security challenges, changing weather conditions, and increased use of agricultural chemicals, like pesticides. Previous research has connected pesticide use to nutrient sequestering in soils and nutrient deficiencies in crops. In East Africa, a largely agrarian region, micronutrient malnourishment has been identified as a critical issue affecting individual health and educational/economic productivity due to decreased immune function. This is especially dangerous during concurrence with malaria as the parasite is able to evade the immune system without a robust response. The current research seeks to extend what is known about pesticides, malnutrition, and malaria to The Republic of Uganda. To do this, a survey was conducted by an interdisciplinary research team in the Kibale region to gain a better understanding of agricultural practices and pesticide use. Additionally, soil and cassava samples were collected from the Rwenzori region and underwent analysis for nutrient sequestering and deficiency. Further, households around the Rwenzori region were surveyed about rates of illness or death and children's anthropometric measurements were obtained. Overall, the survey results will provide information about pesticide use and will be combined with soil/cassava data to gain understanding about current nutrient deficiencies. This will then be combined with anthropometric data to observe correlations between nutrient deficient crops and malnutrition/malaria rates. Preliminary results suggest that climate and pest conditions in Uganda are indeed leading to increased pesticide use and initial soil and cassava nutrient analysis is consistent with patterns of sequestering and deficiency. We also expect to find high rates of malnutrition in conjunction with significant malaria infection. Ultimately, this project strengthens understandings of connections between agricultural policy, climate change, micronutrient malnutrition, and infectious disease.

Jolyanis Muniz Franco

Discipline: Psychology

Authors:

#1 Jolyanis Muniz Franco

Abstract Name: Student Athletes' and Coaches' Perception of Nutrition Education

Nutrition education is essential for student athletes to prevent, identify, and treat any potential disordered eating behaviors they present. Previous research on this topic has been limited and constrained. A study conducted by Hines and colleagues (2019) in Wisconsin found that athletes in both types of sports, lean and non-lean, had comparable nutrition education and that athletes in those sports felt more pressure about weight gain as well as greater concern about eating disorders. They also found that nutrition education was particularly lacking among female athletes (Hines et al., 2019) while a more recent study found that a nutrition education intervention had an impact on female athletes' dietary habits, though they concluded that there must be further research done on educational strategies for female athletes with less limitations (Veloso-Pulgar & Farran-Codina, 2025). Additionally, a study from Lebanon on professional athletes' and coaches' perceptions of nutritional knowledge found that the nutritional knowledge of coaches was much larger than the nutritional knowledge of the athletes (Boumosleh et al., 2021). My research question asks how student perceptions on nutrition education differs across gender or types of sports, and I aim to locate any opportunities for the improvement of nutrition education in athletes. Moreover, I will also be comparing athletics staffs' perceptions of nutrition education with athletes' perceptions of nutrition education. Participants include student athletes and athletics staff from Florida Gulf Coast University and the University of Wisconsin- Eau Claire.

Nnenna Muogboh

Discipline: Biology

Authors:

#1 Devesha Kulkarni

#2 Hrishikesh Kulkarni

Abstract Name: Investigating the Role of Locally-Derived Complement Factor B in Intestinal Barrier Protection

Inflammatory Bowel Disease (IBD) is a disorder marked by chronic inflammation and barrier dysfunction of the intestine. There are more than three million people with IBD in the US alone, and ten million globally. Not much is known about how chronic intestinal inflammation is triggered and there are very few effective treatment options for patients. The complement system is a part of the immune system and Factor B is an important component of the alternative pathway within the complement system. Although there have been elevated levels of complement Factor B observed in human IBD patients, its role in intestinal protection is unknown. If there was an understanding of how it influences disease progression and contributes to the maintenance of the epithelial barrier, then potential specific drug targets for IBD and other related diseases may be discovered. We hypothesize that Factor B plays an important role in the gut and is crucial for preventing intestinal inflammation during disease. To study the importance of Factor B during IBD, we used an animal model of DSS to induce colitis-like disease. We used a whole-body knockout model as well as tissue specific deletion of Factor B which are VillinERT2Cre (epithelial produced) and AlbuminCre (liver produced). Tissue was collected from the gut to validate both the localization of Factor B and epithelial integrity through immunohistochemistry. ELISAs were performed on serum and tissue lysates to quantify inflammatory cytokines. Additionally, we will use quantitative PCR to observe gene expression of Factor B. Additionally, immunohistochemistry confirmed the loss of Factor B expression in intestinal epithelial cells of VillERTCre⁺ mice. ELISA data suggests increased inflammatory markers in DSS treated knockout mice. Our findings suggest that locally-driven Factor B has a protective effect on intestinal barrier integrity and in the regulation of inflammation during colitis.

Blake Murdock

Discipline: Linguistics and World Languages

Authors:

#1 Jane Lutken

Abstract Name: Neurodivergent Adults Outperform On Complex Question Production Under Cognitive Load

When English-speaking children ask questions with embedded clauses (e.g., Who do you think the cat chased?), they sometimes produce an extra “medial” question word (e.g., What do you think who the cat chased?). Prior work suggests these errors may reflect immature linguistic competence or limitations in developing cognitive mechanisms. If these errors are the result of children having a lower threshold for cognitive load, it should be possible to induce similar productions by overloading adults’ cognitive mechanisms. This study explores whether neurodivergent adults differ from neurotypical adults in producing complex questions under such conditions. Methods: Twenty-nine college students were randomly assigned to one control and two experimental conditions. After exclusions, 25 participants remained, and seven self-identified as neurodivergent. In experimental conditions, participants memorized three sentences before reading each scenario and were asked to recall them after posing their question; the control condition involved no cognitive load. Trials were presented in random order via FindingFive, and responses were transcribed and verified. Results: Grammatical, multiclausal questions constituted 52% of productions. A variety of production types were used which are syntactically simpler than multiclausal questions, including monoclausal (34%), “about” questions (11%), and yes/no questions (3%). Bayesian ANOVAs revealed no significant effect of neurodivergence overall, though neurodivergent participants were slightly less likely to

use monoclausal questions (BF10 = 1.136) and, on average, produced more grammatical multiclausal questions than neurotypical peers. We attribute the lack of significance to small sample size. Discussion: Preliminary findings suggest neurodivergent individuals may outperform neurotypical peers on complex question production under cognitive load, relying less on workarounds. Regardless of the exact explanation, this study has implications for linguists and psychologists alike as it suggests a difference in performance between neurotypical and neurodivergent individuals on this type of task.

Joshua Muroi Muroi

Discipline: Engineering

Authors:

#1 Joshua Muroi

Abstract Name: Produced Water Reuse

Produced water, a byproduct of oil and gas production, is often treated as waste despite its high ionic and mineral content. This study investigates the potential reuse of produced water as an electroactive medium capable of storing or conducting electrical energy. By combining produced water with clay-rich soils to create conductive mud formulations, experiments were conducted to analyze voltage retention and current flow when subjected to small potential differences. Various mixtures were tested to evaluate how factors such as salinity, clay content, and water volume influence conductivity and energy storage. Preliminary findings suggest that clay-based muds with higher salinity concentrations demonstrate greater voltage output compared to sandy counterparts, likely due to increased ionic mobility and tighter molecular packing within the clay matrix. These results highlight the feasibility of converting waste fluids from petroleum operations into energy-supporting materials, contributing to sustainable resource utilization and circular energy recovery within the oilfield ecosystem.

Joshua Muroi

Discipline: Interdisciplinary

Authors:

#1 Mahmoud Elsharafi

#2 Romario Hughes

#3 Joshua Muroi

Romario Hughes

Abstract Name: Using Spearman's Rank Correlation Analysis method to determine the relationships between Produced Water quality parameters and their suitability for water membrane distillation

Access to reliable water sources is critical for sustainable desalination processes such as membrane distillation (MD). This study evaluated the physicochemical properties of twenty water samples to assess their suitability for MD applications. Five key water parameters were analyzed: pH, conductivity, free ammonia, total alkalinity, and sulfate concentration. Suitability thresholds were defined based on known operational risks, including corrosion at low pH and scaling at elevated sulfate or conductivity levels. Results showed that most samples (15 of 20) exhibited favorable characteristics for MD, with near-neutral pH and moderate alkalinity supporting process stability. Samples with very high conductivity and sulfate concentrations (e.g., >135,000 $\mu\text{S}/\text{cm}$ and >90 mg/L) were classified as “moderately suitable” due to scaling risk. Two samples with extremely low pH (~3.7) were deemed unsuitable for MD because of corrosion risk and reduced

efficiency. Spearman correlation analysis highlighted key relationships, such as the positive association between alkalinity and pH stability and the contribution of sulfate to scaling risk. These findings emphasize the value of targeted water quality assessment in desalination system planning. By linking physicochemical parameters to performance suitability, this research supports informed decision-making for MD deployment and offers insight into managing water sources in regions facing contamination and scarcity challenges.

Maddie Murphy

Discipline: Biology

Authors:

#1 Maddie Murphy

Abstract Name: Detecting Ranavirus using TaqMan Quantitative PCR in Aquatic Turtles from Central and Southeastern Ohio

Ranavirus is a global pathogen that has caused mass mortality events in wildlife species including amphibians, reptiles, and fish. Frog virus 3 (FV3) ranavirus is the most prevalent lineage and has been found to infect Midland Painted (*Chrysemys picta marginata*) and Eastern Box (*Terrapene carolina carolina*) turtles in Ohio. Even with the increase in reporting of ranavirus in amphibians, the data for turtle populations are limited. This study aims to assess the presence of ranavirus found in aquatic turtle populations at Capital University's Primmer Outdoor Learning Center (Logan, Ohio), Glacier Ridge Metro Park (Plain City, Ohio), and Blacklick Woods Metro Park (Reynoldsburg, Ohio) in Central and Southeastern Ohio. Turtles were captured and adhered to standardized trapping methods with ten Promar collapsible live bait traps per session where oral swabs and non-invasive tail clipping samples were collected. Four trapping sessions have been completed with twenty-nine total samples collected to date. In the lab, DNA extraction was performed using the Qiagen DNeasy Blood & Tissue Kit followed by quantitative polymerase chain reaction (qPCR) with a TaqMan assay and internal positive controls to detect the presence of ranavirus. Preliminary screening with qPCR (n=9) detected positive samples from one Eastern Musk (*Sternotherus odoratus*) turtle with a wound from Primmer Outdoor Learning Center, one adult Midland Painted (*C. picta*) turtle from Blacklick Woods Metro Park, and one juvenile Midland Painted (*C. picta*) turtle from Glacier Ridge Metro Park. Additional swab and tissue samples will be collected and analyzed along with filtered water environmental DNA (eDNA) to evaluate the significance of these results. This project will provide a better understanding of ranavirus prevalence in aquatic turtle populations in Ohio.

Rachel Murphy

Discipline: Architecture, Construction Management, and Interior Design

Authors:

Abstract Name: Transforming Underused Office Space into Mixed-Use Housing and Providing Community Amenities

Denver faces a series of overlapping challenges: a shortage of affordable housing, rising living costs, and a growing number of underused office buildings resulting from post-pandemic shifts in workplace patterns. These circumstances call for design approaches that reconsider how existing buildings can be adapted and reactivated. This project researched adaptive reuse as a viable response by transforming an existing office building into a mixed-use residential community centered on affordability, wellness, and social connection. The proposal positions the building as a neighborhood asset by integrating programs that support physical,

mental, and social well-being. The design strategy draws on biophilic design, environmental psychology, and the WELL Building Standard, which guided decisions related to spatial organization, material selection, and amenity placement. The lower-level amenities, including a community café, nutrition center, library, coworking rooms, youth spaces, and outdoor terraces, are arranged to support daily activities and encourage interaction among people of different ages. The residential floors have a repeatable unit layout that improves efficiency and promotes whole-building performance. Across the project, the design emphasizes daylight, intuitive circulation, and comfortable, dignified living environments. A resident-focused survey supports the neighborhood analysis, helps identify which services were most needed, and how the building could contribute meaningfully to the surrounding environment. This research shaped the program and ensured the proposal responded to actual local needs rather than imposing predetermined amenities. Ultimately, the work positions adaptive reuse as a meaningful tool for addressing housing and community challenges in cities like Denver. By combining affordable housing, health-supportive environments, and community-oriented programming, the project demonstrates how an existing building can be reimaged to better serve both its residents and the broader neighborhood.

Matthias Murphy

Discipline: Chemistry

Authors:

#1 Matthias Murphy

Abstract Name: Synthesis of Novel Melanoma-Inhibiting Compound A-11

Melanoma is the fifth most common cancer in the United States, with cutaneous melanoma accounting for 94% of cases. Cutaneous melanoma originates from melanocytes and is a highly aggressive malignancy. A patented compound, A-11, has demonstrated potential for inhibiting melanoma growth and the removal of existing melanoma cells. Studies have shown A-11 to inhibit melanoma growth in zebrafish embryos and in mouse melanoma cells by mitosis reduction causing morphological changes resembling reversion to normal melanocytes. Studies of this compound indicate that it could be a powerful new therapy for melanoma cancers, however, the current synthetic scheme for this compound has shown little reproducibility, with the remaining amount of the compound dwindling. The aim of this research is to develop and carry out a modernized synthetic scheme to reliably and efficiently produce larger quantities of A-11 for the purpose of further cancer treatment research and application. Thus far, a full scheme has been developed, and the first synthetic intermediates have been successfully produced and characterized in good yield.

Morgan Murphy

Discipline: Biochemistry

Authors:

#1 Nandita Hareesh

#2 Meghan S. Blackledge

#3 Heather B. Miller

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Natalie Small

Abstract Name: Testing Potential Antibiotic Adjuvant Compounds for STP1 Inhibition

Staphylococcus aureus (*S. aureus*) is a Gram-positive, opportunistic bacterium that can cause a variety of life-

threatening infections. *S. aureus* has acquired resistance to many different antibiotics, including vancomycin, methicillin, and penicillin. Previous work in our lab identified that brominated carbazoles can potentiate the activity of β -lactam antibiotics against methicillin-resistant *S. aureus* (MRSA). Small molecules, such as these carbazoles, that increase the efficacy of existing antibiotics against resistant infections are classified as adjuvants. Serine-threonine kinase (STK1) was hypothesized to be the target of these compounds; however, testing demonstrated that they did not alter the activity of its kinase domain. As a result, we began studying the cognate phosphatase of STK1, serine/threonine phosphatase (STP1), to determine whether this protein was the target of these compounds. STP1 is an enzyme in *S. aureus* that plays a role in cell processes, such as cell wall synthesis and homeostasis, cell division and size, and biofilm formation. It is also found to contribute to acquired antibiotic resistance. Inhibition of STP1 poses a promising mechanism for antibiotic adjuvants. To study STP1 function, we expressed STP1 in Origami B(DE3) cells and purified the recombinant protein using affinity chromatography. We utilized a phosphatase assay to screen the impact of the carbazoles on STP1 catalysis. We demonstrate that many carbazoles are competitive inhibitors of STP1 and have begun to establish structure-activity relationships. The inhibition of STP1, therefore, can be linked to the adjuvant activity of these compounds.

Matthias Murphy

Discipline: Chemistry

Authors:

#1 Matthias Murphy

Abstract Name: Synthesis of Novel Fluorinated and Deuterated Methylenedioxymethamphetamine (MDMA) Analogues

Recent studies have shown that 3,4-methylenedioxymethamphetamine (MDMA) can be effective as a treatment of post traumatic stress disorder, (PTSD)¹. The goal of this research is to synthesize next-generation analogues of MDMA that could be tested for PTSD treatment efficacy and offer alternative treatments with improved pharmacological profiles. Target analogues include partially fluorinated and deuterated versions of MDA, MDMA, and methylone. A series of reactions, purifications, and chemical analyses are being carried out to create these new analogues. F2-MDA and F2-MDMA have already been synthesized and characterized. F2-methylone and deuterated analogues are currently in preparation. Pharmacological assays for clinical efficacy will be performed by collaborators.

Maddie Murphy

Discipline: Biology

Authors:

#1 Maddie Murphy

Abstract Name: Detecting Antibiotic Resistance Patterns in Aquatic Turtles from Central and Southeastern Ohio

Antibiotic resistance is an emerging concern for public and environmental health, affecting humans, wildlife, and ecosystems. Aquatic turtles can act as reservoirs and vectors for antibiotic resistant bacteria, although information on resistance patterns in turtle populations is limited. This study aims to assess the presence of antibiotic resistant bacteria in aquatic turtle populations at Glacier Ridge Metro Park (Plain City, Ohio), Blacklick Woods Metro Park (Reynoldsburg, Ohio), and Capital University's Primmer Outdoor Learning

Center (Logan, Ohio) in Central and Southeastern Ohio. To date, seven trapping sessions have been completed with twenty-four total samples having been collected. Turtles were captured following standardized trapping protocols using ten Promar collapsible live bait traps per session. During retrieval, oral, plastron, and cloacal swabs were streaked on nutrient agar plates in the field and an additional oral swab was collected for further analysis. In the lab, the bacteria from the plates were processed using a Kirby-Bauer assay to evaluate antibiotic susceptibility. The additional oral swab was used for DNA extraction using the Qiagen DNeasy Blood and Tissue Kit, followed by PCR amplification, and visualized using gel electrophoresis. Preliminary screening with Kirby-Bauer and PCR detected antibiotic resistance in Eastern Musk (*Sternotherus odoratus*) turtles from Primmer Outdoor Learning Center and Midland Painted (*Chrysemys picta marginata*) turtles from Glacier Ridge Metro Park and Blacklick Woods Metro Park. Additional swabs will be collected and analyzed along with filtered sediment environmental DNA (eDNA) to evaluate the significance of these results. This research will provide a better understanding of antibiotic resistance in aquatic turtle populations in Ohio.

Sultan Musa

Discipline:

Authors:

Abstract Name: Journals as Labs: How Student Reflections and Case Autopsies Decoded AI-Generated Realities

In an era increasingly shaped by artificial intelligence, cultivating AI literacy among students is essential for responsible digital citizenship. This mixed-methods study, conducted through Georgia State University Perimeter College's Center for Outreach, Research & Engagement, explores how undergraduate students interpret and critically engage with AI-generated content using reflective journals and case autopsies. Drawing from a semester-long inquiry, students analyzed fabricated news headlines and narratives produced by AI, documenting their reactions and reasoning in personal journals and collaborative case studies. The research revealed that 83.3% of participants demonstrated discernible AI literacy, successfully identifying synthetic content and articulating nuanced critiques of its implications. Qualitative analysis of student reflections uncovered recurring themes of skepticism, ethical concern, and media awareness, suggesting that reflective practices foster deeper understanding of algorithmic influence. This project positions student writing as a laboratory for decoding digital realities, offering a replicable model for integrating AI literacy into humanities curricula. By bridging critical thinking with emerging technologies, the study contributes to pedagogical strategies that empower students to navigate—and challenge—the complexities of AI-mediated information.

Elif Nalan Mutlu

Discipline: Computer Science

Authors:

#1 Xin Yang

Abstract Name: Identifying Hyper- and Hypo-Connectivity in Autism Spectrum Disorder Through Default Mode Network Analysis Using Resting-State fMRI

This project examines differences in how strongly key brain regions communicate with one another, a pattern often referred to as functional connectivity, in individuals with Autism Spectrum Disorder (ASD), with a

focus on the Default Mode Network (DMN). This network becomes active during self-reflection, social understanding, and the interpretation of thoughts and feelings. Because many traits associated with ASD relate to these processes, studying this network may offer insight into underlying neural patterns. The data used in this study come from the Autism Brain Imaging Data Exchange (ABIDE), which provides resting-state fMRI scans from many research sites. After applying quality controls, the dataset included 871 participants, 403 with ASD and 468 in the control group. To study the DMN, a widely used brain atlas was utilized to identify three core regions, which were represented by 16 smaller parcels using the Schaefer atlas applied to the ABIDE data. Each pair of parcels was then examined to measure how strongly these regions communicated during rest. When comparing the ASD and control groups, a clear pattern emerged: individuals with ASD showed reduced communication between two major DMN hubs, the medial prefrontal cortex and the posterior cingulate cortex. These areas play central roles in social reasoning and self-focused thought, and reduced communication between them has been proposed as a possible explanation for some core features of ASD. This project is ongoing, and the next stage involves using machine-learning methods to test whether these brain-based patterns can help classify ASD more objectively. By identifying consistent differences in how the DMN functions, this work contributes to the broader goal of developing reliable biological markers that could support, rather than replace, traditional behavioral assessments.

Andrea Mutoti

Discipline: Psychology

Authors:

#1 Andrea V. Mutoti
#2 Jolie T. Nshimye
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Jolie Nshimye

Abstract Name: Beyond ACEs: Considering the Role of Strengths-Based Developmental Assets in Reducing Justice Involvement among Black Youth

Black adolescents are overrepresented in juvenile justice systems, despite having similar offending rates compared to their white peers (Padgaonkar et al., 2021; Rovner, 2024), making it important to understand predictors of justice involvement. Adverse childhood experiences (ACEs) have been studied as a predictor, and have been linked with an increased risk of justice involvement and delinquency (Graf et al., 2021). ACEs negatively affect brain development by impairing the areas that are responsible in navigating through high stress situations or difficulties, which creates a vulnerability to justice system contact (Buimer et al., 2022; Kong et al., 2021). Building on this work, it is also important to move beyond ACEs and understand strengths that are related to less justice involvement. Thus, the current study tested whether ACEs and developmental assets predicted justice involvement. Participants were 237 Black adolescents 12 to 17 years of age ($M = 14.46$, $SD = 1.64$). The overall model was significant, $F(3, 221) = 5.114.24$, $p = .02$, $R^2 = .19$. Specifically, Black youths' adverse childhood experiences were not associated with juvenile justice involvement ($\beta = .02$, $p = .38$). However, developmental assets were significantly associated with less juvenile justice involvement ($\beta = -.01$, $p = .01$). Together these findings highlight the protective role of developmental assets in shaping justice involvement among Black adolescents. Interestingly, previous work has tended to focus on ACEs, but our findings highlight that when strengths are considered, they are a more powerful predictor of decreased justice involvement. The results suggest that promoting developmental assets may be a promising strategy for supporting healthy developmental pathways among Black youth.

Giliane Yza Muyna

Discipline: Nursing and Public Health

Authors:

#1 Jeffery Howard

Abstract Name: Geospatial Variation in Particulate Matter, Chronic Obstructive Pulmonary Disease and Life Expectancy in Texas

Particulate matter (PM) is an environmental pollutant with significant public health risks. However, the spatial relationship between PM levels, chronic obstructive pulmonary disease (COPD) and life expectancy across counties in Texas has not been fully explored. This study aims to examine the spatial distribution of PM in relation to COPD prevalence and life expectancy, with a focus on identifying geographic patterns and associations across Texas counties. County-level data on life expectancy, COPD prevalence and PM concentrations were obtained from County Health Rankings database. Data for COPD prevalence among U.S. adults were sourced from the Centers for Disease Control and Prevention database. Spatial analysis techniques including bivariate choropleth mapping and local indicators of spatial association (LISA) analysis were used to identify patterns of spatial clustering in Texas. Two-sided p-values were used for significance testing. All data were analyzed in R version 4.3.1. The analysis revealed significant spatial clustering in East Texas with higher concentrations of PM and elevated COPD prevalence compared to other areas in Texas. Additionally, clusters of lower life expectancy and higher PM levels were also evident in East Texas. In contrast, metropolitan areas despite having higher PM levels, showed higher life expectancy, likely due to better access to healthcare resources. The results highlight that air quality is a crucial determinant of health, with East Texas exhibiting high PM concentrations associated with increased COPD prevalence and lower life expectancy. In contrast, metropolitan areas, despite having elevated PM, show higher life expectancy likely due to better access to health resources. These findings highlight the need for maintaining air quality regulations, and emphasis on the importance of targeted public health interventions in rural areas. Addressing these disparities is essential to reduce exposure to PM and lower the prevalence of chronic respiratory diseases.

Ada Muzoglu

Discipline: Computer Science

Authors:

#1 Ada Muzoglu

Abstract Name: Breaking the Mold: An Exploratory Analysis of Real-World AI Prompt Jailbreaking Scenarios and Their Implications for Cybersecurity

This paper presents a comprehensive analysis of real-world scenarios involving artificial intelligence (AI) prompt jailbreaking, where malicious actors exploit vulnerabilities in AI language models to elicit unintended or unauthorized responses. Through a thorough examination of existing literature and case studies of real-world scenarios, this paper identifies some common patterns, techniques and motivations behind AI prompt jailbreaking attempts and explores the potential consequences of such exploits, including dissemination of misinformation, manipulation of public opinion, and the compromise of sensitive information. An evaluation of 3 large language models (LLMs) are evaluated in total-GPT-3.5, GPT-4, and PaLM 2-against 6 different types of jailbreaking and malicious query types (persona-based, task exploitation, hypothetical

scenario, data exfiltration, and system prompt leakage). This study analyzes the jailbreaking and malicious query types described in this study to assess their robustness against such attacks. The findings in the paper indicate that the majority of such attempts seem to exceed 50% across all tested models, with persona-based jailbreaking attempts being demonstrated to have the highest effectiveness and yield rates out of all jailbreaking types. By investigating the intersection between the safety of AI language models, natural language processing, and cybersecurity, this paper aims to provide insights into the current state of AI prompt jailbreaking, the types of jailbreaking and inform the development into more effective countermeasures against such threats in order to mitigate the risks associated with jailbreaking, as these results underscore the critical importance for the need of urgent countermeasures to mitigate the risks posed by unethical AI jailbreaking.

Aique Mvondo Assomo

Discipline: Computer Science

Authors:

#1 Aique Mvondo Assomo

Abstract Name: Domain-Specialized Genomic Language Models for Plastic-Degradation Detection

Plastic pollution is a rapidly escalating environmental crisis, and microbe-driven mitigation strategies depend on efficiently identifying the organisms and genes that support plastic breakdown. This project focuses on plastic-degrading bacteria and investigates how genomic language models encode and distinguish sequence features associated with plastic-degradation potential in both assembled genomes and unassembled sequencing reads. Large transformer-based genomic architectures trained directly on raw DNA have recently shown that they can capture biologically meaningful sequence regularities and support tasks such as species classification, gene annotation, and functional prediction without explicit feature engineering. Building on this emerging paradigm, we ask whether a domain-specialized genomic language model trained specifically on plastic-degrading bacteria can more sensitively and specifically detect plastic-degradation potential than a general-purpose model, and whether such a model can help reveal novel genes and pathways involved in plastic metabolism. In preliminary analyses, DNABERT-S, a species-aware genomic language model trained on a massive set of diverse bacterial genomes, achieves strong species-level discrimination on newly sequenced candidate plastic-degrading bacteria, suggesting that its embeddings can be used to map plastic-degradation potential across both assembled genomes and environmental metagenomic reads. To address this question systematically, we curate a benchmark dataset from PlasticDB and related resources that link genomes and enzyme sequences annotated for plastic-degrading activity with carefully matched non-degrading controls. Using this corpus, we train a domain-specialized genomic language model and adapt it for sequence-level annotation tasks, including predicting plastic-degrading potential in newly sequenced bacteria and environmental reads. We then compare its performance with DNABERT-S, focusing on classification accuracy and recovery of plastic-degradation genes and pathways. The goal is a plastic-focused genomic language model that enhances detection of plastic-degrading taxa and genes and prioritizes candidate enzymes and pathways for experimental follow-up in microbial bioremediation.

Lily Myers

Discipline: Environmental Science and Sustainability

Authors:

#1 Lily Myers

#2 Brock Payne

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#4 Stephanie Stotts

Abstract Name: Lignin Content in Salt-Exposed Loblolly Pines (*Pinus taeda*) as an Explanation of Reduced Wood Density Using the Acetyl Bromide Method

Coastal forests in the southeastern and mid-Atlantic regions of the United States experience salinization and hydrologic alterations leading to inland marsh migration and expanding ghost forests. Despite widespread tree mortality due to salinity intrusion, the processes driving tree decline and death in these systems are not fully realized. Recent studies have indicated that salt exposure is associated with reduced wood density in loblolly pine (*P. taeda*), but the cause of this altered wood property has not yet been identified. In this study, we hypothesize that reduced lignin content, where lignin is a compound that provides protection and rigidity, could be the source of wood density differences. To test this hypothesis, we compared lignin content from trees in the high-elevation forest (>1m, representing minimal salt exposure and low-elevation forest (<0.7m, representing high salt exposure) at three locations on the Delmarva Peninsula. We hypothesized that salt-exposed trees at Milford Neck, Delaware (nh=10, nl=8), Monie Bay, Maryland (nh=9, nl=10), and Brownsville Forest, Virginia (nh=10, nl=8) would have lower lignin content than their less-exposed upland counterparts due to reduced photosynthetic rates associated with salt stress, explaining the lower wood density found in these trees. Tissue samples were collected by coring trees with an increment borer, and a modified acetyl bromide method was utilized to determine wood lignin content. Samples were restricted to trees with known wood density and cell morphology (i.e., cell wall thickness and lumen area). Results from Monie Bay suggest lower lignin content in salt-exposed forest (mean = 20.86%) when compared to trees with lower salt exposure (30.70%, p-value=0.0001143898). Results from the Delaware and Virginia locations are pending.

Andrew Myshkevych

Discipline: Computer Science

Authors:

#1 Chase Hoffman
#2 Steve Kang
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Abstract Name: EV Range Estimation using Fuzzy Logic Model

This project developed a dynamic electric vehicle (EV) range estimation model using a fuzzy logic system which provides more accurate predictions than the predictions from the manufacturer's computers onboard the electric vehicle. Using the On-Board Diagnostics (OBD) data from a 2012 Chevrolet Volt, the model integrates real-world variables which significantly impacts the battery performance. Some key real-world variables include the driver's behavior which is quantified through "aggressiveness" (rate of acceleration) and "cruise steadiness" (speed variance), and different environmental conditions like the ambient temperature. The fuzzy logic system processes these different inputs and the battery's State of Charge (SoC) in order to generate a dynamic multiplier which ranges from 0.6 to 1.1. This multiplier adjusts the baseline range, accounting for up to a 40% range reduction in adverse conditions or a 10% gain in optimal scenarios. Membership functions for temperature and driving behavior were refined based on already established research from sources like AAA and the Department of Energy, which confirms range loss at extreme high and low temperatures. The challenges which were encountered included limited vehicle access, a small dataset, and the use of an older hybrid car which has a degraded battery that could not be fully charged. Despite these limitations, the model was successful in demonstrating a physics-aligned approach to EV range prediction, proving that the fuzzy logic framework can effectively translate complex, real-world variables into a quantified way in which a more accurate range estimate is possible.

Jeassa Pearl Nabong

Discipline: English and Literature

Authors:

#1 Jeassa Pearl Nabong

Abstract Name: The Immigrant Plight

The immigrant plight is a complex journey, often unknowingly shaped by colonial legacies and racial hierarchies. For decades, immigrants have entered the U.S. under the false premise of the 'American Dream', only to face economic hardships, racism, social isolation, and loss of identity. For brown men in particular, this experience is further complicated by pervasive stereotypes that label them as 'terrorists'. This paper explores the immigrant experience of two brown men in two contemporary South Asian Literature. In both cases, their legal status conveys a crucial role in determining their access to Western economic and social benefits. When human rights are denied, undocumented immigrants are forced to endure hardships in secrecy, isolating themselves to avoid deportation. The experiences of these men are not at all unique. Rather, they reflect the broader stories of migrants who sacrificed their homes for socio-economic betterment. However, their realities post-9/11, gives us a unique perspective into the male, brown migrant experience in modern U.S. particularly how brown bodies are radicalized and profiled despite their deperate origins from the convicted terrorist. These men experience a collective alienation, which raises doubts about whether assimilation is truly accessible. The stark difference in their economic background challenges the concept of 'correct migration', if it's the significant factor to white-acceptance. Yet their decision to abandon their American dream pursuit challenges if the sacrifice it demands is justified. With the current political climate surrounding immigration, it's important to continue the analyzation of the migrant experience. Their story, while fictional, is common amongst migrants across generations. It challenges whether assimilation is attainable or is it rooted in deeper, systematic forces beyond the immigration process itself. It's important to continue this dialogue to raise understanding of their invisible struggles, and larger structure that shape them.

Hemish Naidoo

Discipline: Psychology

Authors:

#1 Emily Cowan

Abstract Name: The Language of Stories: Effects of Consolidation on the Content and Verbal Communication of Memories

New memories are fragile and must undergo a process known as memory consolidation to prevent forgetting. Mechanisms of consolidation facilitate the selective retention of salient information and the transformation of the content of memory traces. However, prior work has generally utilized static images as stimuli, limiting our understanding of how consolidation influences the structure of memories for the dynamic and multidimensional experiences we encounter in everyday life. To address this gap, the current work examines free recall of a naturalistic movie stimulus. Participants are asked to recall a short animated movie both immediately after watching and after a week's delay. As a control for repeated recall, a second group of participants only engaged in the delayed recall test. Leveraging this design, we will explore how the content of memories for a naturalistic stimulus changes over time through differences in verbal communication during the free recall sessions. We will utilize a combination of manual coding schemes and natural language

processing algorithms to analyze each subject's transcripts. Analyses will focus on studying differences in the number of total words, parts of speech (nouns, verbs, etc.), the proportion of highly emotional words used, as well as other queries of the specific content recall used during the two recall sessions. We hypothesize that, with consolidation, participants will demonstrate more linguistically rich speech (e.g., reduced number of total pauses and/or filler words compared to other parts of speech) and will incorporate greater emotional words, consistent with consolidation's prioritization of salient or important information. Together, these results will help adjudicate the precise changes in the content and communication of episodic memories due to consolidation.

Trisha Naidu

Discipline: Engineering

Authors:

Neil George

Ian Jeong

Abstract Name: Designing an Assistive Eye-Dropper Device for Individuals with Limited Hand Dexterity

Many medical conditions affect an individual's mobility, including arthritis and Parkinson's disease. In the United States, these diseases are extremely prevalent, making it difficult for individuals to perform everyday tasks. Individuals required to use eye drops struggle especially, as motor impairments make it challenging to squeeze eye-dropper bottles. This prevents them from receiving the proper dosage amount to their eyes. Attempted solutions on the market are uncomfortable, ineffective, and not standardized in the U.S., indicating a gap in current assistive devices. Our team is designing a novel eye-drop assistive device to simplify this task effectively. Our design utilizes a button-dispenser mechanism. Whereas eye-dropper bottles typically require squeezing, having a single push-button to dispense the liquid requires much less force and precision from the user. Employing the same system as keycaps on a keyboard, our push button is part of an external frame that will fit around a standard eye-dropper bottle. Pressing the button will cause force to be applied onto the bottle, squeezing drops out in a top-down manner. The push button and frame will be 3D printed using common plastic filaments such as PLA and PETG. Our design process begins with modeling our assistive device in Autodesk Fusion. After printing out prototypes to test with an eye-dropper bottle, we will apply various mechanical tests to ensure a high level of quality is met for our stakeholders involved in the distribution and usage of the device. The completed device will allow users to easily self-administer eye drops at home, reducing the force needed to squeeze the bottle and providing consistent dosage delivery. Results and applications will be discussed in the context of improving medication independence for individuals with limited dexterity. Additionally, our design will advocate for greater accessibility in medical care through low-cost engineering solutions in everyday routines.

Sunaina Naik

Discipline: Engineering

Authors:

#1 Tristan Strayer

#2 Jennifer Puetzer

Abstract Name: Investigating Changes in Cellular Focal Adhesions during Hierarchical Collagen Fiber Formation to Better Drive Tendon and Ligament Regeneration

Collagen fibers are the primary source of strength and function in connective tissues, particularly tendons and ligaments. Cells organize these fibers hierarchically, assembling them from nm-wide fibrils into larger fibers and fascicles, growing with mechanical demand. These fibers don't regenerate after injury or with repair, limiting treatment options. There's a need to better understand how cells form hierarchical fibers to engineer functional repairs and replacements. It's well established that cells form aligned fibrils largely through cell contraction forces, highly regulated via cellular focal adhesions (FA) with the extracellular matrix. However, this work has primarily been done on 2D surfaces and in unorganized gels, thus the mechanisms that regulate fiber and fascicle formation are largely unknown. Previously, we developed a culture system that guides anterior cruciate ligament (ACL) fibroblasts in high-density collagen gels to produce aligned collagen fibrils by 2 weeks, which mature into native-sized fibers and fascicles by 4 and 6 weeks. The objective of this study was to explore how FAs change in size and number during hierarchical fiber formation to gain a better understanding of how cells regulate hierarchical fiber formation. To do this, ACL fibroblasts were seeded into high-density collagen gels and cultured in our device for up to 6 weeks to guide hierarchical fiber formation. Similar to previous studies, we found cells formed aligned fibrils by 2 weeks, and larger fibers and fascicles by 6 weeks, coinciding with increased tensile strength and protein accumulation. To evaluate FA formation, vinculin and actin were fluorescently stained at each timepoint. We found that FAs appear to become larger and more diffuse as aligned fibers form in static culture, suggesting a shift in cellular mechanotransduction. Ongoing work is evaluating how dynamic cyclic load alters FAs to further evaluate how cells sense mechanical cues in developing hierarchical fibers.

Sanjay Nair

Discipline: Biology

Authors:

#1 Inho Joh

Ryan Jacobson

Abstract Name: Physical Properties of Cellular Environments Impact Intercellular Adhesion via Heterochromatin Machinery

Cells can sense and respond to their physical environment in a process known as mechanosensing. These mechanical signals can affect the nuclear envelope and how heterochromatin is organized. However, the role of substrate stiffness in gene silencing with heterochromatin is still unclear; better understanding it could reveal how mechanical environments shape cell behavior in development and disease. Fission yeast is one of the most well-studied organisms for heterochromatin assembly and can grow in liquid and solid media. We prepared various solid media with different substrate stiffnesses, and by performing bioindentation, we quantified stiffness with measurements of nN and nm precision, ranging from 1kPa to 100kPa. We then grew fission yeast cells on those media and measured how colony stiffness changes as a function of the substrate stiffness. Our results suggest that cells can increase their stiffness on hard substrates, suggesting that cell-to-cell adhesion is dependent on the extracellular biophysical cues. We also show that this adaptation to stiffness partially depends on heterochromatin machinery like Clr4 and Ago1. These findings suggest that the heterochromatin machinery is required to facilitate the nuclear mechanical response to physical environments. These findings may have applications in stem cell engineering; the physical properties of the cellular environment could be used to differentiate stem cells in conjunction with chemical and biological cues.

Dylana Najera Rios

Discipline: Interdisciplinary

Authors:
#1 Dylana Nájera Rios

Abstract Name: Los Nazis en México: The Untold Relationship Between Mexico and Anti-Nazism

This research project seeks to bring light to the largely overlooked history in Mexico and explores anti-fascism and anti-Nazi propaganda posters created by Mexican artists, situating these works within broader traditions of political art, propaganda studies, and transnational resistance movements. This project will expand on the current literature that rarely addresses Mexico's explicit cultural opposition to fascism or the global circulation of its anti-Nazi imagery. By analyzing propaganda posters created by Mexican artists, including political cartoonists, state-sponsored illustrations, and members of anti-fascist cultural leagues, this study brings new attention to Mexico's role as one of the most outspokenly anti-Nazi countries in Latin America. This project combines archival research, visual analysis, and historical context to assess how Mexican artists used design, symbolism, and rhetoric to denounce totalitarianism. Additionally, this research touches on the unity between the United States and Mexico through a joint effort in aerial combat against a global threat. It further explores underlying social, cultural, and moral issues expressed through these posters, such as anxieties about authoritarianism, refugee solidarity, and the belief that art served as a moral tool in global political struggles. The major impact of this project lies in recovering and interpreting a visual archive that demonstrates Mexico's cultural agency on the world stage during World War II. The findings reveal how Mexican artists shaped public opinion, fostered anti-fascist identity, and contributed to hemispheric efforts against Nazism, which challenged assumptions that Latin American involvement was passive or nonexistent. Target audiences include scholars of Latin American history, art history, political communication, diplomacy, and students interested in global anti-fascist movements. By emphasizing Mexico's creative resistance to Nazism, this research enhances understanding of the interconnectedness of art, politics, and ideology, enriching the field with a more inclusive and transnational narrative of anti-fascist cultural production. Keywords: Mexico, anti-fascism, Nazis, propaganda posters

Lara Najjar

Discipline: Biology

Authors:
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Abstract Name: The Role of WNT Signaling in ALS

Amyotrophic lateral sclerosis (ALS) is a severe and incurable neurodegenerative disease characterized by the loss of motor neuron function and physical impairment. The molecular mechanisms underlying this devastating disease are poorly understood, so further study is necessary to develop therapeutic interventions. In previous studies, links have been discovered between ALS and mutations in RNA binding proteins such as FUS. Our lab recently used spatially resolved RNA sequencing to track gene activity in ALS patient derived motor neurons with a mutation in the FUS protein. Our preliminary data found an upregulation in WNT protein signaling. While the WNT protein family has a known role in development and neuronal function, its relationship with ALS remains undefined. This project aims to examine how WNT signaling is altered in ALS to further characterize the pathways this disease impacts. To investigate the role of WNT signaling in ALS, seven *C. elegans* strains carrying fluorescently tagged WNT components, developed by the Pani Lab, were crossed with a double mutant strain derived from two *C. elegans* ALS model strains, *fust-1* (csb21) and *tdp-1* (csb28). Spinning disk confocal microscopy was then used to characterize protein localization in both normal and mutated individuals across multiple life stages, from larvae to gravid adults.

We first imaged unique localization patterns in each WNT strain without any ALS mutation present. We identified characteristic patterns that define predictable protein dynamics in each strain throughout each life stage. Next, we initiated crosses between the WNT strains and the line with the *fust-1/tdp-1* mutations. However, obtaining these double mutants has proved challenging and is still ongoing. Once these crosses are complete, we will perform imaging and compare the patterns against the WNT localization previously identified in wild types. This will be crucial to recognizing what WNT pathways are altered and at what life stages.

Bryan Nam

Discipline: Biology

Authors:

#1 Yifei Qi

#2 Joshua Schraiber

#3 Eberardo Raymundo

#4 Melinda Yang

Abstract Name: Genetic Continuity Analyses of Northern East Asians

Many different populations live in present-day Siberia and Northern East Asia, reflecting a diversity of ancestries. While ancient DNA has been extensively sampled across this region, a test of direct ancestry has yet to be done to establish the relationships between modern populations and these ancient populations. Using a previously developed test of direct ancestry, or genetic continuity, we analyzed whether modern reference populations from the 1000 Genomes Project and ancient groups from this region were genetically continuous with each other. We found a few examples where continuity tested true in the Shandong region, but most ancient groups were not directly ancestral to any analyzed present-day population. We observed closer relationships between some younger ancient groups and modern populations; for example in the Amur River Basin. Despite the lack of clear examples of direct ancestry, our tests provide valuable insight into the genetic relationships between ancient and present-day populations in Northern East Asia, providing us a better understanding of the evolutionary history of humans in this region.

Naomi Nance

Discipline: Chemistry

Authors:

#1 Patricia De Jesus

#2 Katherine Seley-Radtke

Abstract Name: Structural Expansion of Fleximer Nucleosides via Alkyne Spacer for Enhanced Antiviral Activity

Nucleoside analogues are commonly used for the treatment of various viral diseases and cancers by targeting key biological pathways involved in DNA replication, subsequently inhibiting viral replication. The Seley-Radtke group developed a novel class of flexible nucleoside analogues, termed “fleximers,” that split the purine ring system via a single carbon-carbon bond. This modification allows for the free rotation of the nucleobase which may overcome point mutation. Fleximers have demonstrated broad-spectrum antiviral activity against several viral families such as Ebola, Dengue, and SARS-CoV-2. This project aims to enhance the fleximer technology by replacing the single carbon-carbon bond with varying groups such as alkyne and

alkene. This modification changes the bond distance and spatial geometry of the analogue which may enhance the analogue's ability to access and interact with viral binding pockets more efficiently. The synthesis of each alkyne-expanded nucleoside consisted of the construction of the sugar, the installation of the alkyne group onto the pyrimidine base, the coupling of the alkyne-functionalized pyrimidine to the sugar moiety via a Sonogashira reaction, and finally an instillation of a McGuigan protide prodrug for efficient intercellular transport. To ensure structural accuracy, the compounds were characterized using ¹H NMR and ¹³C NMR. After successfully synthesizing the alkyne-expanded analogues, a series of antiviral assays were conducted to evaluate the biological activity of these compounds against a panel of viruses. In preliminary studies, alkyne-expanded fleximer nucleosides have displayed moderate anti-viral activity against Ebola, Chikungunya, and SARS-CoV-2. These promising results suggest that fleximer nucleosides can potentially contribute to the development of novel compounds for potential antiviral drugs and therapeutics by investigating the effects of various structure-activity based modifications.

Emma Nani

Discipline: Biology

Authors:

#1 Jared Oviatt

#2 Matthew McLean

Abstract Name: Relating Ultra-Fine-Scale Structural Metrics to Cryptobenthic Reef Fish Body Size and Community Structure in Florida

The Florida Reef Tract is one of the world's largest barrier reefs and North America's only living one, making it a hotspot of productivity and crucial to reef fish communities in the Caribbean. Cryptobenthic fishes (< 5cm) typically remain close to structure in coral reefs within reef refuges, which make them difficult to identify and study. Their size and cryptic behavior has created a knowledge gap in scientific literature that we aim to close with a combination of cryptobenthic community data and structural data from shallow coral reefs. The common fish anesthetic, clove oil, was used to collect cryptobenthic species inhabiting Florida Wildlife Commission Coral Reef Evaluation and Monitoring Program sites (FWC CREMP) in an area of 1m². After collecting cryptobenthic fishes, researchers performed underwater photogrammetry on the reef sites to produce high-resolution 3D models with Agisoft Metashape. Utilizing technology such as photogrammetry allows for holistic, noninvasive, accurate recreation of reefs to analyze benthic and coral species present. Additionally, it creates the ability to extract complexity and relief metrics on a fine-scale to determine the link between structure and diversity. Complexity values for each reef patch model will be partitioned into multiple scales ranging from 1mm to 0.5m. Ultimately, this study examines the connection between fish size and physical structure present using trait data measured with ImageJ software in tandem with structural data from Metashape. The implications of these findings can be used to consider a broader perspective on evolution and how rugosity is associated with cryptobenthic body size limitations through an ecological lens. Our results will contribute to the continued understanding of cryptobenthic fish habitat use and will be distributed to the FWC to help inform local policy management and implement optimized artificial reefs in response to natural reef declination.

Isabella Napoli

Discipline: Biology

Authors:

#1 Isabella Napoli

#2 Lavanya Sharma

Abstract Name: Smooth Muscle Klf4 Promotes Spp1⁺ Macrophage Accumulation in Obese Adipose Tissue

Background: Obesity remodels adipose tissue macrophages (ATMs), but how they respond to signals from neighboring smooth muscle cells (SMCs) is less clear. Here we re-analyzed multiple single-cell RNA-seq experiments to build a unified view of adipose immune and stromal cells in a mouse model with SMC-specific Klf4 deletion. **Methods:** We combined 16 10x Genomics libraries from three experiments, including chow and diet-induced obesity (DIO) as well as wild-type (WT) and smooth-muscle Klf4 knockout (Klf4-SMC-KO) mice on DIO. After quality control, 27,398 cells remained. Datasets were integrated with SCTransform and canonical correlation analysis (Seurat v5), using experiment as a batch variable. We then subsetted 12,045 macrophage and mural cells based on marker gene expression and reclustered them using 12 principal components. We curated markers from the adipose macrophage literature (Itgax/CD11c, Cd9, Cd63, Lpl, Steap4, Mafb, Cybb, Pdgfra, Jam2, Prox1, Myocd) and used those to annotate clusters and assess diet- and genotype-dependent changes. **Results:** Single-cell RNA-seq of adipose SVF revealed 18 transcriptionally distinct clusters including macrophages and mural cells. Cluster 0, the largest cluster, contained an Spp1-high macrophage population previously linked to pro-inflammatory and pro-fibrotic functions, crown-like structures, and insulin resistance. In our dataset, Spp1⁺ macrophages increased from 4.2% of cells in chow to 15.9% in DIO (3.8-fold) and within DIO diet, this cluster was more abundant in Klf4 WT than Klf4-SMC-KO mice (0.152 vs 0.083; 1.8-fold higher in WT), suggesting that SMC Klf4 may promote accumulation of this potentially maladaptive macrophage population, which has also been implicated in vascular dysfunction. **Conclusion:** This integrated analysis, built collaboratively with undergraduate students, defines a macrophage- and mural-cell-focused atlas of adipose stromal vascular cells across sorting strategies, diets, and SMC-Klf4 genotypes, and provides a foundation for targeted differential expression and pathway analyses.

Ishneet Narula

Discipline: Law and Legal Studies

Authors:

#1 Ishneet Narula

Abstract Name: Exotic Dancers and Employment Status: Independent Contractors or Employees Under the Fair Labor Standards Act (FLSA)

Abstract The employment classification of exotic dancers under the Fair Labor Standards Act (FLSA) remains capricious, with courts reaching divergent conclusions about whether dancers are employees entitled to wage protections or independent contractors outside the statute's scope. This project explores that divide by examining key federal and state cases and analyzing how judges apply the economic realities test, which considers control, financial risk, investment, skill, permanence, and the dancer's role within the business. While dancers may appear to have autonomy, many decisions highlight their economic dependence on clubs for income, customer access, and workplace structure. Methodologically, the research synthesizes judicial reasoning across jurisdictions, compares diverse applications of the economic realities test and engages with regulatory guidance and scholarly commentary to assess how effectively FLSA's six-prong economic realities test functions in industries with unconventional work arrangements. The review reveals that, despite surface level autonomy, many courts find dancers to be economically dependent on clubs for income, customer access, and workplace structure. However, a minority of courts treat dancers as independent contractors, usually when evidence shows substantial control over schedules, routines, permanence and profit-related decisions. These results highlight the difficulty of fitting nontraditional work arrangements into an employment framework designed for more conventional jobs as well as the inconsistencies in the application

of economic realities test. This study encourages debates about worker status in all the professions in the gig economy.

Talia Narzyski

Discipline: Interdisciplinary

Authors:

Abstract Name: "You Only Go to Title IX When Something Bad Happens:" Addressing the Gap in Knowledge about Healthy Relationship Skills and Programming among College Students

A national report from Harvard's Making Caring Common project found that 65% of 18 to 25-year-olds wished they had received more guidance on emotional aspects of romantic relationships in health or sex education classes. These same concerns are present on Siena University's campus as well, so our project used community engagement best practices to examine how student-driven prevention education and digital outreach can enhance student knowledge and skills in relationship management. From the Spring 2025 through the Fall 2025 semesters, a team of students in the Nonprofit Excellence and Transformation (NExT) Fellowship collaborated with the Title IX, Health Promotions, and Student Life offices to expand educational efforts beyond formal presentations to answer the question: how can we foster healthy relationships and boundaries on a university campus? We examined strategies employed by organizations such as One Love, Green Dot, and It's On Us, all of which utilize evidence-based research to develop healthy relationship best practices, provide bystander training, and support preventative sexual assault measures. We used insights from these organizations to create practical community tools for Siena, such as a campus engagement model prioritizing healthy-relationship education and a strategy for sustained student involvement in this work after our partnership concludes. Additionally, we mapped existing on-campus prevention initiatives, reviewed peer-institution outreach strategies, created student-facing events and resources, and designed social media messaging focused on consent, boundaries, reporting options, support services, and bystander intervention. As a result of our work to partner with several offices at Siena, this project found its home with the Student Life team in the Fall 2025 semester, which demonstrates that purposeful collaboration can make a broader impact on healthy relationship initiatives on a campus when utilizing a community-based approach.

Kaio Nasser

Discipline: Computer Science

Authors:

#1 Kaio Nasser

#2 Germano Correa Silva De Carvalho

#3 Sikha Bagui

#4 Sebastian Ruiz

#5 Dustin Mink

#6 Subhash Bagui

Abstract Name: Improving GMM Clustering for Cyberattack Detection using log1p Feature Transformation

This project investigates how Gaussian Mixture Models (GMM) can be used to detect unusual or possibly malicious network activity across five different Zeek-based cybersecurity datasets. The main goal was to understand how different feature selections and preprocessing steps affect the quality of unsupervised threat detection. First, GMM was tested using only numerical features and experimentation was done with different

values of k and random seeds. The early results were weak, so an ablation study was performed by removing one numeric feature at a time to see which ones had the largest impact. Because numeric features alone still did not produce strong performance, experimentation was expanded to include several categorical network features, converting them into numerical values with PySpark's StringIndexer so they could be used by GMM. A second ablation study showed that the categorical features "proto" and "conn_state" were the most helpful for improving cluster separation. A log1p transformation was also used to reduce the effect of extremely large values in certain numeric columns, which noticeably improved the stability and performance of the model. After testing many combinations of both numeric and categorical features across all five datasets, the best final model reached approximately 99.9% detection accuracy when comparing clusters to ground-truth labels. These results show that careful feature selection, smart use of categorical data, and proper preprocessing such as scaling and log transformations can greatly improve unsupervised machine learning models. Overall, this project demonstrates that GMM, when combined with the right features and transformations, can be a powerful method for detecting abnormal behavior in large and complex network-traffic datasets.

Alborz Nasseri

Discipline: Biology

Authors:

#1 Scott Grayburn

Arash Pashaeimofrad

Abstract Name: Expression of Genes in the bacterium *Pseudomonas* 20ei1 in Response to Co-culture with the Fungus *Aspergillus nidulans*

Some fungi produce harmful toxins that can impact the food supply and cause cancer and other public health issues. Understanding how bacteria respond to fungi at the molecular level can help to develop fungal control strategies. Can genes from the bacterium *Pseudomonas* 20ei1 be identified that are expressed at higher levels when co-cultured with the fungus *Aspergillus nidulans*? *Pseudomonas* 20ei1 is a locally isolated strain of bacteria that was used to inhibit growth of fungi (see: <https://doi.org/10.3389/fmicb.2024.1514950>). Quantitative real-time polymerase chain reactions (qPCRs) were used to compare gene expression in *Pseudomonas* 20ei1 grown alone or the presence of fungi (co-cultures). RNA was extracted from cultures 1, 2, 3, and 4 days after inoculation into two different growth media. RNA quality was verified by agarose gel electrophoresis before DNase treatment and cDNA synthesis. qPCR was performed with validated primers targeting genes related to biofilm formation, metal acquisition, regulatory signaling, and antimicrobial pathways. qPCR results show that *Pseudomonas* 20ei1 exhibits condition-dependent, differential gene expression when co-cultured with *A. nidulans*. Several genes were upregulated, including genes involved in copper and iron metabolism, antibiotic production, and production of extracellular enzymes. Genes for iron metabolism and antibiotics were expressed at elevated levels in two different growth media. Maximum expression occurred on different days after inoculation depending on the gene. Bacteria–fungus interactions strongly influence ecological dynamics, resource competition, and secondary metabolism within microbial communities. Because *Pseudomonas* 20ei1 shows clear transcriptional shifts when exposed to *A. nidulans*, future work will contribute to better understanding natural antagonistic interactions and could support new strategies for improving food safety and biological control.

Sam Nassirharand

Discipline: Music

Authors:

Abstract Name: In No Time: Temporal Manipulation in Makrokosmos I

George Crumb (1929-2022) was one of the foremost American composers of the 20th century. While Crumb's oeuvre is characterized by rigorous treatment of musical elements, the composer reappropriates the modernist paradigm of music-making in service to romantic aesthetic sensibilities (Johnston, 2022). Crumb scholars find their typical analytical approaches confounded, thus requiring novel frameworks for the interpretation of his music. This study utilizes Johnston's novel approach to Crumb's music, where he positions the composer's work at the intersection of three aesthetic paradigms: modernist composition, romantic aesthetics, and postmodern deconstruction. This paper examines Crumb's Makrokosmos I, a four-volume set of pieces for piano, arguing that the composer's modernist-romantic syncretism dissolves linear time into a sensory suspension of the infinite present. I propose that, to achieve this temporal warping effect in Makrokosmos I, Crumb manipulates the relationship between metric and rhythmic parameters, emphasizes visual effect of circular and spiral imagery in his graphic scores, and foregrounds the concept of time by his choice of titles in several pieces in Makrokosmos I. When worrying about the future and regretting the past is a common mindset, embraced and practiced by many in our society, I posit that Crumb's music embodies temporal manipulation that projects the notion of "now" as the only time that exists. Ultimately, Crumb's music allows both performers and listeners to occupy, briefly, the infinite present.

Nayara Nasution

Other/Institution Not Found

Discipline: Engineering

Authors:

#1 Nayara Nasution

Nayara Nasution

Abstract Name: Beehive Health: Tracking Temperature, Weight, and Buzzing Frequencing with an Integrated Sensor Network

The purpose of this project is to develop a real-time beehive monitoring system for beehives located on the Edmonds College campus in Lynnwood, Washington. The system is designed to track key indicators of hive health, including temperature, weight, and buzzing frequency, using a sensor network controlled by an Arduino Nano microcontroller. Honeybee colonies are especially vulnerable during the winter, when sudden temperature drops, reduced food access, and behavioral changes can lead to colony decline. After the Edmonds College campus hive failed to survive last winter, we set out to develop an accessible, low-cost monitoring system capable of detecting early signs of hive stress. The selected metrics of temperature, weight, and buzzing frequency are strong predictors of colony stability because they reflect brood development, food availability, and overall colony activity. Our prototype successfully measured internal and external temperatures using DS18B20 digital thermometers, hive weight using load cells, and buzzing frequency using a MAX4466 microphone and Fast Fourier Transform (FFT) analysis. This system can highlight unusual trends, such as large temperature differences, drastic weight changes, or irregular buzzing frequencies. To enable timestamped, real-time data transmission and alert notifications, the prototype also includes a WiFi-enabled real-time clock module. The expected outcome of this project is a reliable, user-friendly, and open-source device that continuously collects accurate data and supports automated alerts. By simplifying hive monitoring and making the system affordable and scalable, the project aims to promote sustainable beekeeping and reduce colony loss.

Kapil Nathan

Discipline: Psychology

Authors:

#1 Linda Wadiche

#2 Harshad PA

Abstract Name: Structural Comparison of Dendrites and Spines in Adult-Born and Mature Granule Cells

Title: Dendritic Spine Analysis in Adult-Born vs. Mature Granule Cells Adult neurogenesis in the hippocampal dentate gyrus (DG) continuously adds adult-born granule cells (abGCs) to existing neural circuits, resulting in neurons with distinct dendritic morphology, spine dynamics, and synaptic integration compared to developmentally mature granule cells (mGCs). These structural differences influence key hippocampal functions, including pattern separation, memory encoding, and circuit remodeling. Dendritic spines, as primary sites of excitatory synapses, are critical for synaptic plasticity; their number and shape are essential for neuronal connectivity and information processing. Our study will investigate the morphological and dynamic differences between the dendrites and spines of abGCs and mGCs. Using confocal microscopy and semi-automated reconstruction software (Neurolucida 360), neurons were visualized and dendritic spines classified into thin, stubby, and mushroom types along proximal, medial, and distal dendritic segments. Quantification of spine density and turnover across developmental stages will reveal how abGCs, during early integration, transiently increase thin spine numbers and turnover, reflecting heightened structural plasticity relative to mGCs. Combining spine developmental staging with morphometric analyses enables detection of both qualitative and quantitative differences in dendritic structure and spine turnover between mGCs and abGCs. These findings will clarify the unique contributions of newly generated neurons to hippocampal function, particularly in learning and memory, and suggest that identifying these structural hallmarks may inform strategies to enhance neurogenesis or counteract hippocampal dysfunction in brain diseases.

Olivia Naum

Discipline: History

Authors:

#1 Olivia Naum

Abstract Name: “How long will I keep having to try to find myself?": Narratives of Eastern European Jewish Women Immigrants in the United States

This paper is centered around the narratives of Jewish immigrant women who arrived in the United States during the late 19th and early 20th century. The project seeks to determine how the self-discovery of Jewish-American women is intertwined with the process of recounting their lives—both in written and oral accounts. The primary source base focuses on published novels, memoirs, oral histories, as well as unpublished autobiographies and accounts found in the YIVO archives. For women specifically, the United States offered opportunities in secular and non-secular education, allowing them to access new forms of introspection and narration of their own stories. The desire for education, family, independence, and intimate personal connections are preeminent in many of these narratives. Yet a desire for literacy stands out as it demonstrates that reading and writing itself provided access to identity recreation. The question of language is central to this project, as the decision to communicate in either English or Yiddish determined how women were able to construct their intersecting identities. Drawing on work in both immigration history and literary studies, this project builds on scholarship regarding assimilation and the role gender played in women's experiences of cultural adaptation. Exploring how the creation of the self is related to the processes of immigration, the intention is to account for the unique way that Jewish women experienced migration. Other scholars have chosen to make sharp distinctions between fiction, memoir, autobiography, diaries and other mediums, but the methodology of this paper unites genres of personal accounts. The paper intends to demonstrate how Jewish-American women's narrations in various genres have consistent patterns despite the differences in their medium of expression. These patterns will illuminate the unique ways that immigrant narratives depict the self discovery process that these women experienced, especially in terms of education, intimate relationships, and language.

Elias Nauth

Discipline: Psychology

Authors:

#1 Elias Nauth

#2 Michael Moore

Abstract Name: Stress in First Responders

Due to their high occupational risk for experiencing traumatic events, current research suggests that first responders have higher prevalence rates of post-traumatic stress disorder (PTSD) as compared to national averages and are at a higher risk for a multitude of mental disorders. Despite this, current research investigating the mental health of first responders is limited to the point of lacking crucial evidence to support recommendations for care and suffers from an over-representation of White participants, with only one study found in a search to investigate minority first responders. Thus, the aim of this project is to investigate the prevalence of secondary traumatic stress, as in becoming traumatized due to being exposed to details of trauma by others, and vicarious traumatization, as in a noted shift in perspective and worldview because of engaging with those exposed to trauma. Potential differences in the experiences of majority and minority first responders in these variables and attitudes towards mental health seeking will also be investigated. This study

will involve the recruitment of first responders, defined as firefighters, law enforcement officers, emergency dispatchers, and emergency medical technicians (“EMTs”). Their experiences with trauma relating to calls they have either been directly or indirectly involved in will be captured via an anonymous online survey that will seek to measure PTSD symptomology, vicarious and secondary trauma, and attitudes toward treatment. Data will be collected from November 2025 until January 2026. The researcher hopes to identify recent trends in symptomology and experiences of racial/ethnic minorities in the first responder population. This study has been approved by Adelphi University’s Institutional Review Board on October 13th, 2025, as Exempt.

Maria Navarro

Discipline: Linguistics and World Languages

Authors:

#1 Justin Davidson

Abstract Name: “Hey, Siri, Play ‘Hasta Que Te Conocí’ By Juan Gabriel”: Automatic Speech Recognition (ASR) Systems (In)Accuracy In Spanish-English Bilinguals

Automatic Speech Recognition (ASR) systems have been changing human interactions with technology. Systems like Alexa, Google Assistant, and Siri are popular, and for many, have become an integral part of their lives, helping users to complete tasks using voice commands. Even though these ASR systems have improved, many times they may not be accurate, particularly while interacting with nonstandard accents. In this sense, it is argued that the ASR systems still lack accuracy in understanding different accents. Users' complaints and experiences have been shared in social media or online customer services company blogs. In recent years, research on the accuracy of ASR from Amazon, Apple, Google, IBM, and Microsoft display greater word errors on non-native accents of English, as well as some regional dialects notably the African American English in contrast with a standardized, monolingual accent. This can be due to a lack of training datasets that are representative of those populations –for instance, there is predominant sampling from white, affluent, monolingual English communities. So, if ASR systems are currently showing their struggles interacting with some speakers with a non-standardized, non-monolingual accents, would ASR also struggle to understand and follow commands from bilinguals who speak Spanish or English with a non-standardized, non-monolingual accent? Overall, what have been the experiences of Spanish-English bilinguals with ASR systems? Although numerous articles and websites talk about how ASR systems work and their general usability, very few examine if the speech of these bilinguals –whether they are L1- or L2-Spanish speakers– contributes to the (in)accuracy of these systems. This in-progress study aims to address this gap by analyzing the speech of Spanish-English bilinguals as they give commands and read from a short paragraph to ASR systems in both languages. This research signifies advancing towards technology access for understudied populations, for which datasets may be deficient.

Vanesa Navarro

Discipline: Biology

Authors:

#1 Vanesa Navarro

#2 Robert Heischman

#3 Hannah Luna

Hannah Luna

Abstract Name: The Effect of Green and Red Light on the *Manduca sexta*

Manduca sexta, also known as the tobacco hornworm, is a widely-used experimental subject that has helped us for more than 40 years in many areas of insect biology, such as neurobiology, chemical sensing, and immunology. Therefore, it was a beneficial test subject for our research. *Manduca sexta* is a pest found mostly on tomato plants but can also be found on other plants. Finding out which light *Manduca sexta* consumes less food in could help with managing their pest-like tendencies. Understanding how light affects their foraging tendencies could help us apply more eco-friendly methods that aren't harmful to crop growth without relying on pesticides. Hornworms were placed on arugula plants under different wavelengths of light and allowed to forage. Hornworms in red light lost weight and the ones under green light gained weight. This may be due to different light colors matching or not matching their search image. A search image is a mental image that tells the organism what is safe and what isn't to eat. This means that *Manduca sexta* prefers green light since they ate more in this light because the search image was matched, compared to the red light, where the search image was not matched. This research is important because it is able to give us an ethical and easy way to reduce the amount these pests consume and help us agriculturally, without harming the organism or the plant. Red light could be more useful for the plant, it allows more photosynthesis to happen, so it wouldn't only stop *Manduca sexta* from eating the plant, but also allow the plant to grow more.

Bilal Naveed

Discipline: Biology

Authors:

#1 James Fune

#2 James Kang

#3 Andrew George

#4 Hamid Akbarali

Abstract Name: Gastrointestinal Motility Dysfunction in Down Syndrome Bilal Naveed, James Fune, James Kang, Andrew George, and Hamid I. Akbarali Department of Pharmacology and Toxicology, Virginia Commonwealth University

Patients with Down Syndrome (DS) (the result of an extra copy of chromosome 21) experience significant gastrointestinal (GI) issues, specifically constipation. However, the mechanism for the GI dysfunction in DS remains unclear. The Ts65Dn mouse carries an extra copy of chromosome 16 (the mouse equivalent of human chromosome 21), providing a model for studying GI dysmotility. In this study, we measured GI motility in-vivo and in ex-vivo colonic tissues. For total GI transit, a non-absorbable fluorescent dye was gavaged, and the time to first expulsion of a fluorescent fecal pellet was recorded. The contractile patterns in the two cohorts were determined ex-vivo using the gastrointestinal motility monitoring system (GIMM). After dissection, each colon was placed into a temperature-controlled water bath perfused with oxygenated Krebs solution, and contractions were recorded in 30-minute bins to generate spatio-temporal maps. Colonic migrating motor complexes (CMMCs) were recorded as full peristaltic contractions or partial contractions that did not exceed 50% distance. Whole GI transit was significantly faster in DS mice than their disomic littermates. The time to first expulsion for disomic mice was 99.2 ± 16 minutes ($x \pm SD$; $N=16$) and 76 ± 15 minutes ($x \pm SD$; $N=15$) for DS mice ($p = 0.0004$). In ex-vivo studies, CMMCs were recorded for 30 minutes under baseline conditions, followed by perfusion with acetylcholine ($1 \mu M$) for another 30 minutes. The colons from DS and disomic mice showed a similar number of CMMCs under basal conditions, while acetylcholine significantly increased CMMCs in DS mice compared to disomic littermates, reaching $138 \pm 6\%$ of baseline versus $120 \pm 7\%$, respectively. These studies show significant differences in gastrointestinal motility in trisomic vs. disomic mice, consistent with clinical findings. Further studies to determine whether these differences are due to pacemaker activity are underway. Supported by NIH HD114125.

Discipline: Biology

Authors:

#1 Rachel Arnold

#2 Michael Kilgard

Abstract Name: Cross-Study Analysis of Vagus Nerve Stimulation-Induced Cortical Plasticity in the Motor Cortex

Vagus nerve stimulation (VNS) is a promising tool for enhancing neuroplasticity. VNS has demonstrated success in improving motor recovery in stroke patients, but some individuals do not respond to treatment. Understanding the variables underlying these discrepancies is crucial for optimizing therapeutic outcomes. Preclinical models pairing VNS with motor training offer a directly translatable approach to investigate these factors under controlled conditions. Previous studies have shown that VNS expands movement representations in the primary motor cortex, often following an inverted-U pattern of stimulation intensity. However, differences in experimental models, stimulation parameters, and neuromodulatory conditions across studies hinder conclusions about which factor combinations best drive cortical plasticity. In this review, we conducted a cross-study analysis of thirteen preclinical rodent studies (2012-2024) that examined the effects of VNS on motor cortex plasticity. We quantified variable overlap between stimulation intensity, timing, task type, and neurochemical manipulation. Using scatter plots and two-tailed t-tests with multiple comparisons, we identified consistent patterns showing that moderate-intensity VNS at 0.8 mA is most effective at driving motor map expansion when paired with behavior. We also identified gaps in the literature where variables have not been tested in combination; for example, while cholinergic lesions block VNS-induced plasticity, it remains unknown whether higher intensities might overcome this effect. Our findings consolidate existing results and highlight unexplored intersections between key variables. Future studies should aim to test these missing combinations to provide deeper insight into the mechanisms underlying VNS therapy, ultimately increasing responder rates and expanding its therapeutic potential in motor rehabilitation.

Megan Nchekwaram

Discipline: Biochemistry

Authors:

#1 Michael Sheets

#2 Emily Johnson

Abstract Name: Impact of Flanking mRNA Mutations on Bicc1-RNA Binding Specificity

Bicaudal-C (Bicc1) is an evolutionarily conserved RNA-binding protein essential for embryonic development. In our model organism, embryos of the frog *Xenopus laevis*, disruption of Bicc1 function leads to pronounced anterior and posterior anatomical defects. Bicc1 regulates development by binding specific mRNAs and repressing their translation. The goal of my project is to understand how Bicc1 selectively recognizes and binds its target mRNAs. Bicc1 contains five structural domains, and current observations suggest that the KH2 domain—and its conserved GKGG motif—is critical for specific mRNA recognition across species. Using AI-generated structural predictions from AlphaFold 3 and PyMOL, we recently identified and partially confirmed key amino acids within the KH2 domain that directly contact target mRNAs, including the well-characterized Bicc1 targets *dand5* and *cripto*. These residues within the KH2 domain make direct contact with an RNA region that contains a conserved GAC sequence, a motif consistently found in Bicc1-interacting mRNAs. Building on these findings, I am using wild-type *Xenopus* Bicc1 protein to test how variants of Bicc1-interacting mRNAs respond to flanking mutations surrounding

this KH2-contacting region. Using electrophoretic mobility shift assays (EMSAs), I first qualitatively—and later quantitatively—measure changes in RNA–protein binding to determine how these mutations affect Bicc1’s ability to recognize its mRNA targets. Results from these experiments will provide new insight into how Bicc1 interacts with mRNAs, helping us understand how mRNA structure contributes to Bicc1-mediated translational repression during embryonic development.

Maya Ndjarakana

Discipline: Psychology

Authors:

#1 Maya Ndjarakana

#2 Anaya Mitra

Abstract Name: Sleep Hygiene and Well-Being in Older Adults: A Pilot Study

Sleep Hygiene and Well-Being in Older Adults: A Pilot Study Maya Ndjarakana, Anaya Mitra, MPH, PhD Psychology Older adults frequently report poor sleep. This pilot study examined the sleep hygiene habits of older adults, assessing whether behavioral interventions—such as increased physical activity or reduced caffeine intake—could improve sleep quality and quantity. Participants aged 55 and older were recruited at a senior living facility in Minnesota. Participants completed a pre-survey on demographics, caffeine consumption, physical activity, and sleep behaviors. They then selected an intervention—either increasing physical activity or modifying caffeine intake for 2 weeks. The post-survey measured changes in sleep hygiene, quality, and duration. Descriptive statistics, paired t-tests, and Pearson correlations conducted to examine relationships between physical activity, BMI, and sleep metrics. Fourteen participants completed the pre-survey; only 6 participants completed the post-survey. Most participants identified as female (75%) and White/European American (92%). Their average BMI was 24.57 (± 5.76). Most participants consumed caffeine (78%) - primarily coffee. On average, participants reported sleeping 7.9 hours (± 3.3) per night. The mean sleep quality rating (1= Very Poor, 5 = Very Good) was 3.5 (± 1.2). There were no significant differences in the sleep quality, sleep quantity, or demographic profile between those who completed the pre- and post-surveys. The most commonly selected intervention was the addition of a 15-minute walk to their daily routine. The absence of measurable change between the pre- and post-survey results may be due to several factors: the selected intervention may have been ineffective at improving sleep, the two-week time frame may have been too brief to detect change, and it is important to note that baseline sleep was relatively good for the majority of our participants, which left limited room for improvement. Future comparisons will be made with existing data on college-aged participants to explore age-related differences in sleep behavior.

Madeline Neely

CA - University of the Pacific

Discipline: Communications

Authors:

#1 Indira Neill Hoch

Abstract Name: The Limits of Sitcom Progressivism: A Rhetorical Critique of Modern Family

This paper examines the ABC television series Modern Family (2009-2020) through a critical media literacy framework to evaluate the limits of LGBTQ+ representation in mainstream sitcoms. Although the series was widely praised for normalizing a married gay couple on network television, its portrayal of Mitchell

and Cameron reveals the compromises necessary to produce “progressive” content within corporate media structures. Drawing from the ideas of the familiarity-novelty continuum and codes and conventions, this rhetorical critique argues that while *Modern Family* expanded LGBTQ+ visibility, it simultaneously constrained queer characters through heteronormative gender roles, domestic stereotypes, and the structural demands of sitcom storytelling. *Modern Family* reinforces a core principle of critical media literacy: that media texts are never neutral, but instead carry embedded values and points of view. My analysis situates *Modern Family* within broader scholarship on representation, media production, and the packaging of queer identities for straight, middle-class audiences. Using close textual analysis of key episodes and scenes, the project examines how network expectations shape character behavior, relational dynamics, and the boundaries of “acceptable” queerness. The method includes rhetorical analysis, with specific attention to character coding and narrative framing. The findings of my paper indicate that the show’s progressive appearance relies on familiar sitcom tropes, husband/wife binary and rapid conflict resolution, that ultimately reinforce, rather than disrupt, dominant cultural norms. By balancing novelty (gay marriage) with familiarity (traditional gender roles and sitcom conventions), *Modern Family* produces a representation that is “acceptable” but limited. My analysis concludes by arguing that the series exemplified the broader challenges of achieving meaningful representation within network television.

Kanishk Neerumalla

Discipline: Biology

Authors:

#1 Shanna Samels

#2 Rodrigo España

Abstract Name: Verifying Targeted Chemogenetic Manipulation of Hypocretin Neurons in HCRT:Cre Rats through Immunohistochemistry

Hypocretin/orexin (HCRT) is a neuropeptide produced primarily in the lateral hypothalamus and has been proven to be essential for regulating motivated behavior. Historically, efforts to examine the importance of HCRT have relied mainly on pharmacological approaches to block or activate HCRT receptors. Here, we set out to establish methods to selectively activate or inhibit HCRT neurons themselves. We used HCRT:Cre transgenic rats that express the Cre recombinase enzyme only in HCRT neurons. We allowed selective targeting within HCRT neurons to express Cre-dependent DREADDs (Designer Receptors Exclusively Activated by Designer Drugs) for activation or inhibition of HCRT neurons. We injected HCRT:Cre- and HCRT:Cre+ rats with either a Gi or Gq DREADDs virus tagged with fluorescent mCherry. To assess specificity of our approach, we first quantified the co-expression of mCherry tag and HCRT peptide-1 via immunohistochemistry. As expected, we found co-expression of HCRT-1 peptide and mCherry only in HCRT:Cre+ rats, with HCRT:Cre- rats displaying none. Next, to determine the degree of HCRT neuron activation, we injected HCRT:Cre+ and HCRT:Cre- rats with a Gq DREADDs virus and treated with deschloroclozapine (DCZ) 3 weeks after virus injection. Brain slices containing the lateral hypothalamus were analyzed for co-expression of HCRT peptide 1 and the immediate early gene cFos—often used as an index for neuronal activation. Surprisingly, we determined that DCZ administration did not significantly increase cFos in HCRT neurons, with no differences in co-expression of cFos and HCRT-1 peptide between HCRT:Cre+ rats expressed Gq DREADDs and HCRT:Cre- rats. Together, our studies show DREADDs can target specific neurons, but reliable activation using this approach was not achieved. Future studies will be needed to assess other measures of neuronal activity and potentially other DREADDs ligands to determine if we can manipulate the activity of HCRT neurons.

Annie Neill

Discipline: Architecture, Construction Management, and Interior Design

Authors:

#1 Robert Sproull

Abstract Name: Reimagining Unconventional Infrastructure as Social and Ecological Connectors

This project investigates how unconventional infrastructure can be turned into adaptive social and ecological systems. Infrastructure is never neutral, the most utilitarian networks even shape how people move, gather, and access opportunity. These underused thresholds contain latent capacity to serve as civic and ecological connectors that are responsive to both environmental conditions and the social contexts of surrounding communities. The research examines how design can turn these systems into frameworks that adapt to changing climates and social needs. Situated near the Port of Mobile, Alabama, the site frames the study. This project analyses infrastructure life cycles through three temporal phases, Conception, Mid-Life Crisis, and Afterlife. Each of these phases representing a distinct phase in a system's progression over time. Conception investigates projects that are intentionally constructed to satisfy both technical and social functions. Mid-Life Crisis examines current systems experiencing decline or fragmentation, considering interventions needed to restore their full civic purpose. Afterlife envisions obsolete infrastructures transformed into fully renewed public spaces, re-established through creative collaboration with the community. The project integrates these aspects into a systems-based framework for ecological resilience and adaptive reuse by employing precedent mapping, iterative design, and spatial and typological analysis. It reveals parallels between infrastructure and social networks concerned with accessibility, food security, and environmental stewardship, highlighting the reciprocal influence between infrastructure and communities. In conclusion, this study redefines infrastructure not as a static object but as a living medium, both as an archive and an agent of change. It positions these systems as sites to record change, sustain community, and support the shared ecological futures. By recognizing the social and environmental components of infrastructure, the project aims of a more inclusive, resilient civic frameworks that change. In changing can evolve along with, their users' landscapes and communities.

Melina Nejadian

Discipline: Biology

Authors:

#1 Megan Sanctuary

Abstract Name: Investigating the Role of Human Milk-Derived Exosomes in Oligodendrocyte Progenitor Cell Proliferation, Differentiation, and Myelination

Oligodendrocytes are specialized glial cells in the central nervous system responsible for producing myelin, the insulating sheath that enables rapid and efficient neural signal transmission. Oligodendrocyte progenitor cells (OPCs) are the precursor cells that proliferate, migrate, and differentiate into mature oligodendrocytes during early brain development. Proper regulation of OPC development is essential for healthy white matter formation, and disruptions to this process are associated with long-term cognitive and neurological impairments. While early-life nutrition is known to influence neurodevelopment, the molecular mechanisms linking nutrition to myelination remain poorly understood. Human milk contains extracellular vesicles (EVs), nanoscale lipid particles enriched with proteins and microRNAs that can modify gene expression in target cells. This study investigates whether human milk-derived EVs regulate OPC proliferation, differentiation, and early myelination in vitro. Primary OPCs were isolated from neonatal mouse cortices using enzymatic dissociation and density gradient centrifugation, then seeded on poly-D-lysine-coated culture surfaces. Cells were treated under four experimental conditions: growth factor-free control, growth factor control (PDGF-AA and bFGF), low-dose EV (50 µg), and high-dose EV (100 µg). Cell proliferation was quantified using EdU incorporation and Ki67 immunostaining. To assess lineage progression, differentiation was induced

using T3-containing media and evaluated using markers including PDGFR α , O4, CC1, and Sox10. Functional myelination was examined through neuron-OPC co-culture followed by immunostaining for myelin basic protein (MBP) and the neuronal marker NeuN. Preliminary results demonstrate a dose-dependent increase in total OPC number following EV treatment, with the highest proliferation observed in the high-dose EV condition relative to both growth factor and negative controls. Ongoing analyses aim to determine whether EV exposure also accelerates OPC differentiation and enhances early myelin formation. Future studies will focus on identifying specific EV-associated microRNAs. Understanding this mechanism may inform future therapeutic strategies for demyelinating conditions of the central nervous system, including multiple sclerosis.

Lola Nellis

Discipline: Psychology

Authors:

#1 Hannah Nam

Abstract Name: Why Can't We All Laugh Together? A Study On The Utilization of Humor For Mediating Conflict During Political Conversations

Since the 2016 presidential election in the United States, it's common to see relationships tainted by opposing political ideologies and increased political polarization. While strife between humans has been in occurrence since the beginning of man, the hatred and violence developed from centuries of disagreements have greatly intensified over the last 10 years. Humor is a powerful force that can foster positive engagement and build bonds between people. Humor signifies closeness and is associated with intimate, shared experiences. Moreover, a prior relationship is not required for humor to facilitate connection. Given its social power, humor may play a key role in conflict resolution. This raises a question about whether humor might be able to calm political disagreements. Referencing Blake and Mouton's (1964) conflict strategy model and the understanding of universal implications of humor, we examine videos uploaded to YouTube consisting of public conversation held by American liberals and conservatives discussing disagreements over American politics. We explore if there is an effort by either party to ameliorate conflict with humor. Conversations are coded for whether and how humor is used as a type of conflict resolution and if the two parties are able to come to a position of agreement as a result of the use of humor. From inspecting bilateral political debates, we expect to find that humorous speech is used as an attempt to defuse argumentative discourse specifically when there is intent to create companionship. This research attempts to find whether humor can serve to reintroduce partnership in the context of conflict. The results of this research have the potential to serve as a reminder that humans have a natural drive for connection and how humor can be used as a form of resilience against manmade social differences especially within personal relationships and communities.

Chase Nelson

Discipline: Biology

Authors:

#1 Chase Nelson

#2 Rachel Horejsi

#3 Sonja Olson

#4 Saige Maasz-Seawright

Abstract Name: A novel device for high-throughput phenotypic screening of schistosome miracidia enables identification of transient receptor potential (TRP) channels modulators that impact miracidia behavior

Schistosomiasis, a neglected tropical disease caused by three parasitic flatworm species, including *Schistosoma mansoni*, relies on freshwater snails as intermediate hosts. Interrupting the parasite's ability to locate snails could provide a novel strategy for disease control. Praziquantel (PZQ) is the current treatment of choice for human infections, and it exerts its effect by targeting transient receptor potential (TRP) channels on the parasite, debilitating the worms and leading to clearance by the host immune system. Despite its effectiveness in eliminating adult parasites, treated individuals remain susceptible to reinfection. Interestingly, TRP channels are classically recognized as key metazoan sensory receptors, involved in reception of a variety of chemical cues, though the mechanism of action of PZQ is not known to be related to sensation. Since TRP channels have been shown to be a rich source of anthelmintic drug targets, we hypothesized that they could also be targeted to disrupt the sensory behaviors involved in miracidia infection of snails. In this study, a high-throughput phenotypic screen was developed and used to identify bioactive compounds targeting the transient TRP receptors in miracidia. A custom 96-well acrylic device – the ScreenChip – was designed for simultaneous wide-field imaging by a custom high-resolution, multi-camera imaging device. Miracidia were treated with 10 μ M of compound, and the impact of each compound on miracidia behavior was assessed to identify potential hits. Our recording system and downstream analytical pipeline enabled precise observation of miracidia motility and orientation, allowing identification of compounds that disrupt general movement and chemokinetic behaviors. Preliminary findings suggest that TRP channel modulators play a role in altering miracidia navigation, offering a promising avenue for disrupting the parasite's life cycle. Future investigations will establish the effective concentrations of hit compounds and test for potential inhibition of snail host-seeking, penetration, and infection.

Amaya Nelson

Discipline: Architecture, Construction Management, and Interior Design

Authors:

#1 Amaya Nelson

#2 Suzanne Frasier

#3 Namrata Dhobekar

Abstract Name: Case Study of Lacing Joinery

The technique of lacing joinery, which has its roots in centuries of architectural and interior design traditions from various cultures, involves weaving or tying materials together to produce flexible and stable connections. Lacing joinery is a reflection of both technological advancement and cultural adaptability. This study analyzes how this joinery technique can be implemented at multiple spatial scales, ranging from the small artifact level to large-scale spaces like personal and social spaces. The primary objective of this research is to investigate the versatility of lacing joinery by analyzing its use from broad spatial patterns down to small-scale connections. The ability of interlocking patterns to provide cohesive spatial integration across different design scales is examined in this study. By converting lacing approaches into physical objects such as a native american soul catcher, using lacing to join beams and columns in an enclosure design, and broader spatial linkages in personal and social space by relating joinery technique with interlocked and adjacent spatial relationships. The research reveals that lacing joinery can reliably produce both visual and structural links in plans and sections of personal and social spaces by arrangement of walls, level changes, and circulation. The inherent flexibility and adaptability of lacing joinery can unite different components within an interior space, giving a sense of continuity and cohesiveness. In its conclusion, this study emphasizes lacing joinery as a useful tool for modern interior design, providing rich visual language. By integrating traditional craftsmanship with modern architectural practice, lacing joinery provides a framework for coherent and interesting interior settings. The findings emphasize its potential to inspire new avenues in design, where joinery techniques and interconnection become a method of achieving both structural integrity and creative expression.

Chloe Nelson

Discipline: Biology

Authors:

#1 Steven DeLuca

Abstract Name: Mechanisms of Developmental Regulation in *Drosophila melanogaster*

Hox genes determine the segmental patterning of vertebrate embryos from anterior to posterior. These genes aid in cellular differentiation, the process of determining the function of a cell through modifications to gene expression. Hox genes are involved in the development of many human cancers, making this research relevant to furthering cancer identification and treatment. The purpose of this research is to uncover the mechanistic regulation of Hox genes in the model organism *Drosophila melanogaster*. Previous research has concluded that two groups of proteins, Polycomb Group (PcG) and Trithorax Group (TrxG), inhibit and promote Hox gene expression, respectively. Preliminary models of Hox gene regulation propose that a prominent PcG protein, Scm, forms large aggregates on Hox genes, inhibiting their expression in improper segments. Two proteins of interest, tna and velo, alter the aggregate size and subsequent effectiveness of Scm polymerization and silencing. It is not understood the extent to which tna and velo alter the activity of Scm nor the interactions between the proteins. Uncovering the regulation of Scm contributes to an understanding of Hox genes and developmental patterning. To uncover the interactions between these proteins and DNA, genome analysis will be performed using chromatin immunoprecipitation (ChIP). This data will indicate the DNA targets of the proteins of interest, beginning the elucidation of their interactions. To dive further into the effects of tna, velo, and Scm on Hox genes, RNAi will be used to evaluate misexpression in embryos. When Scm is eliminated using RNAi, segmentation is altered. Additionally, the absence of Scm is lethal to the developing embryo, demonstrating the necessity of proper Hox gene expression. Similar experimentation will be used to study the phenotypes of tna and velo RNAi-expressing embryos. Phenotypic abnormalities will indicate the significant impact of the proteins tna and velo on Hox gene expression.

Maiya Nelson

Discipline: Psychology

Authors:

Abstract Name: Testing an Intervention to Decrease Affective Polarization and Increase Interpersonal Trust Utilizing the Theory of Dyadic Morality (TDM)

Current literature surrounding affective polarization indicates that polarization threatens democratic stability, political compromise, and may be linked to political violence. Research surrounding potential interventions for polarization remains limited but suggests that exposure to similarities, establishing a common intergroup identity, and positive contact may reduce polarization. This study attempted to test an intervention to reduce polarization by exposing the experimental group of participants to the Theory of Dyadic Morality (TDM) which highlights the similarities in individual moral formation across cultures. Given the role of morality in political ideology, emphasizing the commonality in human moral formation among individuals may help to reduce polarization. A sample of Introduction to Psychology students (N = 55) were randomly assigned to the TDM condition (n = 27) or the control condition (n = 28), and their levels of affective polarization and interpersonal trust were measured via QualtricsXM. The results of independent samples t-tests and Pearson correlations were nonsignificant but emphasize the importance of continued research surrounding the underpinnings of polarization and potential interventions to mitigate affective polarization. This study also utilizes a recently developed measure for affective polarization, which may prove fruitful in understanding the underlying mechanisms in future polarization research.

Kian Nemzer

Discipline: Interdisciplinary

Authors:

Abstract Name: Brotherhood: The Role of Men's Groups in Reducing Loneliness and Fostering Connection

Loneliness is a growing public health concern with significant effects on mental and physical health, and a mortality risk comparable to smoking fifteen cigarettes a day. Although solutions-based research is extensive, evidence on their long-term effectiveness remains limited. To address this gap, I conducted a case study in Bali, Indonesia to examine whether long-term participation in emotionally open men's groups offers a sustainable solution to loneliness. While loneliness affects everyone, my research focuses on men because they generally face under-addressed loneliness. Men also underuse formal health services due to social stigma and masculine norms, making men's groups a potential, acceptable, and accessible option. I conducted research via fifteen semi-structured interviews with men of various ages and backgrounds who had regularly participated in a men's group for at least three months. I also gathered data through field observations and autoethnographic journaling. Data were analyzed using qualitative thematic analysis informed by Self-Determination Theory (SDT) and Social Identity Theory (SIT). Findings indicate that sustained participation reduces loneliness, deepens belonging, strengthens everyday capability, and fosters a shared identity that normalizes emotionally honest support seeking. Participants reported increased social connection and a stronger sense of volition, with benefits extending into family, work, and community life. The findings suggest that free and easily accessible men's groups are a readily replicable model that can reduce loneliness in men, address SDT needs, and offer a practical foundation for developing peer-led support pathways, especially for long-term members. These findings could be used by public health services, educational institutions, and community organizations to implement this sustainable intervention for loneliness reduction. While longitudinal follow-ups and further research into variable facilitation across groups are needed, this study lays a foundation for further developing replicable models of men's groups that communities, community leaders or individuals could create themselves.

William Nerad

Discipline: Environmental Science and Sustainability

Authors:

#1 Natalie Shortreed

#2 John Frye

Abstract Name: Climate Change in the Greater Yellowstone Ecosystem and its Impacts on Black Bears

The Greater Yellowstone Ecosystem (GYE) is a biodiverse region centered on Yellowstone National Park, encompassing areas in Wyoming, Montana, and Idaho. This area is home to a diverse array of vegetation and animal species, encompassing mountains, forests, valleys, rivers, and numerous geothermal-rich areas. The climate in the region is generally considered temperate, comprising four distinct seasons. This study utilized long-term temperature and precipitation data from stations within and around the GYE to investigate the degree to which the climate is changing in the region. The study used precipitation, snowfall, maximum temperature, minimum temperature, and mean temperature data. Statistical analysis was used to determine how each of those variables was changing, as well as to determine if any of those changes were statistically significant. This climate data analysis serves as the primary metric to examine changes in black bear (*Ursus*

americanus) behavior across the region. Behavioral changes include alterations in hibernation habits, heightened human-bear conflicts, and the general movement of bears on time scales of days, months, and seasons. While black bears are a resilient species with many food source options, climate change could still alter some of their behaviors in the GYE.

Lauren Ness-Schrupp

Discipline: Environmental Science and Sustainability

Authors:

#1 Lauren Ness-Schrupp

Abstract Name: Observing the Impact of Hamline University's Infrastructure on Bird Populations

In recent years, anthropological and environmental inquiry has sought to document the relationship between the built human environment and bird populations. The research objective is to determine the impact of Hamline University's infrastructure on local bird populations. In this study, the researcher compiled current and historic data on bird populations in Minnesota along with self-conducted surveys to establish a baseline for their community. The self-conducted surveys documented any window collisions or bird deaths on their campus, prioritizing the development of proper survey methods for future research. This allowed for further exploration of how the infrastructure of buildings influences the population of birds. Through conducting anthropological work, they have used ethnographic research methods in attempts to create a holistic approach, focusing on the human-created effects of declining bird species. This study found that the highest amount of bird strikes occurred on buildings with large windows and high amounts of trees or greenery near the perimeter. Through their bird observations, they found three deceased birds. Two were non-native bird species, and the third was an immature robin presumed, at the time of death, to be unfamiliar with its surroundings. To achieve the research objective, the researcher collected data that pinpointed buildings where mitigation is essential, thereby creating a building mitigation plan. This project has collaborated with another student conducting research focused on mitigation strategies, raising awareness about the declining bird population, and fostering conversations among other college campuses, in hopes that both projects would be able to evaluate and mitigate Hamline University's campus. Using an anthropological approach, we can understand the ways in which humans influence our environment and affect the world around us.

Vanessa Neubauer

Discipline: Political Science

Authors:

Abstract Name: Malign Influence in Latin America: The Looming Implications of Chinese Adventurism in Panama

This research paper aims to examine the history and implications of China's unconventional geopolitical agenda in Panama and for the United States' national security and ability to reinforce diplomatic ties in the Western Hemisphere. As great power competition between the US and China surges, the homeland's geographical barriers become increasingly less withstanding of the influencing forces its enemies are exercising. The persistent and growing threat is no longer depicted by troops and military strength alone, but by subtle, seemingly noninvasive tactics. China is taking advantage of the US's receding influence in the Global South, primarily in Latin America and the Caribbean (LAC). Opportunistically filling in the void often left after sporadic US involvement in Central and South America, China has implemented a patient

geopolitical strategy set on diminishing the US's longstanding economic and political position in the region. Not only benefitting the ongoing competition on economic and influential fronts, China's involvement with the US's backyard reveals detrimental implications for power projection, national security, intelligence and data privacy, and diplomatic resilience and stability. With an alarmingly expanding presence, China is capable of choking American influence and bases of relations with historical and longstanding LAC allies. Compiling information from various think tank articles, national threat assessments, trade reports, and Department of Defense statements, the paper will provide a cohesive outlook on China's strategy to encroach on the US, coupled with policy recommendations to address the potential implications of Chinese influence in Panama. China's expansionist policies disguised as economic support and infrastructure development pose a significant threat to the US' economic, military, and diplomatic pursuits in and around the region. The United States and its governing body are urged to reevaluate foreign policy directed towards LAC to secure the nation's interests and defend its intelligence apparatuses.

Christiane Neuschwander

Discipline: Biology

Authors:

#1 Coral O'Brien

#2 Leah Spangler

Abstract Name: Phycobiliprotein Biosensors for Critical Mineral Detection

Metal contamination from industrialization poses a persistent environmental challenge, affecting water, soil, plants, animals, and humans due to toxicity and bioaccumulation. Rapid, low-cost detection strategies are needed, particularly in remote areas where conventional methods are slow and require specialized instrumentation. Cryptophyte phycobiliproteins (PBPs) are water-soluble, brightly colored proteins with strong fluorescence in the visible range, making them promising candidates for metal detection. In this project, purified PBPs from *Hemiselmis pacifica* (producing PC-577 protein) and *Proteomonas sulcata* (producing PE-545 protein) were exposed to varying concentrations of metals, including Cu^{2+} and Zn^{2+} , over different time intervals. Fluorescence changes were monitored using kinetic plate-reader measurements to assess how metal exposure impacts the protein optical properties. Dialysis experiments were performed to test whether metal binding to the PBPs is reversible by monitoring for spectral changes using both absorbance and fluorescence spectrophotometers. Preliminary results indicate that Cu^{2+} causes significant fluorescence quenching of both PC-577 and PE-545, while other metals such as Zn^{2+} do not. This suggests that PBP fluorescence can be used to distinguish certain metals. This study also shows that reversible binding may be possible under low metal concentrations, indicating that PBPs can be used over many cycles. This work establishes a foundation for developing PBP-based, aqueous-phase biosensors for rapid, specific, and environmentally friendly detection of metals in water.

Malia Neville

Discipline: Biology

Authors:

#1 Brooke Newell

#2 Paul Dyce

Abstract Name: Effect of Clomiphene citrate exposure during maturation on gene expression in

parthenogenetic porcine embryos.

The use of in vitro embryo production within the livestock industry has allowed for selection of superior genetics while decreasing generation length. A major contributor to inefficiencies during in vitro maturation (IVM) is the accumulation of reactive oxygen species (ROS). Exposure of porcine oocytes to Clomiphene citrate (CC), a selective estrogen receptor modulator, during IVM reduces ROS and alters genetic pathways. To determine the genetic effect of CC exposure during maturation on resulting parthenogenetic embryos, we collected embryos at 60 hours post activation. RNA was isolated from groups of parthenogenetic embryos generated from oocytes matured in the presence or absence of CC. Then, complementary DNA (cDNA) was synthesized. To explore the potential genetic effects of CC exposure, we compared the expression of the cell-to-cell communication gene Gap junction alpha-4 protein (GJA4); the early embryo developmental gene, Bone morphogenetic protein 15 (BMP15); and genes essential in fertilization, Zona pellucida glycoprotein 2 (ZP2) and Zona pellucida glycoprotein 3 (ZP3). There was no difference in the expression of GJA4 in the CC treated embryos (1.824 ± 0.04956 fold expression) when compared to the control embryos (1.578 ± 1.053 fold expression, $p=0.1184$). ZP2 was found to be expressed significantly lower in the CC treated embryos (0.1277 ± 0.0210 fold expression) when compared to the control embryos (1.038 ± 0.2017 SD, $p=0.0012$). Similarly, ZP3 was found to be expressed significantly lower in the CC treated embryos (0.1224 ± 0.05846 fold expression) when compared to the control embryos (1.229 ± 0.5789 fold expression, $p=0.0240$). BMP15 was found to not be differentially expressed in the CC treated embryos (0.6163 ± 0.2905 fold expression) when compared to the control embryos (1.235 ± 0.5798 fold expression, $p=0.3398$). These results suggest that CC exposure during maturation alters the expression of selected genes that potentially influence embryo health.

Madison Newbauer

Discipline: Biology

Authors:

- #1 Andreia Alves
- #2 Incy Rojas-Pina
- #3 Astrid Schwalb
- #4 Weston Nowlin
- #5 Paula Furey

Abstract Name: Fish, Food, and Flow: Algal assemblage response to the presence and absence of grazers in intermittent rivers in Texas.

With climate warming, the duration and frequency of drought events is increasing in rivers worldwide. Intermittent droughts can disrupt river connectivity and cause water stress for biological communities, including algae and their grazers. Changes in temperature and flow dynamics can lead to changes in algal assemblage composition and abundance, as different species have different tolerances of environmental parameters. Grazers, like fish and other aquatic insects (macroinvertebrates), feed on algae, especially diatoms, which are rich in lipids. However, fish may be sensitive to warmer waters and river connectivity. This project aims to understand fish-grazer impact on algal assemblages in intermittent rivers in Texas. If fish graze on macroinvertebrates, algal abundance could increase, or species composition (> diatoms) could shift due to release from grazing pressure. In contrast, fish removal could increase grazing pressure from macroinvertebrates, leading to a decrease in algal abundance, and nutritious algae like diatoms, and an increase in grazer-resistant algae, like cyanobacteria. We collected algal samples from river pools with and without fish grazers during wet (October) and dry (July) periods in 2024. We analyzed algae on a light microscope to determine 'who' was there, and then with a fluid imaging particle analyzer (FlowCam®) to determine the relative abundance of major groups (cyanobacteria, diatoms, green or red algae). Preliminary results indicate that mucilaginous cyanobacteria filaments and diatoms dominated in the presence and absence of grazers, and under both wet and dry conditions. The mucilage-rich cyanobacteria filaments likely provide structure for the fine calcium-carbonate particles present in these rivers. Diatom relative abundance was higher with grazers present under both wet and dry conditions, suggesting a release of grazing pressure

from macroinvertebrates. This suggests that Texas rivers may be adapted to warm conditions and flow changes, but shifts in fish distribution could alter the quality of algae available to foodwebs.

Jaythan Newby

Discipline: Political Science

Authors:

#1 Jaythan Newby

#2 Craig Dearfield

Abstract Name: How Shifting Views Regarding Immigrants/Immigration in America Affects Immigrant Students' Ability to Succeed in Their Education.

As immigration enforcement has expanded in the United States over the past decade, many immigrant communities have experienced increased fear, stress, and uncertainty. This project explores how this enforcement climate affects immigrant college students' academic experiences. The main question is: How does stress related to immigration enforcement influence immigrant students' ability to succeed in school, including their grades, attendance, and overall focus on their studies? To answer this question, the project reviews recent research and reports published in the last 10 years on immigration policy, enforcement activity, and student outcomes. The review will look for studies that describe how enforcement actions, public debates about immigration, and changes in policy shape students' mental well-being, sense of safety, and academic performance. By bringing together findings from different sources, this project aims to summarize what is currently known about the relationship between immigration enforcement and immigrant students' educational success and to highlight where more research and support from schools and communities are needed.

Ryan Newcomb

Discipline: Philosophy, Ethics, and Religious Studies

Authors:

Abstract Name: Phenomenology of a Fictional Character

Fictional characters can be seen as something separate from ourselves, a collection of qualities and actions that are simply part of the character as a whole. But our personal experience of fictional characters and the way we interact with them suggests that there is something more: we live through these fictional characters as someone who can move us, shift our orientation towards ourselves, and shape our sense of being. In this paper I will answer what it means to "live as a fictional character" and what our embodied experiences of them look like. Taking inspiration from Maurice Merleau-Ponty's embodied perception, I will be arguing that fictional characters are not just imaginative constructs separate from ourselves, but as someone we inhabit through our experience of reading them. By examining the phenomenological qualities of fictional characters, we can understand how meaning emerges from them and why they matter. Fictional characters are not just someone that we only read about, they are someone that we embody.

Phuoc Nguyen

Discipline: Physics and Astronomy

Authors:

#1 Nathan Smith

Abstract Name: Multi-Epoch Photometry and Spectroscopy of Luminous Blue Variables (LBVs) in the Andromeda (M31) and Triangulum (M33) Galaxies

Mass loss plays a deterministic role in the evolution of high-mass stars ($> 20 M_{\odot}$), especially during the post-main-sequence stages, and luminous blue variables (LBVs) have the highest mass-loss rates of any stars. LBVs, also known as Hubble-Sandage or S Doradus variables, are rare, evolved massive stars that exhibit unpredictable and sometimes dramatic eruptions. Studies of LBVs in the Milky Way reveal that during these outbursts, the ejected mass forms a cool, dense expanded atmosphere or “pseudo-photosphere,” which has been the proposed explanation for the shift in energy distribution from the UV to the visible, resulting in the dramatic brightening in visible wavelengths at constant bolometric luminosity. This is also why LBVs appear to shift from an instability strip during quiescence to a constant-temperature strip at maximum brightness. To further investigate this theory, we have acquired multi-epoch BVRI photometry from the AAVSO and past literature, and used the Multi Mirror Telescope (MMT) Observatory to obtain spectroscopy for several confirmed LBVs and LBV candidates in the Andromeda (M31) and Triangulum (M33) galaxies, which are then used to monitor their change in brightness and color over time. Current results indicate that even though erupting LBVs become reddened as a result of the brightening in optical, this change in color $\Delta B-V$ with respect to the change in brightness ΔMV is insufficient to maintain constant luminosity, which might imply a different physical process governing this enhanced mass outflow. Future implications include obtaining more photometry to cross-check our current observations about their evolution in brightness and color.

Kobe Nguyen

Discipline: Biology

Authors:

#1 Juwel Chandra Baray

#2 Joel Rothman

#3 Noah Linder

#4 Perrine Changkuon

Abstract Name: Improvements in Healthspan in *C. elegans* through Cellular Reprogramming

Aging is a natural process of life. With age, however, comes the rise of various chronic diseases. Efforts to develop therapies for humans to combat these diseases have increased in popularity. However, working in humans is extremely complicated and impractical due to potential ethical risks and humans' long lifespan. Alternatively, *Caenorhabditis elegans* (*C. elegans*), a type of worm, has been extensively studied and with their short lifespan, quick reproduction, and high homology (up to 80%) to humans, they serve as valuable model organisms in aging research. Using this non-human model organism, we plan to explore mechanisms that potentially slow or reverse aging clocks, ultimately decelerating the onset of chronic diseases. Specifically, this study aims to determine the extent to which the induction of transcription factors (Yamanaka Factors (YF)) in *C. elegans* improves healthspan, or their quality of life. Prior studies found that recurring activation of YF in mice exhibited significant lifespan extension. However, this has not yet been tested in *C. elegans*. Demonstrating a conserved benefit across many species would support YF activation as a potential therapeutic approach in humans. Thus, the Rothman Lab previously completed an optimization of recurring YF activation in *C. elegans* that maximally extended lifespan. But a long life is meaningless if you are not healthy during this life. Therefore, this study will test the extent of healthspan improvement, given these optimal lifespan extending conditions, specifically measuring thermotolerance, mobility, and oxidative stress

at key life stages. Thermotolerance assays will assess survival to prolonged heat stress. Mobility will be quantified by counting the number of pharyngeal pumps and body bends. Oxidative stress will be measured using H2DCFDA fluorescence staining to measure reactive oxygen species accumulation. Through this work, we hope to determine whether YF activation significantly enhances healthspan alongside lifespan and ultimately strengthen the potential of YF-based therapeutic therapies in humans

Hang Nguyen

Discipline: Interdisciplinary

Authors:

Abstract Name: Différance and Meaning in Antiquity and Modernity: The Abjected Versus Objectified Dido in Books 2, 4, and 6 of Virgil's Aeneid

When, in Book 4 of Virgil's Aeneid, Queen Dido transforms from a powerful woman in her own right to a tool used by the gods to forward their own agenda (one which centers a man— Aeneas— and his own apparent destiny), Dido transforms from a figure who is objectified to one who is abjected— that is, someone who is othered and made so repulsive or miserable that they can no longer be looked at directly. Certain ways of writing emphasize the abject in powerful female figures, demonstrating *différance*, or the Derridean concept of how symbols (including components of language, like letters or words) gain meaning. Through a literary analysis of Virgil's Aeneid in its original Latin, in addition to various translations (with special attention paid to Books 2, 4, and 6), I intend to answer the question of to what extent the language of Dido's descriptions within Virgil's Aeneid still retain their old meanings from antiquity, and how this manifests in contemporary depictions, particularly in regards to Dido's power, her body, and perceptions of her (from a Derridean point of view). The writings which will be read and used to frame the character of Dido include Jacques Derrida's *Speech and Phenomena*, *Writing and Difference*, and "Différance," with particular interest in Derrida's writings on abjection and the language of *différance*. The analysis of Books 2, 4, and 6 of the Aeneid will therefore inform how the language used affects perceptions of Dido and her apparent abjection in contemporary understandings/translations. Within its discipline, this research will examine how the Derridean concept of *différance* applies to antiquity, as well as how this affects perceptions and interpretations of powerful women (such as Virgil's Dido) in modernity.

Van Tu Nguyen

Discipline: Computer Science

Authors:

#1 Van Tu Nguyen

Abstract Name: Design of a Gesture-Controlled Smart Glass Interface Using Computer Vision

Gesture-based interfaces are becoming increasingly important as alternative interaction methods for situations where physical touch is limited or hands-free interaction is preferred. This project explores the design and development of a low-cost, gesture-controlled smart glass system that uses computer vision to allow users to manipulate on-screen elements without touching a device. The goal of this work is to investigate how accessible hardware, such as a Raspberry Pi and a standard webcam, can support real-time hand tracking and create intuitive, touch-free user interfaces. The smart glass system is built by combining a two-way acrylic mirror with a 15.6-inch display panel to create a semi-transparent interactive surface. A camera mounted behind the mirror captures hand movements, and MediaPipe's machine-learning-based hand-tracking model

identifies fingertip positions, detects open- and closed-hand gestures, and calculates motion in real time. These signals are transmitted to a custom interface, allowing users to grab, move, and release digital objects displayed behind the mirror. This creates the appearance of interacting directly with elements “inside” the glass. Expected results include demonstrating stable real-time gesture recognition at practical frame rates, validating that low-cost hardware can support interactive computer vision interfaces, and evaluating how intuitive the gesture mappings feel to first-time users. The project aims to show that embedded systems and open-source AI tools can be combined to create affordable, hands-free interaction technologies with potential applications in accessibility, smart-home interfaces, education, and public information displays. This prototype highlights how computer vision can extend traditional display surfaces into new forms of interactive, gesture-responsive interfaces.

Jaydon Nguyen

Discipline: Art History

Authors:

Abstract Name: Just Beyond the Red Circle: Yūsaku Kamekura Rebuilt Post-War Japan Through Design

This paper explores the life and design philosophy of Yūsaku Kamekura, a central graphic design during the post-war period of Japan. He combined traditional Japanese aesthetics with modernist design principles to shape visual elements, highlighting the cultural context and aesthetics of the post-war era. Kamekura conveyed ideas, messages, and emotions through his work to promote cultural modernization and support economic recovery after World War II. Design acted as a social tool, demonstrating the power of visual communication in designs to reach people of Japan and maintain its cultural integrity, which has always been a strategy to unify people during challenging times to improve life during the post-war period through its Olympic Games designs. His collaboration with colleagues not only advanced modern graphic design but also created a platform for effective communication with American foreigners, fostering a positive recovery during the reconstruction period. Kamekura was honored to serve as an inspiration or a model to motivate young designers because many designers and global audiences recognized him for his contributions to post-war Japan.

Katey Nguyen

Discipline: Engineering

Authors:

#1 Miguel Melgoza

#2 Joshua Lee

Micaela Garcia

Abstract Name: Carbon Conscious Concrete: Integrating Pinewood Biochar for Structural Applications

Portland Cement Concrete (PCC) is a composite material composed primarily of Portland cement (PC), coarse and fine aggregates, and water. Its versatility, accessibility, and cost-effectiveness make it the most widely used construction material. However, rising global demand for infrastructure and urban development has intensified concerns over the carbon-intensive nature of PC production, emphasizing the need for sustainable alternatives. Previous research indicates that pinewood biochar, an inherently porous fine material, has potential as a supplementary sustainable cementitious material (SCM) due to its high surface area and carbon sequestration properties. This study investigates the potential replacement of PC with biochar at 2%,

6% and 15% by weight to evaluate its impact on the mechanical performance of PCC while providing environmental benefits. Replacements exceeding 6% of PC were not generally recommended by previous studies, due to considerable reduction in workability and compressive strength of PCC, limiting its suitability for structural applications. Experimental findings of the team confirmed this observation, indicating that high doses of biochar decrease the overall strength of PCC. The 6% biochar mix achieved an average compressive strength of 4.7 ksi and a tensile strength of 439 psi, values consistent with requirements for structural concrete. This study highlights that incorporating biochar can maintain acceptable mechanical properties without adversely affecting curing time or hydration behavior, even across varying water-to-cement ratios in the PCC mix design. The findings demonstrated biochar's promising potential as a SCM in concrete production, contributing to reduced PC usage to support the development of environmentally responsible construction practices.

Sheila Nguyen

Discipline: Film/Photography Studies

Authors:

Abstract Name: Increasing Autobiographical Memory in Individuals Suffering from Dementia through Nostalgia Elicitation from Digital Childhood Photographs

Dementia is a neurodegenerative disease that erodes autobiographical memory and shifts identity, emotional well-being, and interpersonal relationships. As individuals lose access to life experiences, especially from childhood, understanding how memory could be supported becomes crucial in both clinical and everyday settings. This paper investigates how digital photographs from an individual's childhood could act as a form of storytelling, elicit nostalgia, and enhance autobiographical memory in individuals with dementia. Specifically, I explore how the features of digital photography, such as accessibility, organization, and visual quality, affect memory recall and emotional engagement. The central question guiding this research is how digital photographs function as a mediated archive that supports personal memory and identity in the context of dementia. I conducted a comprehensive review of interdisciplinary literature, drawing from neuroscience, psychology, media studies, and dementia care. Studies included EEG and fMRI research on nostalgia's neurological effects, qualitative interviews involving photo-elicited narratives, and experimental findings on nostalgia's psychological benefits. This approach allowed me to examine both the emotional and cognitive dimensions of memory recall through digital imagery. The research suggests that nostalgic digital photographs activate brain regions related to reward, social cognition, and perspective-taking, which may promote self-continuity, social connectedness, and emotional resilience. Further research is needed to understand how the photo helps individuals remember aspects of their lives over time based on the type, emotional connection, and physical reaction the viewers feel. These findings point to a practical and accessible form of memory support for people living with dementia. Incorporating nostalgic digital photographs into therapeutic contexts could foster emotional healing, identity reinforcement, and improved communication with caregivers and loved ones. Future work should focus on developing structured photo-based interventions and testing their efficacy in real-world dementia care environments.

Kenny Nguyen

Discipline: Computer Science

Authors:

#1 Kenny Nguyen

#2 Nathan Tran

#3 Tony Nguyen
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Tony Nguyen
Nathan Tran

Abstract Name: Multi-Modal Apple Detection - Combining 3D LiDAR and RGB analysis for Precision Orchard Yield Estimation

Fruit yield estimation has been a long-standing challenge, yet few approaches have combined both perceptual (color) and geometric (3D shape) features for single-fruit detection. Earlier methods largely relied on 2D imagery or spectral signatures and modeled apple density across orchards without ground-truth-validated observations—often overlooking the three-dimensional structure of fruit clusters and limiting physical accuracy. We enhance this task by introducing a multi-method pipeline that integrates LiDAR-derived point-cloud geometry and RGB color analysis for robust, ground-truth-verified apple detection and counting. The pipeline combines three complementary components: Excess-Red (ExR) color filtering, RANSAC-based spherical fitting, and DBSCAN clustering to segment apple-like structures while filtering out foliage and background artifacts. A parameter-tuning framework adapts DBSCAN's epsilon, MinSamples, and diameter thresholds across test plots to adjust detection sensitivity for varying canopy densities. To address cases of dense clusters, we explored a K-means refinement step for intra-cluster separation. However, improvements were limited, suggesting that natural fruit clustering and point-cloud sparsity constrain centroid-based refinement. Detection results were georeferenced and evaluated against human-labeled ground-truth datasets to quantify precision and error. Both the spherical-fitting and cubical bounding-box methods achieved approximately 21% relative error and demonstrated strong correlation between estimated and reference counts. We further analyzed performance trade-offs between detection accuracy and computational efficiency, observing stable performance across different orchard conditions. Future work will integrate hyperspectral imagery and adaptive weighting to improve detection under occlusion. Collectively, this study presents one of the first ground-truth-based LiDAR-RGB integrated systems for precise fruit detection, bridging computer vision, remote sensing, and agronomic analysis to support scalable, data-driven orchard management.

Anh Nguyen

Discipline: Psychology

Authors:

Abstract Name: Examining How Facial Expressions Influence Perceptions of Sexual Consent

Affirmative consent emphasizes clear, continuous, and voluntary communication during sexual interactions (Gotell, 2008). Although people often define consent in ways consistent with affirmative consent standards: explicit, revocable, and free of coercion—they frequently communicate it through implicit or ambiguous cues (Jozkowski et al., 2014; Muehlenhard et al., 2016). Such ambiguity complicates both real-time and retrospective assessments of whether consent was granted. Prior research also shows that third-party judgments depend on how closely an encounter aligns with observers' schemas of rape, including expectations that targets physically resist. However, it is unclear whether a target's facial expression influences evaluations of sexual consent, despite the prominence of facial cues in everyday decision-making (Yu et al., 2023). The present study examined whether facial expression shapes perceptions of consensual, nonconsensual, and ambiguous encounters. Eighty-seven female participants completed a 3 (Consent: consensual, nonconsensual, ambiguous) $\times$ 2 (Emotion: happy, neutral) within-subjects design. Participants read 12 vignettes in which a male initiator asked a female target to have sex. The target either clearly agreed, clearly disagreed, or communicated ambiguously; each vignette was paired with a happy or neutral expression. Participants rated perceived consensuality, target sexual desire, and target responsibility. A significant main effect of consent emerged for all variables (p s $\leq$.001). Consensual vignettes were judged as more consensual, more desired, and as placing more responsibility on the target compared with ambiguous

or nonconsensual vignettes. Nonconsensual encounters were rated lowest on these dimensions. Facial expression produced no main effects or interactions ($p > .05$). These findings suggest participants relied primarily on explicit consent cues and clearly distinguished consensual from nonconsensual scenarios. Yet ambiguous communication was not consistently classified as nonconsensual, highlighting a gap between stated definitions of consent and applied judgments. The absence of facial-expression effects indicates evaluators prioritized verbal consent over affective cues.

Tu Anh Nguyen

Discipline: Chemistry

Authors:

#1 Tu Anh Nguyen

#2 Eva-Maria Rudler

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Abstract Name: Structure–Photophysics Engineering of Small-Molecule Fluorophores for High-Resolution Bioimaging

Fluorescent small molecules are indispensable tools for visualizing biological structures and processes, yet many widely used probes still suffer from poor photostability, low quantum yields, and limited selectivity in complex cellular environments. The central question guiding this project is: How can systematic structural modification of small-molecule fluorophores be used to improve their photophysical performance and biological specificity? Existing research demonstrates that fluorophore behavior is highly sensitive to electronic structure, and that incorporating electron-donating or electron-withdrawing substituents can significantly alter absorption, emission, and stability. However, there remains a gap in understanding how specific substituent patterns influence performance in live-cell environments. This project seeks to address this gap by establishing clear structure–photophysics relationships that can guide the design of next-generation fluorescent probes. To investigate this question, we synthesized a small library of fluorophores with systematically varied donor–acceptor substituents. Each compound was structurally characterized using nuclear magnetic resonance spectroscopy and mass spectrometry, followed by photophysical characterization using UV-visible and fluorescence spectroscopy. These measurements allowed us to evaluate changes in brightness, Stokes shift, and environmental sensitivity. To assess biological compatibility, the probes were tested in live-cell imaging experiments to measure cellular uptake, localization patterns, labeling performance, and cytotoxicity. We expect to identify substituent patterns that reliably enhance photostability, brightness, and selectivity, as well as structural motifs that improve performance in bioorthogonal labeling strategies. The conclusions will focus on the design rules that emerged from this systematic approach and how these rules can accelerate the development of more effective imaging agents for disease diagnostics, targeted imaging, and long-term cellular monitoring.

Catherine Nguyen

Discipline: Film/Photography Studies

Authors:

#1 Joshua Barton

Abstract Name: Media as a Toxin: Exploring the Detrimental Effects of Korean Drama Viewership on their Audience's Cognition and Resulting Behavior

Following a period marked by extensive immigration and rapid technological development, international films experienced a significant rise in visibility among both domestic and global audiences. By the late twentieth century, Korean dramas—commonly referred to as “K-dramas”—became increasingly prominent with the emergence of the “Korean Wave,” a cultural movement that propelled East Asian media into mainstream popularity. This surge generated a wide range of conflicting interpretations, dividing public opinion between those who view K-dramas as valuable educational tools and those who consider them detrimental forms of media. K-dramas, however, often function as inadvertent sources of malinformation, particularly among impressionable viewers. Many series normalize harmful relationship dynamics while idealizing portrayals of Korean men, potentially encouraging audiences to perceive such behaviors as acceptable or even aspirational. Additionally, these dramas frequently incorporate pervasive alcohol messaging, suggesting that excessive consumption across professional, emotional, and social contexts is both typical and beneficial, despite its real-world risks. They also reinforce narrow and unattainable beauty standards, prompting some viewers to adopt extreme measures in pursuit of these unrealistic ideals. Beyond this, K-dramas can cultivate disproportionate cultural fixations, fostering forms of fandom that verge on obsession and influence behavioral intentions. Although some argue that K-dramas promote mental health awareness, these portrayals are often dramatized and rarely translate effectively into practical, real-world application. Taken together, these factors underscore the need for more critical engagement with K-dramas and greater awareness of their broader social and psychological implications.

Hoang-Vu Nguyen

Discipline: Mathematics

Authors:

Abstract Name: Physics and Calculus of the Sailboat Motion

This research explores the physics and calculus behind sailboat motion, focusing on how a sailboat harnesses wind power to travel, even against the wind. After a brief overview of sailboat evolution and key components (sail, hull, and keel), the study examines how adjusting the sail angle enables efficient upwind motion through vector decomposition of forces. Using Python, the project models the wind as a vector field and applies optimization to determine the most efficient sailing trajectory and the shortest-time path between two points. The results illustrate how principles of calculus and physics intersect to improve understanding and performance of sailboat dynamics.

Viet Nguyen

Discipline: Nursing and Public Health

Authors:

#1 Viet Nguyen
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Abstract Name: Wanna Party with Data? Connecting Richmond Communities with Substance Use Results, Education, and Resources

Rates of substance use overdose in Richmond, VA increased from 44.6 in 2018 to 129.5 per 100,000 city residents in 2023. Our team conducted a series of "community conversations", focus groups, to understand the perceived factors contributing to overdose and resource needs in the community. The aim of this project is to conduct and assess dissemination activities that share research findings identified in the community conversations through community-engaged approaches. In particular, we sought to determine the degree to which inclusion of research results would produce activities that would be positively perceived by community residents and address substance use concerns. Since April 2025, we have implemented two types of community-facing results dissemination activities: (1) "Party with Data" activity tables that share results through trivia-style games and (2) a series of educational workshops, developed in collaboration with non-profit community organizations. Ten "Party with Data" events were conducted between April-November 2025, disseminating results to approximately 300 community residents. At each event, community residents were invited to anonymously share substance use-related topics of interest. Common themes included: engaging in healthy family discussion, support group resources, and strategies to address substance use. Themes from "Party with Data" events, focus groups, and community organization feedback informed the development of day-long community workshops. To date, one community workshop for youth and adults has been conducted (N = 36). Among participants who attended the event, an average of 87.5% agreed/strongly agreed with statements across seven areas (e.g., awareness of available resources, ability to discuss substance use with youth and adults). Inclusion of research results in community events produced activities that improved resource and research awareness and facilitated conversations on substance use. The success of these events encourages future inclusion of research dissemination during community-facing activities.

Le Phuc Diem Nguyen

Discipline: Biology

Authors:

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Abstract Name: Ciliotherapy as a therapeutic approach for fibrotic dermal fibroblasts

Fibrosis can occur in any organ and is characterized by excessive collagen and extracellular matrix production by myofibroblasts, ultimately disrupting tissue structure and function. Although several signaling pathways have been implicated in fibrosis, the underlying molecular mechanisms remain poorly understood. Recent studies have shown that primary cilia (PC) shortening is an early hallmark that drives the fibrotic reprogramming of dermal fibroblasts. Moreover, Spag17 and other cilia-associated genes play a critical role in regulating primary cilia length and, consequently, fibrotic responses. Loss of Spag17 function leads to cilia shortening, spontaneous myofibroblast transition, and activation of profibrotic pathways, including TGF- β signaling, resulting in increased collagen deposition and fibrosis. Therefore, we hypothesize that therapeutic modulation of PC length (termed ciliotherapy) represents a promising strategy for preventing or even reversing fibrosis. To evaluate this therapeutic approach, we treated Spag17 KO fibroblasts with LiCl and forskolin—two compounds known to modulate cilia length—as well as with a PDE4D inhibitor, a modulator of phosphodiesterase activity involved in cilio genesis. We then assessed treatment effects by immunofluorescence analysis of profibrotic markers. All treatments effectively restored PC length in Spag17 KO fibroblasts and reversed the fibrotic phenotype, as evidenced by reduced expression of the myofibroblast marker α -smooth muscle actin (ASMA) and procollagen, along with a lower nuclear-to-cytoplasmic ratio of

SMAD2/3, indicating deactivation of TGF- β signaling. In conclusion, these findings highlight the therapeutic potential of targeting primary cilia-related mechanisms to reverse fibrosis.

Tran Nguyen

Discipline: Nursing and Public Health

Authors:

#1 Tran Nguyen

#2 Jiale Hu

Jiale Hu

Abstract Name: The Promise of Artificial Intelligence in Anesthesiology: Rapid Review

Artificial intelligence (AI) is increasingly applied in modern healthcare, including anesthesiology. Numerous AI applications have been developed in this field. However, their use in clinical practice remains uncertain. This study aimed to provide a clear overview of the current state of AI integration in anesthesiology, with a particular focus on the positive impacts of AI within anesthetic practice. A rapid review was conducted following the 2020 Preferred Reporting Items for Systematic Reviews and Meta-Analyses (PRISMA) guidelines. We searched MEDLINE via PUBMED for articles published from 2015 to November 2025 using terms related to AI, application, and anesthesiology. Articles that were secondary/ tertiary articles, non-English, or involved animal subjects were excluded. The accuracy and risk of bias of each study were assessed using the Cochrane Risk of Bias Tool. A total of 47 studies were included. Regarding their clinical applicability, we found that the studies fall into 5 groups: (1) Monitor/Control depth of anesthesia, (2) Event and risk prediction, (3) Pain management, (4) Ultrasound guidance, and (5) Miscellaneous. Event and risk prediction represented the largest category (32/47 studies). Although limited by a single database search, this review found that AI showed considerable promise in anesthesiology for enhancing patient safety, supporting clinical decision-making, and improving workflow efficiency. Further research is needed to validate these technologies across diverse patient populations and clinical settings, and to establish guidelines for safe implementation.

Anh-Tu Nguyen

Discipline: Biochemistry

Authors:

#1 Anh-Tu Nguyen

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Abstract Name: Investigation of the Localization of Fucoxanthin and Fucoxanthinol in BEAS-2B Cells

Fucoxanthin is a carotenoid that naturally occurs in microalgae. Fucoxanthin and its active form, fucoxanthinol, have shown potential in reducing anti-inflammatory reactions in the human body, specifically in respiratory diseases. However, their specific biochemical or cellular processes are unknown. To address the cellular processes, we will determine the subcellular localization of these compounds in respiratory cells. Namely, the compounds will be tested at different concentrations on BEAS-2B cells, a line of human bronchial epithelial cells. The application of these compounds on the cells will then be analyzed by spectroscopic and microscopic methods, such as fluorescence microscopy and Raman spectroscopy. Through these methods, the localization of the compounds in these cells will be investigated. It is expected that

fucoxanthin and fucoxanthinol will inhibit inflammatory responses through interactions with interleukin signaling in the cells. Furthermore, we expect fucoxanthinol to have a more effective inhibition of inflammatory responses in the cells compared to fucoxanthin as it is the active metabolite of fucoxanthin. The findings of this research can contribute to major advancements in pharmaceuticals for respiratory diseases. This research also promotes the use of marine-derived bioactive compounds, reducing dependence on synthetic alternatives, and ultimately supporting sustainable production processes.

Jessica Nguyen

Discipline: Engineering

Authors:

#1 Keera Rhoads

#2 Michael Hindle

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#4 Rebecca Heise

Abstract Name: Spray-Dried Lung Extracellular Matrix Microparticles for Acute Respiratory Distress Syndrome-Related Bacterial Infections

Acute respiratory distress syndrome (ARDS) is a severe form of lung injury with a high mortality rate and no cure. ARDS is characterized by pulmonary edema, gap formation in endothelial tissue, an influx of inflammatory cells, surfactant dysfunction, a decrease in lung compliance, and hypoxemia. One of the leading causes of ARDS is bacterial lung infections, with community-acquired pneumonia (CAP) and ventilator-associated pneumonia (VAP) being the most common forms. Patients with ARDS who receive mechanical ventilation are at a much higher risk of developing VAP, with the most common pathogens belonging to the ESKAPE group. Rising rates of antibiotic resistance among these pathogens and the lack of targeted treatments for ARDS emphasize the need for novel therapies and drug delivery carriers that not only prevent lung infection but also address the pathologic immune response and attempt to reverse structural changes in injured lung tissue. This study aims to develop extracellular matrix microparticles (ECM MPs) that have bacteriostatic, pro-regenerative, and anti-inflammatory properties when tested in bacterial and in vivo models of ARDS. Decellularized pig lung ECM was combined with excipients like DPPC and L-leucine to mimic lung surfactants and enhance the dispersibility of delivered aerosols while minimizing mouth-throat deposition loss. This novel formulation was then spray dried to yield particles with diameters in the range of 1-5 μm , with an average size of 1.2 μm , and a composition of 10% ECM, 25% L-Leucine, and 65% DPPC. To evaluate and optimize the efficacy of this formulation, bacterial inhibition assays are currently being conducted, and effective antibacterial activity is expected to produce a dose-dependent decrease in OD600 relative to untreated controls. Preliminary data indicate that the current ECM MP formulation is effective in reducing growth of E.coli. Ongoing studies will determine the consistency of this effect across varying concentrations and bacterial strains.

Princeton Niblack

Discipline: Nursing and Public Health

Authors:

#1 Erik Huneke

#2 Lindsey Churchill

Abstract Name: Sexual Health Education, Attitudes, Experiences, and STI Testing Rates of College Students

at the University of Central Oklahoma

Sexually transmitted infections (STIs) are a significant public health problem that can cause serious long-term health consequences if left untreated. The reduction of incidence, transmission, and complications associated with STIs requires prompt testing, diagnosis, and treatment. College students in the United States face a disproportionately high risk for STIs. They are more likely to engage in risky sexual behavior, less likely to utilize STI testing services, and face more barriers to sexual health. Previous research has indicated a lack of sexual health knowledge and attitudes towards sexual health influences the likelihood of engaging in risky sexual behavior. This study sought to assess the sexual health of college students at the University of Central Oklahoma and how it is impacted by their previous sexual education and structural barriers to healthy sexual behaviors. A cross-sectional, mixed-method online survey was conducted over the spring semester of 2026, recruiting university students from the University of Central Oklahoma via an all-student email. The anonymous questionnaire assessed student demographics, sexual education history, STI testing behaviours, sexual risk behaviours, knowledge, and five psychological constructs indicated to be predictive of STI testing from previous research: attitudes, perceived susceptibility to STIs, social norms, social fear and self-efficacy. The possible responses to questions related to sexual health were graded on a point scale, with a higher point value indicating alignment with practices that promote or improve sexual health. Optional follow-up interviews provided in-depth information regarding attitudes about sexual health and sexual health education. The survey responses will be compared to STI infection data provided by the Oklahoma State Department of Health. Efforts to improve sexual health on college campuses and provide evidence-based sexual health education will benefit from the data collected by identifying public health priorities and tailoring health promotion strategies to the needs of UCO students.

Princeton Niblack

Discipline: Biology

Authors:

#1 James Creecy

Abstract Name: Utilizing Plant-Pollinator-Microbe Networks to Explore a Novel Method of Pathogen Tracking via CRISPR-Cas9 Engineered *E. coli* and *S. cerevisiae*

The interaction of pollinators like bees with the flowers in a plant-pollinator network is a key component of microbial spread through ecosystems, with flowers acting as hubs of pathogen transmission. Microbes can travel on or inside of pollen grains, live on the surfaces of plants, and reside within the flower's nectar. The interaction of bees and flowers is a reciprocal transmission route for microbes that shapes their respective microbiomes. The primary purpose of this research is to develop a novel method of tracking pathogens in non-sterile environments by synthesizing a genetically distinct DNA barcode sequence that is inserted into the genomic DNA of *Escherichia coli* K-12 and *Saccharomyces cerevisiae* using CRISPR-Cas9. Doing so will also allow for the development of a methodology for tracking the movements of pathogens within plant-pollinator networks to support further research into their microbiomes. A genetically distinct DNA sequence, or barcode, was synthesized for insertion in the nuclear genomes of non-pathogenic *E. coli* K-12 and *S. cerevisiae* using the *Streptococcus pyogenes* type II CRISPR-Cas9 system. The barcode sequence was inserted into the internal transcribed spacer (ITS) region between the small- and large-subunit rRNA genes of the genomic DNA of both model organisms. The successfully transformed bacteria and yeast colonies were lyophilized, producing an inert powder. The lyophilized cells were applied to flowers in a pollinator garden, where they were collected by visiting bees and carried back to their hive. The hive was outfitted with a trap that collects the debris deposited by the bees. The debris was regularly collected and analyzed using qPCR and DNA sequencing. Data analysis is being conducted to determine the method's success. The ability to track the spread of pathogens in non-sterile environments such as the plant-pollinator network is of concern as climate change changes the landscape of plant-pollinator networks and their pathogen transmission.

Ariel Nicastro

Discipline: Physics and Astronomy

Authors:

#1 Ariel Nicastro

Abstract Name: Improving Zinc Oxide Nanorod Synthesis for Enhanced Electrochemical Sensor Performance

Zinc oxide (ZnO) is a biocompatible inorganic semiconductor with a wide bandgap and high electron mobility, making it suitable for light emitting, catalytic, and sensing applications. This study focuses on optimizing the hydrothermal synthesis of ZnO nanorods by examining the effects of autoclave temperature and surfactant choice on crystallinity, diameter, and aspect ratio. Optimal growth conditions were identified at 150°C with the precursor solution containing a one to one ratio of sodium dodecylbenzenesulfonate and sodium hydroxide. These conditions produced nanorods with an average diameter of 50 nm and high length-to-diameter ratios, which provide a large surface area that supports improved sensor performance. X-ray diffraction confirmed the wurtzite crystal structure of the ZnO, and scanning and transmission electron microscopy characterized nanorod morphology. UV visible spectroscopy showed a strong absorption peak at 370 nm, corresponding to an estimated 3.35 eV bandgap which is consistent with high quality ZnO. The nanorods were then applied as a thin layer to the electrode in the electrochemical sensor and evaluated using cyclic voltammetry. During measurement, the electrolyte solution undergoes a redox reaction that generates current. In this process, the analyte, which is the chemical species in the solution that gains or loses electrons, diffuses to the electrode surface. When the redox reaction occurs, electrons move through the ZnO layer to the sensor, demonstrating that ZnO can conduct charge and has useful electrical properties for sensing. Future work will refine ZnO integration with electrode materials, explore alternative synthesis routes, and assess the performance of ZnO modification in biosensing and photoelectric applications. This research contributes to the development of sensitive, accurate, and scalable ZnO based sensors for environmental, biomedical, and industrial use.

Sanaya Nichani

Discipline: Engineering

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Abstract Name: Electrical Capacitance to High-Observation resolution (ECHO) as a Solution to Mass-Gauging of Cryogenic Fuel in Microgravity for Spaceflight Applications

As the space industry prepares to embark on extended missions to the Moon and Mars, it has become evident that current mass gauging techniques are not sufficient for long duration space travel. Current techniques often rely on bookkeeping, calculations using pressure readings, or measurements utilizing intermittent accelerations burns to measure propellant usage. Such methods are unreliable due to estimation errors, propellant sloshing, and propellant boiloff, all issues which are aggravated during long duration missions. This paper proposes a novel solution called Electrical Capacitance to High resolution Observation (ECHO), which adapts Electrical Capacitance Tomography (ECT) as well as implements a machine learning (ML) algorithm to accurately and continuously measure propellant quantities. When implemented, ECHO will line the interior of a spacecraft propellant tank with rings of capacitance measuring electrodes. Each electrode pair can gather its own unique capacitance measurement. Higher concentrations of mass between a given electrode pair will produce a higher capacitance measurement, and as such, higher capacitance values represent a higher concentration of mass across any given exciting-measuring electrode pair. This data is then read by the ML algorithm which, by recognizing patterns in the measurements, generates accurate cross-sectional images and mass estimates of the interior of the tank, with significant computational reductions versus current reconstruction methods. To prove functionality of the system, the current testing setup is composed of a cryogenic dewar whose interior is lined with electrodes printed on a flexible PCB. Current ECHO tests are being on 3D-printed cross-sections, and in the future, ECHO will be tested with liquid nitrogen to confirm operation in extreme temperatures. With funding from Embry-Riddle Aeronautical University and NASA's Human Lander Challenge, ECHO will be tested with on-ground cryogenic fluid and a parabolic, sub-orbital flight test for the preparation of eventual space applications.

Ellie Nichols

Discipline: Exercise Science and Nutrition

Authors:

#1 Lauren Miutz

Abstract Name: Mental stress, physical activity and reproductive health: a pilot study on college-aged females in STEM

Undergraduate students enrolled in STEM (Science, Technology, Engineering and Mathematics) programs face rigorous academic demands that place them under immense stress. Chronic exposure to stress elevates cortisol, a key hormone known to disrupt endocrine function, including the reproductive system; such disruptions may contribute to menstrual irregularities. Among mediators that help the body return to homeostasis, physical activity is widely recognized as an effective tool for managing stress. Although previous literature has documented the relationship between stress and reproductive health, as well as the benefits of physical activity for stress relief, limited research has examined how physical activity may buffer stress related reproductive disruptions within the undergraduate STEM student population. The central research question guiding this study is whether physical activity mediates the relationship between academic stress and reproductive health among college-aged females in STEM programs. The purpose of this study is to evaluate the potential mitigating effect of physical activity on stress induced physiological changes. To investigate this question, researchers recruited eight female STEM students from the University of Dayton. Participants attended three data collection sessions scheduled before, during and after midterms to capture changes across a period of academic stress. At each session, participants provided passive drool saliva samples for cortisol measurement and completed five questionnaires assessing general health, reproductive status, stress levels and physical activity engagement. The same procedures were followed at each session. It is expected that participants with higher physical activity levels will exhibit lower cortisol reactivity during peak academic stress and report fewer disruptions to reproductive status. Findings will be discussed in the context of improving stress management strategies for undergraduate women in STEM, with attention to implications for reproductive health, academic performance and overall wellbeing. This study seeks to contribute new insight to an understudied intersection of stress, physical activity and reproductive health.

Brayden Nichols

Discipline: Architecture, Construction Management, and Interior Design

Authors:

Abstract Name: Exploring soil remediation and its significance for site development

As part of an independent undergraduate research project, I collaborated with the University of Kentucky's Department of Plant and Soil Sciences to assess soil toxicity across brownfield sites in Lexington's Distillery District and to examine how contamination influences public health and environmental quality. This scientific investigation directly informed my final architectural studio project, where I designed a proposed soil remediation facility that combined industrial treatment processes with public engagement. I selected three sampling zones: a disturbed site near railroad tracks, a reclaimed section of the Legacy Town Branch Trail, and an agricultural grassland control. These locations represented different levels of human impact and allowed for interesting comparison. Working with soil science researchers, I analyzed pH, macronutrients such as phosphorus and potassium, secondary nutrients including calcium and magnesium, and heavy metals including lead, cadmium, and zinc. Elevated pH and calcium levels suggested the influence of limestone dust from quarry activity, while heavy metal concentrations indicated legacy industrial pollution. These findings clarified how hidden chemical conditions shape both environmental health and the potential of contaminated sites. By integrating the scientific results into my design work, I explored remediation strategies such as phytoremediation gardens, constructed wetlands, and community soil laboratories. In the speculative facility, these strategies were developed not only as ecological interventions but also as public amenities that help make environmental processes visible and accessible. This project demonstrates how laboratory analysis can guide architectural decision-making and how remediation can become an opportunity for education, restoration, and community involvement.

Jonethan Nichols

Discipline: Health and Human Development

Authors:

Abstract Name: Antimicrobial Stewardship: Identifying Communication and Procedural Gaps Between the Medical Laboratory and the Clinician

In October of 2025, the World Health Organization warned the medical community that one in six bacterial infections worldwide are now resistant to antimicrobial treatments. Drug-resistant bacteria are just one specific type of antimicrobial resistance. The inclusion of fungi, viruses, and parasites that no longer respond to antimicrobial drugs are a global threat to public health. This current global concern requires enhanced antimicrobial stewardship. Antimicrobial stewardship can impact the growing phenomenon of antimicrobial resistance. However, its success greatly depends on the effective collaboration between the medical laboratory and the ordering clinician. Antimicrobial stewardship has been hindered by a lack of communication, training, incompatible scheduling, and technological difficulties between the medical laboratory and clinicians resulting in compromised patient care. Key strategies that focus on better management and control of the factors responsible for these communication and procedural issues must be determined and implemented. This review's thorough analysis of the literature identifies multiple recommendations that provide medical laboratory scientists (MLS) and clinicians with effective methods to bridge operational, procedural, and communication gaps. The aim of this literature review is to provide solutions that will serve to improve communication and reporting guidelines, MLS-clinician interactions, and patient specimen retrieval protocols to strengthen existing antimicrobial stewardship programs.

Daniel Nickson

Discipline: Biology

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#1 Gretchen Neigh
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#8 Isha Satapathy

Abstract Name: Impact of Early Life Stress on Blood–Brain Barrier Gene Expression following Skeletal Fracture in Mice

Exposure to stress early in life increases the risk of adverse health outcomes later in life. A common challenge faced by the general population is a skeletal fracture requiring surgical repair, yet the impact of early life stress on fracture outcomes is poorly understood. Previous rodent studies have demonstrated that early adversity can sensitize neuroimmune and vascular systems so that later stressors produce an exaggerated or altered inflammatory response. In fact, two-hit studies have illustrated that a peripheral immune challenge and a history of psychological stress together, but not alone, can synergistically amplify brain immune responses, raising the question of whether the blood–brain barrier responds differentially to peripheral challenges in those with a history of early life stress. The current study tests the hypothesis that a history of early life stress will alter the blood–brain barrier response to a peripheral skeletal fracture. This study uses a two-hit mouse model in which early life predator stress is followed by an adult orthopedic surgery or sham procedure to test whether stress history alters late blood–brain barrier recovery in the prefrontal cortex. Male and female mice are assigned to early life predator stress or no predator stress, and later receive a bone fracture under anesthesia and analgesia or a sham surgery, yielding a 2 by 2 by 2 design. Prefrontal cortex tissue was collected 7, 14, or 28 days after surgery and compared to tissue from control mice. Gene expression of the primary tight junction gene occludin (Ocln) will be quantified by RT-qPCR to determine whether early life stress and adult fracture surgery are associated with persistent alterations in a marker of blood–brain barrier integrity. Understanding the impact of early life stress on recovery from skeletal fractures will provide foundational knowledge to support future comprehensive personalized medical care.

Austin Nielsen

Discipline: Health and Human Development

Authors:

#1 Sean Cochran

Abstract Name: The Effects of Aerobic Fitness on Bilateral Transfer in Older Adults

INTRODUCTION: Transfer between limbs in older adults is typically symmetrical, with similar changes in the non-dominant limb following practice with the dominant limb and vice versa. This symmetry is caused by compensatory hemispheric activation due to motor control deficiencies with aging. Higher aerobic fitness has been shown to help older adults retain healthy hemispheric activation. Previous research shows that high reported physical activity exhibits asymmetrical transfer in older adults similarly of young adults. The purpose of this study was to examine the effects of aerobic fitness on bilateral transfer in older adults.

METHODS: 12 right-handed participants (65-80) were grouped by aerobic fitness level determined via a 2-minute walk test to estimate VO2 max following training. Prior to training, handedness was determined via the Edinburgh Handedness Inventory. Individuals performed a 30° visual rotation drawing task assessing movement parameters. Pre-test of two trials with each limb established baseline performance, followed by 40 practice trials on the left limb. Post-tests mirrored pre-tests assessing same-side learning and the transfer of motor planning parameters including movement time, normalized jerk, trajectory length, and initial direction error. **RESULTS:** A 2 (time) x 2 (group) repeated measures ANOVA was conducted for each independent variable. A main effect for time showed bilateral transfer occurred irrespective of aerobic fitness for movement time (Meandiff = 1.24s ± .226; F(3,8) = 21.9, p<.001) and normalized jerk (Meandiff = 5862.23 ± 1310.7; F(3,8) = 16.6, p<.001). However, transfer did not occur for trajectory length (Meandiff = .182cm ± .065; F(3,8) = 10.04, p>.05) or initial direction error (Meandiff = .005° ± .003; F(3,8) = 17.2, p>.05). **CONCLUSIONS:** Our findings suggest that older adults exhibit younger adult hemispheric activation, and certain motor parameters are not influenced by aerobic fitness. These findings could be due to compensatory hemispheric activation being motor parameter specific.

Izzie Nielsen

Discipline: Computer Science

Authors:

#1 Steven Fernandes

#2 Vignesh Rathinavelpandian Anandavel

#3 Peter Steygner

Abstract Name: Development of an AI model for detecting fluorescence intensity in cell lines & the cells of vestibular system

More than 35% of US adults aged 40 years and older (~69 million Americans) have had a vestibular dysfunction at some point in their lives. Vestibular disorders may be caused by disease, injury, drug or chemical poisoning, or aging. Symptoms of vestibular disorders include dizziness, vertigo (a spinning sensation), imbalance, fatigue, jumping vision, and cognitive difficulties. There is no “cure” for most vestibular disorders; however, they can be managed with medication, physical therapy, lifestyle changes (e.g., diet, exercise), or surgery. In most cases, patients must adapt to a host of life-altering limitations. In the US, medical care for patients with chronic balance disorders exceeds \$20 billion per year. The AI model we intend to develop is a hybrid approach that integrates convolutional neural networks (CNN) with vision transformers (ViT) to quantify fluorescence intensity. The proposed hybrid approach can simultaneously capture local fluorescence patterns with CNNs and global contextual understanding with ViT. Unlike per-cell analysis pipelines that crop and analyze cells independently, this architecture accounts for spatial relationships between neighboring cells, enabling robust quantification of fluorescence intensity. Our AI model’s fluorescence intensity detection will be compared with ground-truth values using the Pearson correlation coefficient, mean absolute error, and Bland–Altman analysis. Determining the fluorescence intensity in cell lines will be the first step in establishing the role of LRP2 in cellular transport of aminoglycosides. These initial data will be used to secure grants and other resources to determine the role of LRP2 in zebrafish and mouse explants.

Kaleb Nielson

Discipline: English and Literature

Authors:

Abstract Name: Credibility and Misinformation in American College Students.

Currently, there seem to be no meaningful regulations on online news. People posing as doctors sell “miracle supplements,” commentators pretending to be political experts use the same set of facts to portray individuals in entirely different lights, and websites masquerading as official news sources publish stories that may be wholly false. And yet, all of this is protected by the First Amendment. Free speech is the first requirement of a free democracy, and regulations must not be enacted that would infringe on this essential right. Such controls allow those in power to shape the perception of their citizens, and even well-intentioned limitations can be weaponized into a form of authoritarian influence. However, the alternative—a system with no oversight or accountability—produces its own dangers. The unfiltered freedom of modern media can reinforce misconceptions, amplify confirmation bias, and lend legitimacy to unfounded science. Where complete governmental control leads to tyranny, total absence of regulation invites informational anarchy. Both extremes ultimately threaten the survival of free society. Since government regulation is unacceptable and market forces have failed to promote truth over engagement, the responsibility falls on individual consumers. Everyone must learn to critically assess the information they receive. To do this, we must first understand how we think about information itself, and in particular, how we evaluate the credibility of a source. This study seeks to understand the link between source credibility and belief through a long-reaching poll of American college students that uses a variety of similar texts to evaluate whether the salience and perceived credibility of a source drastically influence how much a single text influences a belief. It is expected that low salience will cause the credibility of a source to have a lower impact on the perceptions of a reader, and high salience will have the opposite effect.

Estevan Nieto

Discipline: Physical/Occupational Therapy and Speech Language Pathology

Authors:

#1 Carolina Valencia

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Nayeli Esparza

Sofia Iniguez

Abstract Name: The Art of Connection: Creative Healing After Stroke

Stroke is the fifth leading cause of death in the United States and a major source of long-term disability. Reduced social engagement, emotional distress, and a lack of possibilities for community involvement are common among survivors, all of which hinder recovery. Research indicates that peer support, community programs, and arts-based activities can improve psychosocial well-being, cognitive resilience, and social connectedness. Guided by this evidence, The Art of Connection: Creative Healing After Stroke was developed as a six-week community art program aimed at enhancing social participation, emotional expression, and fine motor involvement in adult stroke survivors. Sessions were held at a local accessible church and facilitated by rehabilitation science students. Activities included painting, jewelry making, clay sculpting, picture-frame decorating, a collaborative mural, and reflective art naming. The program used a service-learning approach that benefited both students and participants. To measure perceived social connectivity and engagement, the Stroke Impact Scale (Participation Domain) and the Friendship Scale were administered at baseline and the final session. Results showed an increase in social participation, with SIS scores rising from $M = 63.54$ to $M = 78.13$ ($+14.58$). Although not statistically significant (Wilcoxon $Z = -1.633$, $p = .102$), all participants improved. Friendship Scale scores remained stable (Pre: $M = 6.33$, Post: $M = 5.67$; $Z = -.447$, $p = .655$), suggesting a constant sense of social contact throughout our brief program. Additionally, higher mood, collaboration, shared story, and increased involvement were seen in qualitative assessments. By combining a supportive group environment with creative expression is an example of the advantages of attending to psychological needs of stroke survivors. Partnerships with academic programs,

places of worship, and rehabilitation organizations encourage sustainability and ongoing art classes. The Art of Connection shows how accessible, low-cost arts programming can strengthen social connectedness and enhance community-based stroke recovery.

Mikayla Niggel

Discipline: Biology

Authors:

#1 Emily Dobry

#2 Michael Campbell

Abstract Name: Study of Gene Expression for FLOWERING LOCUS T and SEPALLATA 2-like Genes in *Solanum tuberosum*

In *Solanum tuberosum* (potatoes), flowering serves as a visual indicator that tubers have begun to develop underground. FLOWERING LOCUS T (StFT) proteins are known to act as mobile signals to initiate flowering. While researching more homologous genes with similar functions, a SEPALLATA 2-like gene (StSEP2) was identified in the potato genomic databases but was discovered to be mostly uncharacterized. This study aims to determine the location and quantity of expression for StFT and StSEP2 across different developmental stages in Caribou potatoes. Tissue samples were taken from both reproductive (buds, sepals, petals, stamens, ovaries, pedicles, fruits) and vegetative tissues (roots, stems, stolons, leaves, meristems) of the plant across five major stages of development: pre-planting, bud formation, flowering, post-flowering, and fruiting (which was a fruit-only sampling). Additionally, floral bud samples were collected from ten distinct size-based developmental stages. All samples will undergo RNA extraction and be analyzed using quantitative PCR (qPCR) analysis to assess gene expression levels across all tissues and timepoints. The goal is to generate a timeline of StFT and StSEP2 expressions to provide insight into their roles in both reproductive signaling and floral organ development.

Chloe Nissen

Discipline: Biology

Authors:

#1 Eva McClory

Natalie Brattain

Kylie Nager

Abstract Name: Tardigrade Bio-Exploration Reproduction Research Payload

Tardigrades, affectionately known as “water bears”, are a well-known scientific peculiarity studied for their tolerances of various extreme environments. The Tardigrade Bio-Exploration Reproduction Research Payload (tBEARR) is an external International Space Station (ISS) payload module under development by the Embry-Riddle Orbital Research Association (ERORA), an undergraduate research club at Embry-Riddle Aeronautical University in Daytona Beach, FL. The project is an undergraduate student-lead project researching the ability of *Hypsibius exemplaris* to reproduce in Low Earth Orbit while exposed to space radiation. The metabolically active cultures will be housed in an undergraduate student-built module to be attached externally to the ISS and exposed to radiation. The Payload Team has a focus on building the external payload module, designing and operating life support systems, and remotely collecting data from the onboard systems. The Research Team’s primary purpose is to conduct on-ground experiments to provide an

experimental control dataset. In preparation of the mission, the Research Team is currently researching and with on-ground experiments, quantifying the severity of specific stressors that tardigrades can tolerate in order to guide the Payload Team's systems requirements. These stressors include thermal stress, anoxia, and microgravity. While previous missions showed that tardigrades can survive brief exposure to Low Earth Orbit, there is a knowledge gap as to whether they can successfully reproduce under sustained radiation and environmental stress. The project's overall mission statement is to investigate the consequences of prolonged exposure on reproduction during spaceflight, providing insight into the possibility of reproduction in space for more complex organisms.

Jenny Nix

Discipline: English and Literature

Authors:

Abstract Name: The Storytelling Project: Building Belonging Through Narrative

This presentation examines my experience designing and implementing a student-led creative journal for Texas Woman's University's Department of Language, Culture, & Gender Studies. Many institutions provide opportunities for students to participate in publications as contributors and managers; few, however, offer the chance to build a journal from the ground up. Yet doing so expands how programs allow students to apply the literary, rhetorical, and linguistic skills they gain. In addition to developing submission and editorial workflows, I will establish processes to support a multilingual mission that fosters inclusiveness and provides readers exposure to other languages and cultures. In my research, I hope to answer several questions. What does it take to start a student journal, and what are the benefits to English majors leading this process? What does a student staff look like, and what will the workflows be? How will we address rubrics and submission guidelines, as well as the peer-review process? I plan to reach out to other institutions with student-led journals to better understand their models, which will aid in developing mine. In turn, I aim to establish a network beneficial to all parties, including those seeking to launch similar efforts on their own campuses. Through this exploration, I aim to demonstrate the value of inviting students to participate not only in publication processes (as contributors or editors) but more significantly as primary developers of the journal's design and infrastructure. I will also offer suggestions for maintaining student engagement post-launch, as the goal is to ensure the journal continues contributing to student success for years to come.

Vrishab Nooka

Discipline: Economics

Authors:

#1 Vrishab Nooka Nooka

Abstract Name: The impact of Fed Rate Announcements in Shaping Returns in High-Growth Tech vs. Traditional Rate-Sensitive Sectors

This project analyzes how different sectors of the U.S. economy respond to Federal Reserve interest rate announcements, focusing on high-growth technology firms and traditional rate-sensitive industries. Although these sectors are often grouped together as being sensitive to monetary policy, they react through distinct economic mechanisms. Traditional sectors tend to respond to interest rate changes through shifts in borrowing costs, mortgage rates, and credit-market conditions. High-growth technology firms, however, derive a significant portion of their valuation from expected future earnings, which makes them behave like

long-duration assets and more sensitive to changes in interest rate expectations rather than the direct cost of borrowing. To evaluate these differences, the study uses an event-study method centered on the Federal Open Market Committee (FOMC) announcement dates from 2010 to 2024. Stock returns, trading volume, and volatility are measured in short windows surrounding each announcement, with a distinction made between expected policy decisions and policy surprises. Abnormal returns are calculated for each sector to isolate the market's reaction specifically attributable to monetary policy communication. Preliminary research shows that high-growth technology stocks exhibit faster and more distinct price movements in response to Federal Reserve announcements, especially when the decision deviates from market expectations. Traditional sectors tend to react in steadier and less dramatic ways. Their movements follow the typical economic effects of changing interest rates, such as shifts in loan demand or investors moving toward or away from safer industries. These patterns suggest evolving differences in how investors interpret monetary policy across sectors, as well as increasing sensitivity within the technology sector over time. By comparing sector-level responses across more than a decade of policy announcements, this project provides insight into how monetary policy shapes modern financial markets while highlighting the importance of understanding sector-specific channels of rate sensitivity.

Mohammad Noor

Discipline: Engineering

Authors:

#1 Mohammad Noor

Abstract Name: Effectiveness of 3-Dimensional Airfoil-shaped Collars On Reducing Pier Scour

Bridge pier scour is when the obstruction and diversion of regular flow leads to the removal of sediment surrounding bridge pier structures. Scour is unpredictable and difficult to detect, making it extremely dangerous as uneven scour causes differential settlement, tilting, and ultimately, collapse. Recent studies on airfoil shaped geometries for piles have shown success in reducing the effects of scour. In 2023, the National Institute of Technology Waranga demonstrated that airfoil shaped pier collars with optimized dimensions reduced scour by 100%. When placed at bed level, the collars directly combated scouring by blocking the impact of horseshoe vortices. Likewise, in 2019, the Indian Academy of Sciences conducted experiments with extruded airfoil shaped piers tested the effects of the orientation of the airfoil on scour depth. When the extruded airfoil-shaped pier was oriented with the tail facing upstream, the formation of wake vortices was reduced by streamlining the diversion of flow. While effective, neither of the two aforementioned solutions combat both horseshoe and wake vortices. Thus, the 3D airfoil shaped pier collar (ASPC) is proposed as a combination of the flat collar and vertical extrusion concepts. By combatting both types of vortices, ASPCs with smaller footprints were tested to compare scour reduction versus individual flat collars and vertical extrusions. Model 3D printed ASPCs with varying diameter-to-width and diameter-to-tail length ratios were placed in a flume with a sand sediment bed to test if they achieved similar results to collars and extrusions within a smaller footprint. Under steady flow conditions, the scour depth after 6 hours was measured for each variation and compared to the control pier which had no collar. In practice, successful ASPCs would provide scour protection while requiring less material and construction effort.

Harrison Nordmeyer

Discipline: Nursing and Public Health

Authors:

#1 Whitney Van De Graaff

#2 Ann Laughlin

#3 Jacqueline Williams
#4 Dana Koziol
#5 Misty Schwartz
#6 Steven Fernandes
#7 Susan Connelly
Victor Mbengwie

Abstract Name: Implementation of a School Health Report Card to Improve Health Outcomes in a Low-Resource Elementary School

The Creighton University College of Nursing (CUCON) Health Promotion program has provided annual state-mandated health screenings for children in six low-resource parochial schools since 2004. These schools serve racially and ethnically diverse students who experience high levels of socioeconomic disadvantage, placing them at increased risk for adverse health and academic outcomes. Although routine screening identifies concerns related to body mass index (BMI), blood pressure (BP), vision, hearing, and dental health, there is currently no systematic method to ensure follow-up after abnormal findings. Challenges include inconsistent calculation of BMI and BP percentiles and the absence of a structured process to support communication with parents or track follow-up care. To address these gaps, this quality improvement (QI) project aims to implement a School Health Report Card (SHRC) to improve health outcomes in one partner school. This pilot project involves developing a reliable pediatric BMI and BP calculator and a secure, locally run web-based application to facilitate accurate data entry and automated SHRC generation. Individualized SHRCs will provide screening results, interpretations, and low-cost or no-cost referral resources. Parents/caregivers will receive a follow-up survey one month after SHRC distribution to evaluate completion of recommended care and satisfaction with the SHRC. Existing program data will serve as baseline measures to assess changes in referral patterns, follow-up completion, and parental perceptions of the tool's usefulness. Outcomes will determine whether the SHRC improves communication, increases follow-up for abnormal screenings, and enhances parental engagement in child health. Anticipated benefits include earlier intervention, improved health and academic performance, and strengthened partnerships between families and school health providers. If effective, the SHRC model may be expanded to additional schools served by the CUCON Health Promotion program.

Brooklynn-Lear Norman

Discipline: Biology

Authors:
Jordyn Mitchell
Kristan Johnson

Abstract Name: Genomic Analysis of Cold-Adapted *Sulfitobacter pontiacus* from Antarctica

The Antarctic region is described as a frigid, oligotrophic environment. During a November 2009 expedition, phytoplankton were observed in the bottom 5 cm of the sea ice cores collected from Ross Sea, McMurdo Sound Station, Antarctica. This study focuses on understanding which type of heterotrophic bacteria are associated with these algae/phytoplankton and whether they have the genomic capacity to utilize these carbon sources. To test this, we used an enrichment culture approach using laminarin and cellobiose as the sole carbon source. The resulting microbial growth was serially diluted and plated on seawater-complete media (SWC), from which four well-isolated colonies (01DW25, 04NG25, 01KJ25, and 01JM25) were selected for pure culture. The 16S rRNA gene was amplified and sequenced. The phylogenomic analysis identified these isolates as *Sulfitobacter pontiacus*. Growth rate estimates on SWC and defined media showed that these isolates did not utilize beta-glucan, suggesting that other microbes had broken down algal polysaccharides into oligo- and monosaccharides (public goods) before isolation. Whole-genome shotgun sequencing and comparative genomic analysis with ANVIO confirmed that the Average Nucleotide Identity (ANI) between

the *S. pontiacus* isolates and their closest relative, *S. pontiacus* (GCF_022788675.1), is 97.9%. CAZyme screening showed 22 glycoside hydrolase genes and 37 glycosyl transferase genes. These findings suggest that these psychrotrophic strains have the capacity to break down complex carbohydrates and adopted an energy-conserving strategy called carbon catabolite repression in the lab, which implies that these isolates represent a cheating strain of *S. pontiacus* that likely uses cross-feeding to sustain itself within Antarctic microbial communities, given the inherent costs of resource acquisition in a cold, oligotrophic environment. Future proteomic analyses will investigate specific proteins involved in carbon utilization and environmental responsiveness.

Logan North

Discipline: Computer Science

Authors:

#1 Sashi Kumar

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#3 Peilong Li

Priya Kaluskar

Abstract Name: Lightweight Intrusion Detection for IoT: Deploying Machine Learning on Resource-Constrained Edge Devices

The expansion of Internet of Things (IoT) devices and edge computing has increased the vulnerability of modern networks to cyberattacks. Traditional signature-based intrusion detection systems (IDS) cannot reliably identify new or rapidly evolving threats, and many machine learning-based IDS solutions are too computationally expensive for small edge devices. This project investigates a lightweight, anomaly-based IDS designed specifically for resource-constrained hardware such as the Raspberry Pi 3B+. Using the TON-IoT and CICIDS2017 datasets, we trained multiple machine learning models, including multilayer perceptrons, 1-D convolutional neural networks, and random forests, and achieved offline accuracies exceeding 95%. These models were then deployed onto the Raspberry Pi to evaluate their real-time performance in simulated edge environments. Early experiments, including port-scanning detection tests, show promising accuracy levels (88%), demonstrating the potential of these compact models to operate effectively under strict hardware limitations. Our findings highlight a practical pathway for deploying real-time intrusion detection on low-power IoT devices, improving security at the network's edge.

Abby Novak

Discipline: Biology

Authors:

#1 Jessica Wood

#2 Kathryn Zimlich

#3 Matthew Fields

Abstract Name: Growth Characterization of the Dissolved Silica-Tolerant Green Microalga *Micractinium* sp. for Biofuel Applications

Photosynthetic organisms such as microalgae and diatoms are being studied for sustainable biofuel applications. Co-culturing of photosynthetic organisms may increase biomass production, lipid accumulation, and flocculation efficiency of both organisms as they exchange nutrients and metabolites. However, diatoms

require dissolved silica to build their cell walls, but high silica levels can have inhibitory growth effects on microalgae. Because co-culturing microalgae with diatoms is a potential strategy to further enhance biofuel yield, understanding how both organisms respond to silica-rich environments is important. Hidden Lake Algae (HLA), or *Micractinium* sp., is a green microalga isolated from Hidden Lake in the Beartooth Mountains of Montana. Hidden Lake has a uniquely high dissolved silica level of around 0.3 mM. The lipid production of both xenic (with microbiome) and axenic (without microbiome) HLA was characterized using fatty acid methyl ester (FAME) analysis and shown to be at industrially relevant levels when compared to other microalgae. The dissolved silica tolerance of xenic and axenic HLA cultures were evaluated through dose response with no obvious difference up to 2 mM Si content. Currently, experimentation is in progress to determine the optimal pH range for HLA growth at high silica levels, with acidity effecting silica solubility. Sequencing of Hidden Lake environmental samples is in progress along with diatom enrichment for future co-culture experimentation of HLA and Hidden Lake diatoms. The high silica tolerance of HLA may facilitate a productive microalgae-diatom collaboration, offering a promising boost to biofuel production.

Mason Novak

Discipline: History

Authors:
#1 Arijit Sen

Abstract Name: Researching and Disseminating the History of Community Gardens in Underserved Neighborhoods

Accounts of vacant lots in low-income, inner-city neighborhoods examine these spaces as blighted results of foreclosures and city disinvestment. “Single stories” of urban decline fail to disseminate accounts of resilience and survival in these neighborhoods. Since 2012, the Buildings-Landscapes-Cultures public humanities project at UW-Milwaukee has been disseminating counter-narratives that highlight community survival in the face of difficulty. This project examines the experience of researchers who worked with residents in the Walnut Hill Community Garden on Milwaukee’s north side from 2023-2025 to facilitate community development and engagement and collect and disseminate qualitative neighborhood data. Through long and short form interviews, ethnographic data collection, and iterative engaged processes, the research team was able to better understand the lived experience of the community. Residents led us on walks through the garden, the surrounding neighborhood, and local abandoned industrial sites. We recorded accounts of community experiences, changes residents have seen through time, and dreams residents hold for the future. We identified issues and vital knowledge that would otherwise not be available to us if we examined quantitative demographic data. We came to understand how past, present, and future are intertwined. We recorded residents’ memories of the neighborhood, what used to occupy the garden lot, and how they claimed the land back as their own. Participating in engagement and mutual aid events helped researchers form lifelong connections with the people they worked with. With community members, we designed resource products around engagement and neighborhood history, and produced asset, vision, and tenant resource guides. These encouraged a continued conversation around the garden and its role. We end with a hope that engaged and iterative research methods will continuously explore ways to give back the collected history of the neighborhoods we work with and allow undergraduate students to apply their knowledge to address real life situations.

Christian Novalski

Discipline: Computer Science

Authors:

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#2 Christian Novalski
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Abstract Name: A Weekly Project Newsletter to Engage Episodic Participants in OSS Projects

Open Source Software (OSS) projects increasingly depend on a diverse set of contributors, including episodic participants who contribute intermittently. Episodic contributors represent a large portion of OSS communities, yet projects often struggle to retain them, leading to decreased project health and continuity. While dashboards and real-time communication tools support continuously active contributors, they often fail to serve the unique needs of episodic participants, who may struggle to remain informed and re-engage with project activity after periods of absence. In this study, we examine the effect of a weekly, email-based newsletter intervention designed to improve awareness and engagement among episodic OSS contributors. We ground our approach in self-determination theory, emphasizing autonomy, competence, and relatedness as key motivational constructs. To inform the design of the Weekly Project Newsletter, we conducted a systematic literature review, followed by a think-aloud study with OSS contributors, leading to a refined newsletter that summarizes recent activity in issues, pull requests, and commits, and highlights project milestones and community interactions. We evaluate the final design of our Weekly Project Newsletter through a three-week diary study involving nine episodic contributors, analyzing how its content affected their awareness, motivation, and re-engagement patterns. Our findings show that the newsletter improves participant awareness and perceived project connection. These findings highlight how theory-driven communication tools can complement existing OSS infrastructure by supporting re-engagement and lowering the barrier to continued participation. However, its influence on OSS contribution behavior remains limited without actionable prompts or surfacing of beginner-friendly tasks.

Reagan Nsubuga

Discipline: Film/Photography Studies

Authors:

#1 Carolyne King

Abstract Name: Visualizing Inequality: The Utilization of Cinematography as Social Commentary in Parasite (2019)

This project investigates how the director Bong Joon-Ho and cinematographer Hong Kyung-pyo use cinematography in the movie Parasite (2019) as a rhetorical device to convey the central themes of the movie—namely, social inequality and class struggle. The overarching question guiding this project is: How do the filmmakers utilize compositional elements such as framing, space, lines, blocking, color, movement, and lighting to visually represent social classism and inequality? Parasite (2019) solidified its cultural impact in 2020 when it became the first non-english film to win ‘Best Picture’. Unfortunately, the true brilliance behind the film may be lost on the average, casual movie watcher who may misinterpret the movie as another “great thriller, with some hints of comedy” or recognize the surface level metaphors that point towards class struggle. The mistake in this approach is that they are overlooking the craftsmanship of visuals that gives the moments in the film power. This presentation will provide an in-depth close-reading of 8 stills from Parasite, focusing on how the visual design elements including color, lighting, and space show the way the film applies visual rhetoric to connote meaning. Analyzing these stills will allow the audience to fully comprehend how cinematography is used to show the film’s themes of social inequality and class struggle. Too often, movie

viewers engage in thematic interpretation from a surface level perspective. As a result, they are not experiencing film to the fullest, most engaging potential. By reading this visual analysis on the movie Parasite (2019) audiences can gain needed perspective needed to better understand and appreciate how films tell stories.

Allen Nunes

Discipline: Engineering

Authors:

Abstract Name: Accelerating Mission Design: Alpha-Beta Control Method Applied to Guidance and Control in Earth Re-Entry Missions

The industry standard for spacecraft atmospheric reentry is the Apollo Guidance, Navigation, and Control (GNC) system; however, this system only works well for blunt spacecraft with simple aerodynamics. As spacecraft become more complex the need to investigate other options increases. This project investigates whether the alpha-beta control method, with control of angle of attack and sideslip, can provide an updated alternative to the Apollo GNC. We examine the Alpha-Beta control system in reentry and attempt to benchmark its performance against the legacy industry standard, the Apollo (GNC) system. We predict that the ability to control the angle of attack and sideslip angle will offer an advantage compared to Apollo's control of bank angle. We have developed a full-scale 3-degree-of-freedom reentry simulator to determine the optimal guidance and control method. The simulation works by generating a reference trajectory and minimizing the distance error between it and the actual trajectory through reentry. The following assumptions are made to simplify the problem: point mass, constant mass, non-rotating planet, no thrust, drag acts in the direction opposite to velocity, lift is perpendicular to velocity, and gravity is directed along a vector from the point mass to the center of the planet. Results indicate that alpha-beta reduced distance error marginally. Error convergence plateaued on the order of 10^5 meters, well above the <20 km expectation. Analysis suggests the limitation originates from insufficient lift vector control. These findings indicate that alpha-beta alone is not a viable replacement for the Apollo GNC; however, it may serve as a complementary system if integrated with bank angle regulation. Future work includes implementing bank angle control coupled with angle of attack and sideslip, and testing various planets' atmospheres. This study showcases one of the first benchmarking attempts comparing Apollo GNC to the alpha-beta method and advances spacecraft atmospheric reentry

Jasmine Nunez

Discipline: Nursing and Public Health

Authors:

#1 Leann Laubach

Abstract Name: Language Barriers and Pediatric Pain Management

Abstract Background and Significance: In America, 22% of households speak a language other than English. This transfers easily to healthcare as the field becomes increasingly diversified. Language barriers in limited English proficiency patients (LEP) are linked to undocumented pain scores, lower analgesic use, and higher readmission rates in LEP children. Previous studies have evaluated interventions such as integrating bilingual education into nursing curriculum, integrating interpreter training and collaboration into nursing simulations, and modifying pediatric pain tools. The integration of interpreter training into nursing simulation has shown

positive results; increased confidence in communicating with LEP populations, improved empathy, cultural competence, and teamwork with interprofessional teams. Leininger's Culture Care Theory emphasizes the integral role of culture in providing effective, congruent care. Language is a major part of culture and cannot be ignored and must be included in patient care. Aim: The aim of the project is to assess students' confidence and preparedness in working with interpreters and LEP patient populations. Method: This Evidence-Based Practice project will integrate nursing training simulations to teach and prepare students to collaborate with interpreters and work with LEP pediatric patient populations, using surveys of student and interpreter feedback to determine the simulation's effectiveness. In addition to measuring pre- and post-test assessments of language and communication knowledge, interpreters will use a competency checklist, pain assessment accuracy, and self-efficacy scales. Conclusion: Pediatric Patients with LEP experience inadequate care compared to their English-proficient counterparts. Pain management is a human right deserved by all patients regardless of culture or language. In integrating interpreter training in nursing simulation practice, it is expected to increase nursing students' confidence in working with interpreters and the LEP patient population, as well as cultural competence. Keywords: Limited English Proficiency, Health Equity, Language Barriers

Aslan Nutter

Discipline: Anthropology and Archaeology

Authors:

#1 Aslan Nutter

#2 Marie Vergamini

Marie Vergamini

Abstract Name: Relationship Between *Australopithecus Afarensis* and Intermediate *A. anamensis/afarensis*

Understanding the relationship between late *Australopithecus anamensis*, intermediate *A. anamensis/afarensis*, and early extinct *Theropithecus* (~3.9 Ma) at the Woranso-Mille site in the Afar Region of Ethiopia provides insight into the environmental and ecological context preceding the emergence of *A. afarensis*. During the early to mid-Pliocene, Eastern Africa experienced a transition from humid, closed woodlands to increasingly dry, open shrub-grassland ecosystems with heightened seasonality. At Woranso-Mille, hominin fossils are comparatively rare, whereas *Theropithecus* remains are abundant. This raises the question of whether ecological interactions, particularly competition or niche partitioning between hominins and fossil cercopithecines, contributed to paleobiological changes within early *Australopithecus*. This project synthesizes peer-reviewed literature to compile morphological and paleoenvironmental data relevant to these taxa across time. Faunal assemblages from early Woranso-Mille indicate a predominance of arboreal and semi-arboreal species, with few carnivores, suggesting mosaic habitats of closed floodplain woodland adjacent to shrub-dominated grasslands. These reconstructions align with evidence that *A. anamensis* was an obligate biped primarily associated with C3 woodland resources, while stable isotope analyses of *Theropithecus* dentition indicate a heavily C4-based diet (approximately 35–40%) (Include a source). Paleoenvironmental indicators such as pollen and plant wax isotopes further document increasing aridity and expansion of C4 grasslands through time. Notably, hominin remains tend to occur near woodland margins surrounding alkaline lake systems. The combined environmental and faunal evidence suggests that climatic shifts toward more open, arid landscapes may have reduced suitable habitats for early hominins, contributing to population declines or local extirpations in the region.

Adaobi Nwatu

Discipline: Communications

Authors:

Abstract Name: Deconstructing The Bear: Reconceptualizing Masculine Archetypes & the Importance of Brotherhood

The Bear, which began airing in June 2022 on FX/Hulu, is a drama show that explores how guilt rooted in generational trauma alters one's perception of themselves, male emotional isolation and the importance of family: both found and of blood relation. Traditional depictions of brotherhood, seen in shows such as Suits, You, and The Office, depicts masculinity as a constant competition and assertion of dominance between males rather than a relationship where men can come together and talk; holding each other accountable for past mistakes, or searching for guidance from a place of understanding not judgement. In this paper, I argue that The Bear offers a more nuanced perspective that centers masculinity through the reconfiguration of community after grief. The Bear explores the relationship between legacy, family, and culinary experience, and showcases significant progress in developing media representations of masculine identities. It underscores that masculinity exists outside of oversimplified stereotypes while simultaneously humanizing men by showing the complexity of their emotional cores. This paper consists of a close textual analysis of Season 1 and Season 2 of The Bear via watching the show and reviewing transcripts of all episodes. I observe the visual storytelling and cinematography of the show in order to deconstruct the male-main character's portrayal of masculinity. I found that The Bear uses the ugly parts of what society has constructed of manhood as commentary, evolving tropes around male aggression and violent outbursts. The show takes a cognitively distant approach to these displays as demonstrations of deconstructed gender overperformance. As a means of creating representation, television enters to make masculine archetypes with which audiences can align. This show offers an alternative to the current oversaturated depiction of unhealed trauma and emotional stagnation existing in male characters, by portraying positive masculine representation that can affirm viewers.

Carey Nygaard

Discipline: Nursing and Public Health

Authors:

#1 Carey Nygaard

#2 Jiale Hu

Abstract Name: The Development of a Pre-Admission Writing Program for Incoming Nurse Anesthesia Doctoral Students

Resident registered nurse anesthetists (RRNAs) are registered nurses (RNs) enrolled in a graduate nursing program. Typically, a Doctor of Nursing Practice (DNP) or Doctor of Nurse Anesthesia Practice (DNAP) program. These programs require a higher level of academic writing skills than undergraduate programs. The goal of this project was to develop a self-directed online pre-admission writing course to improve the writing ability and self-efficacy of incoming RRNAs. A mixed-methods design was employed over two academic years, a pilot phase (2023) and a formal evaluation phase (2024). Both cohorts of RRNAs were included in the sample: 55 students from the 2023 cohort, and 61 from the 2024 cohort. The intervention consisted of an 8-week asynchronous Canvas course, grounded in adult learning theory and self-directed learning principles. The Situated Academic Writing Self-Efficacy Scale (SAWSES) and the CUNY Assessment Test in Writing (CATW) were used to assess the program's efficacy. And the program acceptability was evaluated using the Theoretical Framework of Acceptability (TFA) questionnaire. The 2024 cohort exhibited higher engagement with a 90% completion rate and consistent post-intervention gains across all SAWSES domains. The 2023 cohort achieved a 58% completion rate but showed inconsistent self-efficacy outcomes. There were measurable improvements in writing performance (CATW scores) for both cohorts, with the 2024 cohort demonstrating greater proficiency in idea development and structure than the pilot cohort. In 2023, 19 themes were identified among responses to the TFA, and in 2024, 15 were identified. In 2023, 11 themes were identified in the SAWSES pre-intervention responses and 12 in the post-intervention responses. In 2024, 12

themes were identified both pre- and post-intervention. The CATW identified 15 themes in the 2023 cohort's writing, and 22 in the 2024 cohort's. Refining the curriculum improved engagement and outcomes, suggesting that a pre-admission writing program effectively enhances RRNAs' scholarly abilities.

Annabelle Oberg

Discipline: Mathematics

Authors:

#1 Annabelle Oberg

Abstract Name: Modeling the Predictors of Childcare Availability: Evidence from St. Louis County

The availability of affordable, high-quality childcare remains a growing concern across the United States, with many communities facing persistent shortages that affect family stability and local economic growth. This project examines how demographic and economic characteristics shape the distribution of licensed childcare centers, using St. Louis County as a focused case study. St. Louis County provides an ideal setting for this analysis because it includes municipalities with substantial variation in population density, income levels, and childcare demand, allowing for meaningful comparisons across local areas. Using publicly available data from state and federal sources, the study develops a regression model to identify which county-level factors are most strongly associated with the number of licensed childcare providers. The analysis will concentrate on a core set of measurable predictors, including the number of children under age five, median household income, and indicators of the childcare workforce. Additional variables, such as the average cost of care or staff vacancy rates, may be incorporated as data availability allows. This measured approach ensures a feasible and focused model while still capturing the most influential drivers of childcare access. The findings aim to provide evidence-based insights that can inform policy recommendations to expand childcare availability. Potential applications include targeted support for providers, zoning or regulatory adjustments that reduce barriers to opening new centers, and increased public investment in early childhood infrastructure. By highlighting which community characteristics are most closely linked to childcare supply, this project contributes to a clearer understanding of how local demographics and economic conditions shape the childcare landscape and how policymakers can more effectively respond to ongoing shortages.

SueRae O'Bleness

Discipline: Political Science

Authors:

Abstract Name: In the Name of God: Christian Nationalism, Political Extremism, and the New Face of Terrorism

In the United States, Christian nationalism does not just shape politics, it discretely redraws the line between a “patriot” and a “terrorist.” This research examines how, from Donald Trump’s 2016 election through the present, Christian nationalism in the United States reshapes political extremism and what we are willing to name as “terrorism,” while tracing its roots through further histories of settler colonialism and state violence against Indigenous communities in North America. Rather than treating Christian nationalism as only a set of beliefs, I approach it as a political regime that fuses national identity, race, and power; asking how leaders and organizations define a “Christian nation” and how that language justifies increasingly extreme actions. Employing a mixed-methods research approach, I combine historical and legal analysis, media analysis, and qualitative case studies of historical events and documented acts of violence. I examine how the media,

politicians, and law enforcement label or refuse to label Christian nationalist violence as terrorism, compared with other religious or ideological violence, in the name of God. I also analyze how race, immigration, Indigenous sovereignty, and “Western civilization” narratives shape who is imagined as a terrorist, and where gaps in domestic terrorism law allow religiously coded extremism to go unnamed and/or unpunished. Using an intersectional framework, I dissect the impacts of how consistently naming Christian nationalist violence as terrorism might transform public understandings of security, democracy, and political legitimacy in the United States.

Hannah O'Brien

Discipline: Psychology

Authors:
Hyejun Kim

Abstract Name: Voices on AI: Student and Instructor Perspectives

The increasing use of Artificial Intelligence (AI) tools has transformed higher education, and research is just beginning to explore people's attitudes and usage of AI, particularly in educational settings. The purpose of this survey is to find how university students and instructors use AI in both academic and non-academic contexts. We will also measure their attitudes and comfort with AI and relationships between attitudes and use. The participants will be university students and instructors completing a survey using Qualtrics. Participants will report their role in the university (student or instructor), the frequency and tasks they use AI for (both academic/work and non-academic such as budgeting), provide open-ended responses on how they use AI, and indicate their overall attitudes to a series of statements about AI (e.g., excitement, privacy concerns, perceived impact). Survey questions have been finalized and recently approved by the Institutional Review Board (IRB). Data collection will begin in mid January. The frequency of AI usage is hypothesized to positively correlate with positive attitudes toward AI, and negatively correlate with concerns about privacy or potential educational harm. Students are expected to report higher usage and more optimistic attitudes toward AI than instructors. Patterns on how AI is used will also be summarized. These results can help provide insight into how students and instructors are adapting to the growing tool of AI. Understanding these differences can help educators integrate AI in a way that can enhance learning while maintaining academic integrity and knowledge of AI security. As AI becomes increasingly utilized in higher education settings, identifying feelings of AI use across academic roles will be critical.

Conor O'Brien

Discipline: Psychology

Authors:
#1 Jean Pretz

Abstract Name: Mindfulness does not protect against mental health concerns associated with passive social media use

Passive social media use is linked to increased anxiety and depression, fear of missing out (FOMO), and social comparison. The purposes of this study were to investigate passive social media use in relation to mental health, FOMO, and social comparison, and to examine mindfulness as a moderating variable in the relationship between passive use and mental health. The main hypothesis here is that mindfulness will moderate the positive relationship between passive social media use and mental health problems. This is

important as mindfulness could help combat the harmful mental health impacts of passive social media use, and there is little research on this topic. A correlational study was conducted with eighty-five participants who answered questions regarding their levels of anxiety, depression, FOMO, social comparison, passive social media use, and mindfulness. Results revealed that passive social media use was positively correlated to anxiety, depression, and FOMO, but negatively correlated to social comparison. Passive use was negatively correlated to mindfulness. This largely supports the hypothesis, aside from social comparison. Active social media use, in contrast, was uncorrelated with mental health and social comparison variables, though it was positively related to FOMO. Contrary to predictions, mindfulness was not a significant moderator of the relationship between passive use and anxiety, or passive use and depression. These findings suggest that mindfulness is not a sufficient buffer against mental health issues resulting from passive social media use. In contrast, active social media use was found to be unrelated to mental health concerns. Current research is in progress to explore these possible relationships using a mindfulness intervention, and results will be presented at the research conference.

doga ocal

Discipline: Psychology

Authors:
#1 Doga Ocal

Abstract Name: What Students Find Helpful About 'Psychology as a Profession': A Thematic Analysis of Career Development Reflections

Many undergraduate students struggle with making decisions relating to their majors. They report that they are not feeling confident in their knowledge of potential career paths related to their field of study. Only a small percentage of students are aware of the career services, and a smaller percentage of students actually use those services. A total of 93% of the students who are taking career-focused courses report changing their career plans. After taking these courses, students also report feeling more confident and educated about their career decisions and the opportunities available. Studies show career-exploration classes have the largest effect on career outcomes compared to other career interventions. We want to know what exactly it is that students find helpful about their career-focused course. We will conduct a thematic analysis of survey responses we got from four open-ended questions of 225 undergraduate students from a large public university, in the southeast of the United States, who were enrolled in a mandatory career-focused course (Psychology as a Profession). I hope that this analysis will allow me to identify important patterns and certain themes regarding career literacy, enhanced self-efficacy in decision-making, a more well-rounded knowledge of psychology, and overall increased knowledge/confidence in psychology careers.

Joshua Ihke Ocampo Loresca

Discipline: Interdisciplinary

Authors:

Abstract Name: Belonging Beyond Borders: Interfaith Leadership in Contested Migration Landscapes

Amid a sociopolitical climate marked by rising anti-immigrant sentiment and increasingly exclusionary policy frameworks, faith leaders continue to navigate a complex terrain where religious tradition meets civic responsibility. Operating at the intersection of faith-based practice, humanitarian response, and political resistance, rabbis, imams, priests, and other spiritual leaders have become central actors in supporting

displaced communities across the United States, providing immediate care and vital resources. This project will use storytelling, oral history, and photographic documentation to examine how interfaith leaders, particularly those in Sanctuary Cities facing heightened hostility, respond to the needs of asylum-seekers, refugees, and undocumented individuals. By engaging both community leaders and the migrant communities they serve, the project aims to illuminate stories of resilience, solidarity, and advocacy within contested political landscapes. Oral history interviews will allow narrators to share the lived experiences of populations too often marginalized in policy debates and media narratives. These testimonies will capture the everyday realities, aspirations, and challenges of displaced populations, offering a nuanced understanding of migration beyond statistics or political rhetoric. Photography will function as a complementary narrative form, building a visual archive that situates these stories within place, identity, and memory. Together, these methods will not only aim to preserve memory but also capture how interfaith networks can cultivate care, protection, and collective resistance. By documenting these intertwined narratives, the project seeks to contribute to broader dialogues on migrant justice, highlighting how future policies might be shaped by empathy, community knowledge, and the lived experiences of those most affected. Empathy, in this context, becomes an essential lens that expands policy evaluation to include dignity, safety, well-being, and long-term community impact. This project, therefore, asks: What strategies do interfaith leaders employ to cultivate practices of solidarity, care, and advocacy that reimagine belonging and reshape conversations about migration within contested political landscapes?

Paola Ochoa

Other/Institution Not Found

Discipline: Biology

Authors:

Nyx Bajaire

Omar Mendez

Abstract Name: Tolerance of Copper Treated Plants by *Pieris rapae* Caterpillars

Although agricultural practices aim to meet the requirements of our growing population, continuous agricultural activity has increased the contamination of heavy metals in the environment. The levels at which they are currently present are toxic to both the plants and the specialist herbivores that consume them. While many studies have conducted research on the effects of HM contamination on the performance of *Pieris rapae* butterflies, a common agricultural pest, few have observed the effects of HM based pesticides on such organisms. Our research focuses on the effects that copper pesticide use has on the growth and survival of *P. rapae* larvae at the 4th and 5th instars. This study was conducted using a no choice leaf experiment over 3-day periods split into small segments of 24 hour data collection sections, with a total of three 3-day experiments. The setup consisted of 2-3 *P. rapae* caterpillars placed in dishes on small *Brassica oleracea* clippings. The clippings were treated via spray with one of two solutions, at different concentrations, of Captain Jack's copper fungicide and a control with untreated (water sprayed) leaves. To measure performance in terms of growth, all caterpillars were weighed before and after each 24 hour segment, survival was recorded after every segment as well. Dead caterpillars were also measured to account for weight changes that could indicate poor survival. Our experiments found that caterpillar weight was negatively affected by the fungicide treatment, but there was no significant effect on caterpillar mortality. Future research should aim to examine and observe the behavioral plasticity of *P. rapae* caterpillars when forced into conditions at different copper pollution levels to further our understanding regarding the effects of pesticide use on ecological life.

Grace Ochs

Discipline: Chemistry

Authors:
Moiria Stanisch

Abstract Name: Analysis of Benzophenanthridine Alkaloids in Black Salve Medicinal Supplements via Liquid Chromatography-Triple Quadrupole Mass Spectrometry

Ointments and creams collectively known as black salves have been used to treat various skin conditions since the 19th century. Black salves have been promoted as alternative treatments for benign lesions such as moles and skin tags, as well as for serious conditions including skin cancer. However, despite their longstanding use, there is no scientific evidence supporting the efficacy of black salves for any dermatological condition. The FDA warns that these products can cause scarring, infection, and permanent disfigurement. Despite these risks, black salves remain widely available for purchase online. Furthermore, because black salves are marketed as supplements rather than approved medical treatments, they face limited regulatory scrutiny, and their exact chemical compositions often remain unknown. Black salve products are typically made from bloodroot (*Sanguinaria canadensis*) and contain benzophenanthridine alkaloids suspected to be the principal components responsible for tissue damage. Sanguinarine and chelerythrine, two biologically active benzophenanthridine alkaloids derived from bloodroot, are of particular interest. Liquid chromatography–mass spectrometry (LC-MS) is a powerful analytical technique suitable for characterizing these compounds. In this study, an LC–MS method using selected ion monitoring was developed to detect and quantify both sanguinarine and chelerythrine in a variety of black salve extracts. The resulting data will aid in determining the presence and concentration of these potentially toxic alkaloids in black salve supplements.

Ryan Ochterski

Discipline: Chemistry

Authors:
#1 Todd Eckroat

Abstract Name: Synthesis of 3-Hydroxylamine and 3-Hydroxyl Bis-Isatin Derivatives and the Investigation into Their Biological Activity

As people tend to live longer, the challenge with Alzheimer's Disease (AD) will only increase. Today around 55 million people worldwide suffer from the effects of AD, and the cost of providing care is around \$1 trillion. AD is characterized by brain degeneration of those afflicted, leading to loss of memory and cognitive abilities. Acetylcholinesterase (AChE) and butyrylcholinesterase (BChE) inhibitors are being looked at for the treatment of AD, which still does not have a cure. Previous work in our lab has identified bis-isatins as selective BChE inhibitors. Ongoing studies have synthesized 3-hydroxyimino bis-isatins through condensation with hydroxylamine and 3-hydroxy bis-isatins through reduction with sodium borohydride. Preliminary inhibition results show promising activity with similar selectivity, and interactions with the enzyme have been predicted using computational docking. The full results of these ongoing synthetic and inhibition studies along with results of docking will be presented and add to the growing knowledge of these isatin-based molecules.

Olivia Odell

Discipline: Art History

Authors:
#1 Olivia Odell

Abstract Name: A Comparative Study of Loki and Coyote as Cultural Tricksters

Few mythical characters more clearly reflect the good and bad aspects of human nature than Coyote from Native American folklore and Loki from Norse mythology. Both Coyote and Loki are tricksters and shapeshifters whose metamorphoses reflect the values, anxieties, and beliefs of the communities from which they originated. This study will examine how the myths surrounding Coyote and Loki shape their respective symbolic value in visual culture by examining artwork by artists who have brought these tales to life. Theodor Freund's bronze "Loki" depicts tension and intelligence, Mühlten Eskil Winge's "Loki and Sigyn" depicts divine anguish. Contemporary artwork such as Bob Haozous's "God's Favorite," Harry Fonseca's "Queer Coyote," emphasize modern interpretations of these ancient figures. These artworks show how trickster imagery continues to influence moral and cultural thought in their respective societies. A discussion of Coyote's transformational abilities will demonstrate how Native Americans perceive nature as fluid, cyclical, and intertwined with humans. Following analysis of Norse concepts of chaos, pride, and the precarious equilibrium between gods and giants will show Loki's transformations into animals like a fly, salmon, or horse. The comparative examination will demonstrate how both characters employ deceit and transformation not only to stir up trouble but to impart cultural and moral lessons about identity, power, and change.

Caleb Oderinde

Discipline: Chemistry

Authors:
#1 Leah Chase
#2 Caleb Oderinde

Abstract Name: Studying the Relationship between System xc- and Calmodulin

System xc- a protein involved in glutamate and cystine exchange across the membrane- is known to exhibit increased activity in response to oxidative stress. A preliminary proteomics screen to identify proteins that interact with System xc- demonstrated that a calcium-sensitive protein, known as calmodulin, is often found associated with the transporter. Calmodulin regulates the trafficking and activity of several protein channels and is also recognized as a key regulator of protein function during oxidative stress. Therefore, this project aims to understand the relationship between System xc- and calmodulin. Using consensus sequence analysis, we identified putative calmodulin binding sites on the N and C-terminus, and we are using site-directed mutagenesis to determine how disruption of each of these sites alters System xc- function, cellular localization, and association with calmodulin. Thus far, we have assessed K43, I16, V24, I10, and V20 and have discovered that transport activity is reduced when either I10 or V20 is mutated to glutamate. These data are particularly intriguing, as hydrophobic residues spaced 10 amino acids apart are common consensus binding sites for calmodulin, suggesting that I10 and V20 may serve as such a site on xCT. Moreover, we have examined the calcium sensitivity of System xc- given that calmodulin often binds in a calcium-dependent manner. We have observed that when calcium is included in the extracellular solution, System xc- activity increases relative to that when calcium is not included in the extracellular solution. We are currently determining whether the presence of calcium impacts the association of System xc- and calmodulin in vivo. Once completed, this study will unveil potential novel mechanisms by which System xc- is regulated during times of oxidative stress.

Discipline: Psychology

Authors:

#1 Jelynna Horsey

#2 Sophia Rankin

#3 Erin Worgan

#4 Meghan Farrar

Abstract Name: Interaction Between Geographic Location, Alcohol Use, and Depression/Anxiety/Stress in College Students.

Geographic location has been shown to influence mental health, with individuals in rural areas experiencing poorer mental health than those in urban areas. Adolescents in rural communities are more likely to meet criteria for alcohol use disorder. Several factors could explain this such as familial influence, geographic isolation, and limited recreational activities. Potential risk factors of rurality are known. However, there is a significant lack of research on the effects of rurality on college students. Many studies have examined alcohol use in college populations. However, many of them do not specify rural vs urban campus location as a variable. This research seeks to contribute to limited literature on alcohol use and rates of anxiety/depression/stress college students who live in rural areas may face. A community sample of college students from a Maryland university will be asked questions regarding the geographic location they have spent the most time in, alcohol abuse, depression, anxiety, and stress in an online survey. Students will also be questioned about family and personal history of mental health. T-tests with Bonferroni corrections will be used to evaluate the mean differences in these two related outcomes for our two regional categories. We expect higher rates of alcohol use and lower rates of formal mental health diagnoses in people from rural environments compared to those in urban environments. However, we do not anticipate significant differences in rates of depression, anxiety, and stress levels among these two groups.

Daevin Oey

Discipline: Engineering

Authors:

#1 Yuichi Motai

#2 Alper Bozkurt

Abstract Name: Integrating Hardware Fabrication and Visuomotor Policy Learning for Robotic Manipulation

Recent advances in learned robotic manipulation have demonstrated impressive capabilities in industrial, healthcare, and defense domains. However, applications in these domains usually require expensive hardware inaccessible to most researchers. In this work, we address this gap by demonstrating that effective control policies can be trained and deployed on hardware fabricated with accessible university resources, enabling broader access to robot learning research. We develop an end-to-end pipeline for autonomous robotic manipulation, integrating hardware fabrication, hardware-software integration, and machine learning to train visuomotor policies directly from human demonstrations on low cost open-source hardware and software. Our setup uses SO-101 robotic arms with a 6-DOF design, printed using makerspace facilities and assembled with twelve STS3215 servo motors, motor controllers, and power distribution systems sourced through the university resources. In our pipeline, motor controller boards manage servo motor control through position commands and encoder feedback via UART serial communication. A leader-follower teleoperation configuration captures demonstrations by synchronizing joint trajectories with RGB image sequences. The software architecture employs a machine learning framework based on LeRobot and d3rlpy to predict future

joint targets conditioned on visual and proprioceptive input. The demonstrations are processed into datasets and used to train policies via offline reinforcement learning on an NVIDIA T4 GPU, which are subsequently deployed for real-time control on consumer-grade hardware. Evaluation focuses on household manipulation tasks such as pick-and-place, with expected results demonstrating reliable task completion despite hardware cost constraints. Future work will use and integrate NVIDIA Isaac Lab for sim-to-real transfer, leveraging offline-to-online reinforcement learning for adaptive policy selection. This pipeline enables rapid prototyping of learned control policies for application-specific hardware configurations.

Foster Ofosuhenne

Discipline: Biochemistry

Authors:

#1 Nurashau Blount

#2 Shelby Foulks Foulks

#3 Kenneth Austin

#4 Graham Chakafana

Abstract Name: Biochemical and Biophysical Characterization of *Neisseria gonorrhoeae* Nucleoside Diphosphate Kinase (NDPK)

Neisseria gonorrhoeae, the causative agent of gonorrhea, poses a growing global health threat due to the rapid emergence of antimicrobial resistance (AMR). Novel therapeutic strategies are urgently needed to combat this pathogen. Nucleoside diphosphate kinase (NDPK) from *N. gonorrhoeae* (NgNDPK) represents a promising drug target because it catalyzes a key step in the nucleotide salvage pathway, which is essential for bacterial survival. NDPKs maintain cellular nucleotide homeostasis by transferring γ -phosphate groups from nucleoside triphosphates to diphosphates via a phospho-histidine intermediate. Despite previous characterization in model organisms, the structural and functional features of NDPKs from pathogenic bacteria remain poorly understood. Here, we report the structural and biochemical characterization of NgNDPK. The crystal structure reveals a tetrameric assembly, with each subunit adopting the canonical α/β -sandwich fold composed of a central four-stranded antiparallel β -sheet ($\beta 1$ - $\beta 4$) flanked by α -helices. In contrast, human NDPKs typically form hexamers. Sequence analysis identified key differences between NgNDPK and human NDPK isoforms, particularly within the catalytic kpn-motif involved in substrate binding and phosphoryl transfer. These findings provide new insight into the architecture and potential regulatory mechanisms of NgNDPK and establish a foundation for structure-guided inhibitor design targeting this essential enzyme in *N. gonorrhoeae*.

Andrew Ogbeide

Discipline: Political Science

Authors:

#1 Andrew Ogbeide

Abstract Name: Profits Over Public Health: Tobacco Industry Influence on Scientific Evidence and Regulation

The tobacco industry spends tens of millions each year lobbying the federal government, even as tobacco-related diseases cost the U.S. hundreds of billions in healthcare spending. This imbalance shows how corporations use economic power to shape policies that protect profits over public health. Sam Kean's *The*

Icepick Surgeon illustrates how similar patterns recur throughout history: institutions have often used scientific language to justify harm while defending their own interests. Although scholars have examined lobbying expenditures and regulatory capture, we still lack a clear understanding of how tobacco companies coordinate economic influence with manufactured scientific doubt to manipulate policy outcomes. Our research investigates how tobacco corporations use lobbying expenditures, revolving-door employment, and industry-funded research to influence policy decisions. We connect these strategies to the dynamics Kean describes, where scientific authority becomes a tool for maintaining power. Our literature search draws on databases such as JSTOR and policy documents and campaign finance records from federal government websites. Key search terms included “tobacco lobbying,” “regulatory capture,” “corporate influence,” and “policy manipulation.” Our analysis identifies three strategies companies use to shape policy. First, directing political contributions toward legislators on health committees to obstruct restrictive regulations. Second, funding research that creates uncertainty about tobacco’s harms, weakening scientific consensus and delaying public health protections. Third, cultivating insider relationships through revolving-door hiring, recruiting former regulators as lobbyists to shape rulemaking from within. Across these tactics, the industry frames regulation as an economic threat rather than a public health necessity, echoing Kean’s accounts of institutions that use authority and strategic messaging to shield harmful practices. At the same time, grassroots advocacy and evidence-based policy initiatives are pushing back. Understanding these strategies shows how economic power enables systemic manipulation and informs potential reforms such as campaign finance regulation, limits on revolving-door employment, and independent research funding.

Annointing Ogbewekon

Discipline: Biology

Authors:

#1 Annointing Ogbewekon

#2 Zachary Kipp

#3 Dr. Terry Hinds

Abstract Name: The Bioconversion of Bilirubin to Urobilin as a Potential Driver of Colorectal Cancer

Colorectal cancer is the third most diagnosed form of cancer in the world with 1.5 million new diagnoses and 800,000 deaths every year. Bilirubin is a product of heme metabolism with antioxidant and hormonal properties which is excreted as conjugated bilirubin. Within the gut microbiota, conjugated bilirubin is converted to urobilin which currently has no known physiological functions. Bilirubin has been negatively associated with all forms of cancer except colorectal cancer while urobilin is an important biomarker for the diseases. The goal of our research was to investigate the effects of bilirubin and its derivative compounds on cancer cell proliferation and metastasis pathways. We hypothesized that bioconversion of bilirubin to urobilin is correlated with colorectal cancer risk. We treated Caco2 colorectal adenocarcinoma cells with DMSO as the vehicle bilirubin, conjugated bilirubin and urobilin. We determined cell viability and proliferation using growth assay and cell migration using the scratch assay. We discovered that urobilin and conjugated bilirubin increased cell migration but not proliferation while bilirubin reduced both. In conclusion, these results suggest that the conversion of bilirubin to urobilin in the colon may be a driving factor for colorectal cancer progression and more studies are needed to better understand their mechanisms.

David Ogunbanjo

Discipline: Computer Science

Authors:

#1 Hoyeon Kim

Abstract Name: Analytical Study of Machine Learning Models for the Detection of Potholes

The goal of this research is to evaluate the reliability of machine learning models in image-based pothole detection. Using Ultralytics YOLOv11 (You Only Look Once), a real-time object detection model optimized for both accuracy and speed, multiple models were developed and analyzed under varying environmental conditions. The study focuses on understanding how factors such as lighting, weather, and camera quality affect detection performance. To test these conditions, individual models were trained on datasets representing day, night, and rainy environments, as well as a combined dataset encompassing all three. A major challenge identified was the occurrence of false positives, instances where the model detects a pothole that does not exist. This issue poses a significant concern for real-world deployment, as misidentifications could trigger unnecessary alerts or responses in safety-critical systems such as autonomous vehicles. To ensure robust experimentation, models were trained using a high-performance computing setup featuring an NVIDIA GeForce RTX 2060 GPU, Intel® Core™ i9-14900K processor, 128 GB of memory, and 2 TB of storage, achieving maximum training efficiency with sessions averaging 27 hours. Two primary optimization techniques were applied: optimal loss weighting (adjusting weight distribution to improve generalization) and hyperparameter tuning (refining model parameters for performance stability). Results indicate that balanced loss weighting enhanced the model's ability to understand entire scenes beyond simple bounding boxes, while momentum tuning led to smoother and faster convergence. Adjusting confidence thresholds also reduced false positives with only a minor decrease in recall. This analytical study highlights how tuning strategies can improve reliability and performance in pothole detection models, contributing to safer and more trustworthy intelligent transportation systems.

Ayomide Ogunlana

Discipline: Engineering

Authors:

#1 Ayomide Ogunlana

#2 Leah Spangler

Abstract Name: Socio-Environmental Life Cycle Assessment on Vanadium Production

This project examines the effects that Vanadium Oxide (V_2O_5) producing mines have on the surrounding environment and nearby communities. This will be done through a Life Cycle Analysis (LCA) of mineral production. These analyses are typically conducted from cradle to grave, meaning the analysis encompasses the collection, production, and distribution processes. However, this project will primarily focus on the collection and production portions of the LCA. The socio-environmental ramifications of Vanadium mines were quantified using historical databases of mines operating from as early as 1900 to 2014. Process pathways were examined based on metrics designed to determine which techniques of ore extraction are the most environmentally friendly. Emissions such as wastewater, noxious gases (CO_2 , HCl , SO_2), water depletion, solid waste, airborne dust, and others were taken into consideration. Using a combination of these inputs and metrics, we then constructed process flow diagrams outlining the inputs and outputs associated with each pathway of Vanadium Oxide extraction. Techniques such as sodium roasting, calcium roasting, and sub-molten salt processing were evaluated, and through this examination we identified the pathways that are most environmentally sustainable while still remaining cost and energy efficient. In essence, this Vanadium LCA can be used to encourage large corporations to employ safer practices that cause the least amount of harm, as the demand for V_2O_5 rises, so too should efforts to optimize these processes for the planet and for the local communities who bear the environmental consequences.

Jesus Ojeda

Discipline: Computer Science

Authors:

#1 Jesus Ojeda

Abstract Name: Learning vs. Logic: A Comparative Analysis of Deep Reinforcement Learning and Heuristic Pathfinding

As AI becomes a more commonly used tool among businesses, social media, creative fields, and various other networks, understanding the optimal algorithms for specific environments becomes equally important. This research investigates the efficacy of “learning-based” approaches and traditional “heuristic-based” pathfinding. This study will utilize the OpenAI gymnasium library to simulate the classic game “Snake”, providing a standardized environment for testing AI agent adaptability in a stable environment. We will implement and compare three different algorithms: The Deep Q-Network (DQN) algorithm, a reinforcement based learning algorithm implemented by using Python and PyTorch; the A-Star search algorithm based on mathematics, and the greedy best first search algorithm, a heuristic approach that prioritizes speed and simulates human “naive” behavior. The algorithms will be evaluated based on the AI agent's ability to achieve a high score, how long it can survive, and the overall efficiency. We hypothesize that the A-Star algorithm should have consistent high scores thanks to its mathematical approach, the DQN algorithm will start weaker than the “heuristic-based” approach but will eventually outperform it thanks to its learning capabilities. Based on this we can reason that the greedy algorithm will serve as a baseline for lower performance. This project ultimately aims to conduct research on modern machine learning using classical computer science theory in the form of algorithms.

Ruth Okorley

Discipline: Nursing and Public Health

Authors:

#1 Ruth Okorley

#2 Michael Behring

Abstract Name: Biological, Social, and Environmental Determinants of Allostatic Load in Black Woman.

This project examines how biological, social, and structural-environmental stressors shape the long-term health of Black women. The central aim of this research is to identify novel markers of health disparity within this population, using allostatic load as a key outcome measure. Allostatic load captures the cumulative physiological burden produced by chronic stress and has become an essential lens through which to understand racialized health inequities. Black women in the United States experience accelerated health deterioration, often described as weathering, driven by socio-economic pressures, behavioral demands, and persistent structural inequalities. This phenomenon has been linked to elevated mortality, pregnancy complications, and disability. While Black and Latina women consistently demonstrate the highest allostatic load scores, the mechanisms behind these disparities remain insufficiently understood. Daily stress exposure, neighborhood conditions, and environmental toxicity may jointly shape these outcomes, yet their interplay requires deeper investigation. To explore these relationships, we conducted a cross-sectional analysis using data from the National Health and Nutrition Examination Survey, a nationally representative sample. Allostatic load scores were calculated from individuals in the highest-risk quartile for pulse, C-reactive protein, urine albumin, glycohemoglobin, systolic and diastolic blood pressure, total cholesterol, and high-density lipoprotein. Demographic, laboratory, and examination variables were assessed for associations with elevated allostatic load. Sub-analyses were performed by sex and race/ethnicity, and associations were evaluated using Spearman's rank-order correlation with adjustment for multiple comparisons. Initial results

confirmed marked disparities in allostatic burden across sex and racial/ethnic groups. Significant positive correlations emerged between allostatic load and exposure biomarkers of blood lead and cadmium. We hypothesize that these relationships may be modified by sex and race/ethnicity. These findings highlight the importance of integrating biological, environmental, and social determinants when studying chronic stress. Understanding these interactions can inform effective public health strategies and interventions that reduce disparities among vulnerable communities.

faith oladoyin

Discipline: Nursing and Public Health

Authors:

#1 Corrine Williams

Abstract Name: Racial Differences in the Relationship Between Maternal Smoking, Cesarean Delivery, and NICU admission.

Maternal smoking during pregnancy stays consistent as a preventable risk factor associated with negative neonatal outcomes, yet racial disparities concerning these outcomes still persist. This study examines whether maternal smoking during pregnancy is associated with admission into the neonatal intensive care unit (NICU), and whether cesarean delivery is a mediator in this relationship. This study will focus on the differences between non-hispanic black women, and non-hispanic white women. 2024 national birth certificate data will be used to evaluate the associations, including live, singleton births from non-Hispanic Black and White women. Multifetal pregnancies, other racial/ethnic groups will be excluded. Key variables include any smoking during pregnancy (primary; trimester specific smoking (secondary) as exposure, cesarean delivery (planned/unplanned/emergency) as mediator, NICU admission (YES/NO) as outcome, and maternal age, education, pre-pregnancy BMI, etc as some major confounders. This project's aim is to evaluate the direction and strength of the association between NICU admission and smoking to establish whether the mode of delivery somewhat explains this relationship. In conjunction, this study examines whether these associations present key differences between non-Hispanic Black and non-Hispanic White women, contributing to an in-depth understanding of racial disparities in infant and maternal health outcomes. This research is in progress. My role includes designing the study, selecting variables, refining the research question with the guidance of a research professor, examining birth certificate data, and developing the framework of a research article. By defining whether cesarean delivery acts as a mediation, this study may assist to inform clinic decision making and strategies in public health aimed at lowering NICU admissions while addressing racial disparities concerning perinatal care. Overall, the findings of this study may help improve maternal and infant outcomes across diverse populations with targeted interventions.

Ruth Olawumi

Discipline: Environmental Science and Sustainability

Authors:

#1 Alexia Menezes

#2 Patricia Delgado

#3 Jason Davison

Abstract Name: Assessing the Presence of Microplastics in Jug Bay

In recent years, the presence of microplastics in marine environments is becoming an area of increased

environmental concern. Aquatic habitats act as a final sink for the improper disposal of plastic waste. The conditions of these environments easily degrade plastics and transport them to large bodies of water that support life around the globe. As the size of microplastics decreases, their toxicity, likelihood of being consumed increase, and ability to absorb contaminants increases. The Patuxent River, which provides drinking water to thousands of Maryland residents and acts as shelter to a variety of aquatic and terrestrial species, suffers from this issue as well. However, there are significant gaps in knowledge around the concentrations of microplastics in this river. This project explores 2 methods of analyzing microplastics in Jug Bay, a tidal estuary along the Patuxent River.

Precious Olayinka

Discipline: Social Work and Human Services

Authors:

#1 Precious Olayinka

Abstract Name: The Literacy Divide: A Global Literature Review of K–8 Reading Performance During COVID-19 School Closures

The COVID-19 pandemic led to prolonged school closures, raising concerns about reading outcomes among K-8th-grade students. This review investigates international and U.S. research on how socioeconomic status, marginalization, and teacher preparedness affected student academic reading performance during closures. Eleven peer-reviewed longitudinal, mixed-methods, and cross-cohort peer-reviewed studies published between 2020 and 2024 were analyzed. Lower socioeconomic status students consistently showed larger discrepancies in academic reading scores, marginalized communities experienced exacerbated learning losses, and teacher readiness notably improved by the second set of COVID-19 school closures. These findings underscore the need for programs and initiatives that target technology access, differentiated teacher training, and policy interventions to decrease the marginalization of communities in order to avoid reading gaps and variables caused by socioeconomic status.

Elizabeth Oldham

Discipline: Exercise Science and Nutrition

Authors:

#1 Elizabeth Oldham

#2 Reyes Salazar

#3 David Aguilar

Reyes Salazar

Abstract Name: Prolonged Endurance Exercise Enhances Insulin Sensitivity and Alters Adiponectin During Recovery

Purpose/Hypothesis This study examined how marathon running affects circulating adiponectin and insulin, two hormones involved in lipid metabolism and glucose regulation. Adiponectin promotes fatty acid oxidation and increases insulin sensitivity, while insulin regulates glucose uptake and storage. Understanding how these hormones respond to prolonged endurance exercise can provide insight into post-exercise metabolic recovery. We hypothesize that insulin will show an immediate reduction after the marathon, while adiponectin will increase during the recovery period. **Methodology** Thirty adults participating in the 2024 Ogden Marathon were recruited. Blood samples were collected at three time points: (1) before the race

baseline, (2) immediately after finishing the race, and (3) 48 hours post-race. Plasma was analyzed using a Luminex® MAGPIX® immunoassay to quantify adiponectin (ng/mL) and insulin (pmol/L). A repeated measures ANOVA with least significant difference pairwise comparisons evaluated changes over time. Results Insulin levels decreased significantly from pre-race ($M = 81.14$ pmol/L) to immediately post-race ($M = 25.93$ pmol/L, $p < .001$) and remained lower at 48 hours ($M = 33.70$ pmol/L, $p < .001$ vs. pre-race), with no significant difference between post-race and 48-hour insulin ($p = .178$). Adiponectin did not significantly change immediately post-race ($M = 2368.48$ to 2847.77 ng/mL, $p = .093$), but increased significantly at 48 hours ($M = 4583.96$ ng/mL, $p < .001$). Conclusion Insulin decreased sharply after the marathon and remained low during recovery, while adiponectin increased later at 48 hours. This pattern suggests that marathon running induces a prolonged shift toward greater insulin sensitivity and enhanced lipid utilization during the post-exercise recovery period.

Rafaela Oliveira

Discipline: Health and Human Development

Authors:

#1 Eshita Kadiri

#2 Amanda Serapiglia

#3 Nikhil Panicker

Abstract Name: Investigating Mechanistic Consequences of GSDMD Assembly at Mitochondria in Models of Alpha-Synucleinopathies

Parkinson's disease (PD) is a prevalent neurodegenerative disorder characterized by the accumulation of misfolded alpha-synuclein (α -syn) and chronic neuroinflammation. One pathway implicated in this neuroinflammatory response involves Gasdermin D (GSDMD), a key effector downstream of the NLRP3 inflammasome, which is cleaved upon activation and forms pores in the membrane that facilitate the release of inflammatory cytokines. In macrophages, cleaved GSDMD has been shown to localize to mitochondria, forming pores that lead to mitochondrial DNA release and activation of the cGAS/STING pathway. However, this mechanism has not yet been investigated in microglia, the brain's resident immune cells. This project aims to determine whether GSDMD contributes to mitochondrial dysfunction and neuroinflammation in microglia. To examine inflammasome activation, microglial cells from wild-type and Caspase-1 knockout mice have been treated with LPS and LPS combined with ATP at different time points. Western blotting was used to assess inflammasome activation by detecting markers such as NLRP3 and GSDMD. DNA leakage assays, including qPCR, were used to quantify cytosolic mitochondrial DNA. Moreover, to model PD-relevant conditions, primary microglial cells from wild-type and GSDMD knockout mice were treated with α -syn preformed fibrils. The hypothesis states that knocking out GSDMD will prevent pore formation in the mitochondria, thereby decreasing mitochondrial DNA leakage and activation of the cGAS/STING pathway. These findings would support a mechanistic link between GSDMD-mediated mitochondrial damage and neuroinflammation in PD. By clarifying GSDMD's role in microglial immune signaling, this project aims to address critical gaps in the understanding of PD pathogenesis and inform future therapeutic strategies targeting neuroinflammation in alpha-synucleinopathies.

Jasmine Oliver

Discipline: Geography/Geology

Authors:

#1 Colleen Hammelman

Abstract Name: Placemaking Narratives in Food Halls

Today, in cities across the US, it is possible to walk into an old industrial building and order a fusion meal accompanied by entertainment, showcasing the gastronomy of urban restructuring. Using secondary data and literature review, we aim to explore how food halls rely on adaptive reuse and market themselves to contribute to developing contemporary cities. We created a database of all 360 operational food halls in the U.S and searched for patterns such as how many food halls serve immigrant foods, reside in reused spaces, and have small or local businesses under their roof. We then analyzed these characteristics to identify patterns in how food halls aim to integrate themselves into the urban fabric and cater to the experience economy, wherein memories outperform individual services. To better understand these patterns, we turned to the literature on food halls to examine how reusing buildings influences modern attitudes toward sustainable practices within architecture and food systems. By integrating the food halls database with existing literature, we found that food halls showcase changing consumer attitudes regarding land use and historical preservation. Food halls market themselves through ideals of sustainability, ethnic variety, and cultural significance, reflecting changes in urban redevelopment that demonstrate a consumer society valuing these ideals.

Thalia Oliveros

Discipline: Biochemistry

Authors:

#1 Herene Saint-Clair

#2 Mustapha Olatunji

#3 Jeanpierre Fuente

#4 Yuan Liu

Abstract Name: Manganese induces oxidative RNA damage on R-loops of a long noncoding RNA in human cancer cells

Manganese (Mn^{2+}) is an essential trace metal for human life. However, a high level of exposure to Mn^{2+} can cause oxidative stress, DNA damage, and mutations, leading to neurodegenerative diseases and cancer. We have recently found that the gene transcription intermediate R-loops form hotspots of DNA and RNA damage. We further hypothesize that high level of Mn^{2+} can damage RNA and DNA on R-loops, thereby compromising RNA-guided DNA base damage repair. To test this hypothesis, we determined if a high level of Mn^{2+} can induce oxidative RNA damage on the R-loops of the long noncoding RNA gene MALAT1 in human kidney cancer cells without or with the deficiency of human translesion DNA polymerase pol η . The results showed that pol η gene knockout significantly increased the amount and frequency of RNA strand breaks and abasic sites on MALAT1 R-loops, indicating that pol η plays a crucial role in maintaining RNA integrity. We further demonstrated that 500 μM Mn^{2+} induced RNA base damage hotspots which are predominantly located on As and Us on MALAT1 R-loops. Our study provides the first evidence of Mn^{2+} -induced RNA damage on R-loops, opening a new avenue to reveal Mn^{2+} -induced genome instability in causing human neurodegenerative diseases and cancer via oxidative RNA damage.

Emily Olson

Discipline: Chemistry

Authors:

#1 Katy Hosbein

#2 Amy Phelps

Abstract Name: Understanding Student Thought Processes in General Chemistry and Introductory Physics

Introductory chemistry and physics are foundational to building students' knowledge and problem-solving skills that they will use throughout their time in college. However, students often struggle to apply their conceptual knowledge and mathematical skills to problems. As such, there appears to be a disconnect between what students know about content and how they solve problems. This project aims to help clarify this disconnect in knowledge and application. To do this, think aloud interviews were conducted with students where students worked through problems while explaining each step in their thought process. Questions were formulated from sources such as the Group Assessment of Logical Thinking, the Force Concept Inventory, and chemistry textbooks. Students were asked questions for both chemistry and physics topics, and introductory students and upper division students were both interviewed with the same set of questions. These interviews were then analyzed to determine the method that students think through the problem, specifically in terms of pattern recognition and proportional reasoning. These results will then hopefully be formulated into a plan that can be used by professors to adjust teaching strategies to increase student success. Future work will also aim to connect these results to common misconceptions that students have in these classes.

Discipline: Interdisciplinary

Authors:

Mais Aljambi

Khalid Alismaeel

Abstract Name: SentimentVoice Korea

“SentimentVoice” is an ongoing series of immersive work exploring emotions and immigrant voices across cultures. The original project presents stories in the U.S. context, while “SentimentVoice Korea” adapts the concept to marriage migrant women in Korea and their experiences, expanding the dialogue through a different cultural lens. We want to focus on how emotions that technology fails to capture—complex, contradictory, and lingering outside of language—are marginalized. Interviewees reconstruct the emotional shifts they have experienced within Korean society in their own words, offering testimonies of how culturally specific emotional codes—such as *han* and *jeong*—have been received and internalized in their lives. These narratives move beyond individual stories to function as an emotional lens, revealing how Korean society constructs and maintains “othered emotions.”

Aidan O'Mara

Discipline: Biochemistry

Authors:

#1 Michael G. Nichols

Alex Chen

Jinann Shoshara

Abstract Name: Using NADH-phasor FLIM to Monitor Changes in Mitochondrial Metabolism of Squamous Cell Carcinoma Cultured in Atmospheric and Hypoxic Environments and Differing HER2 Expression Levels

Squamous cell carcinoma (SCC) is an aggressive form of skin cancer and is among the most commonly treated cancers in the United States, with millions of patients being treated for SCC annually. While highly effective, current methods of diagnosing SCC are invasive and cannot monitor long-term changes in cellular metabolism. Our group investigated the use of an all-optical non-invasive method to simultaneously monitor changes in cellular metabolism and collagen in the extracellular matrix. To assess metabolic changes, we measured the levels of free and protein-bound NADH in cancerous cells using Phasor Fluorescence Lifetime Imaging Microscopy (FLIM). Critically, our group investigated changes in the metabolism of cells grown at atmospheric and hypoxic O₂ levels, as many cancerous tumors proliferate in hypoxic environments. Metabolism of SCC grown at atmospheric and hypoxic O₂ levels was investigated in conditions with and without glucose, and in the presence of electron transport chain (ETC) uncoupling and inhibition. We found that cells grown in hypoxic conditions shift from aerobic to anaerobic metabolism and rely less on the ETC. Our group was also interested in the expression of HER2 in SCC cells, a protein responsible for cell cycle regulation that is often overactive in cancerous cells. We quantified relative HER2 expression of cells grown at low and high O₂ and measured mitochondrial metabolism via NADH-phasor FLIM in the presence or absence of the HER2 inhibitor AG825. We found in SCC that the fraction of protein-bound NADH was higher in the absence of glucose, decreased in the presence of ETC inhibitors, and decreased when cells were exposed to AG825. We can conclude that NADH-phasor FLIM is an effective way to detect SCC based on changes in cellular mitochondrial metabolism.

Kiara O'Neal

Discipline: Engineering

Authors:
#1 Da Hu

Abstract Name: Automated Post-Disaster Building Damage Assessment Using Drone Imagery and Deep Learning

Natural disasters such as hurricanes, tornadoes, and earthquakes can cause widespread structural damage, posing immediate safety hazards, and complicating recovery efforts. Timely and accurate damage assessment is critical for guiding emergency response, allocating resources, and planning reconstruction. However, traditional assessment methods often rely on manual inspections, which can be slow, labor-intensive, and potentially dangerous for inspectors operating in unstable environments. This project aims to develop an automated system for post-disaster building damage assessment using aerial imagery collected by drone combined with advanced deep learning techniques. The system will be capable of processing high-resolution images to identify and categorize damage levels rapidly and consistently, enabling faster and more informed decision-making for emergency managers and government agencies. Data was collected using drones equipped with high resolution cameras that have captured aerial imagery of buildings in post disaster environments. These images will be hand segmented to classify the different types of structural damage (e.g, no damage, minor damage, major damage, destroyed). A state-of-the-art deep learning model will then be trained to recognize and classify the verifying degrees of structural damage. The trained models will be incorporated into a prototype application that can automatically process drone imagery and generate visual and numerical damage reports. The system will be evaluated using datasets and, where possible, real-world disaster imagery. By automating the building damage assessment process, this project has the potential to significantly reduce the time required to assess disaster impacts, minimize risks to human inspectors, and improve the overall effectiveness of disaster response. Beyond emergency management, the technology could also be applied to routine infrastructure monitoring and resilience planning, making it a valuable contribution to the fields of civil engineering, computer vision, and disaster management.

Lou O'Neil

Discipline: Visual Arts

Authors:

Abstract Name: Wear Is Your Hunger?

I aim to explore the line between animal and human in terms of emotional expression, value, and personal relationships. My argument is that we are animals at heart; it is not us vs them but instead we. I would like to have three models that each represent a different animal and slowly they fall into madness, fear, shame and go against each other instead of the common enemy- the hunter. The hunter is played by the camera, you never see this character, you only experience the scenes through their 'eyes'. The five final images will each depict an emotion along the journey of being hunted. Starting with docile transitioning into fear as the subject starts to become aware of the hunter, madness as the subject cannot find the source of their fear and starts to turn on its brethren/self, violence against the self as the madness sets in, and the finale is shame. The shots will alternate between far away shots and close ups. Docile- far, fear- close, madness- far, violence- close, shame- far. To complete my vision for the preliminary shoot, I worked with my model who is a dancer to determine

the body language that would convey each emotion best. Through my knowledge of photography and art, defining space, color use, and lighting, and her knowledge of dance, conveying emotions to an audience and body movement, I was able to articulate the concepts I had worked hard to put into words. This shoot was successful at seeing how audiences would perceive the work and figuring out how to better the images for the final shoot. For this shoot I only was able to use one model but plan to extend the shoot with other models, props, and lighting.

Lou ONeil

Discipline: Visual Arts

Authors:

Abstract Name: The Intimacy of an Overcrowded Table

Though a dinner table is an inanimate object, it is too a place for individuals to come together to become a collective. Conversation flows around the table, alliances form and deconstruct as topics change, but there is a group mindset of being together in this place at this time, to listen and tell all at once. It can become a saving grace, a foundation of comfort, an atmosphere of home. I grew up having very individual relationships with my parents and not an encompassing family dynamic. This changed when I started being included in family dinners at my partner's house. At first, I felt uncomfortable with the idea of being trapped at a table with a group of people I felt I did not belong too. But every time I was told 'there is always enough room for you'. The sculpture is multimedia, a mix of woodwork, plaster, and 3D printing. The choice of the piece being primarily white is to convey the idea that these items are inanimate and do not hold the life and promise that the figures who would sit around these objects would. The mirror paper is to take place of shadow that the base of the piece resides on, which creates the shape of a house. The table, cutlery, and chairs are 3D printed to create a uniform and lifeless feel. The red thread symbolizes the conversation flow around the table as well as the connection binding them together. The table is merely an item, a tool, that can be utilized by people if they so choose. The people (absent intentionally in the piece) are what create the life; their conversations and jokes, anger and sorrow, these are what bring life. Through this sculpture I found my artistic voice. a

Christian O'Neill

Discipline: History

Authors:

Abstract Name: Ukrainian Resistance in the Face of Russification: Nestor Makhno and Anarchism

In 1917, the Russian state saw great political change as the communist Bolshevik party replaced the traditional monarchy. The ensuing Civil War, which lasted from 1918 to 1922, saw the Bolsheviks attempt to gain control over the territories that made up the former Russian empire. Their efforts towards the incorporation and assimilation of other non-Russians is known as "Russification." The Bolsheviks faced numerous opponents and resistance movements, including the Makhno movement, or Makhnovshchina, that emerged in Ukraine in 1917. This research is on Nestor Makhno, the prominent leader of the Makhnovshchina. Makhnovshchina was a major Ukrainian anarchist movement that combatted Soviet oppression and Bolshevik rule at the turn of the twentieth century. Makhno used anarcho-communist principles to resist—both actively and passively—Soviet attempts to control the Ukrainian territory and suppress Ukrainian culture. Besides violence, the movement's focus on Ukrainian literacy and education,

anarchist ideology, peasant desires for political and economic autonomy, and the dissemination of anti-Bolshevik literature served as forms of resistance against Bolshevik Russification. This research examines the complex impact of Russification policies in Ukraine, contributing to a better understanding of how Soviet policies functioned and how Soviet authorities dealt with the local Ukrainian population. A study of the Makhnovshchina is especially significant today, as there is a destructive war currently unfolding between Russia and Ukraine that features a similar assimilation policy from the current Russian government as the one used by the Soviets toward Ukraine from 1917-1921. This analysis uses primary accounts derived from members, associates, and witnesses of the Makhnovshchina, such as Peter Arshinov's History of the Makhnovist Movement and several leaflets produced by the Makhnovists. This work also uses secondary sources that discuss other aspects of the movement, such as its exceptional use of violence and the peculiarity of its political ideology.

Ricardo Onescar

Discipline: Business

Authors:

#1 Ricardo Onescar

Abstract Name: Gendered Perceptions of Gene Editing: A Survey of Public Comfort with Somatic vs. Germline Gene Editing

The modernization of medical science has led to innovative biomedical procedures addressing persistent health conditions. With the introduction of CRISPR technology, gene editing has become possible; however, its implementation has led to controversy. To better understand the public's perception of gene editing, I distributed an 18-question survey through REP Data, receiving 417 total responses. Analysis of the results revealed clear gender differences in comfort levels toward various gene-editing applications. Males were more likely to endorse germline¹ editing for serious disease prevention (45.4% male vs. 31.0% female), a difference found to be statistically significant at the 0.01% level. In contrast, females demonstrated substantially higher uncertainty toward germline interventions (25.2% female vs. 6.3% male), suggesting heightened ethical caution surrounding genetic modifications passed to future generations. However, this hesitancy diminishes when the focus shifts to somatic² gene editing. A majority of female respondents (51.9%) supported somatic editing for serious disease prevention, indicating greater acceptance when genetic modifications affect only the treated individual rather than offspring. These patterns suggest that female reservations toward germline editing may be shaped by deeper associations with maternal identity and nurturing roles, reinforcing concerns about protecting potential children and maintaining natural developmental processes. This gender divergence highlights the importance of understanding how ethical perspectives informed by social and biological roles influence public acceptance of emerging biotechnologies. 1: Inheritable changes to the DNA of reproductive cells where traits continue through successive generations. 2: Non-inheritable changes to the DNA of reproductive cells.

kesiena oniovosa

Discipline: Psychology

Authors:

#1 Kesiena Oniovosa

#2 Roque V. Mendez

Abstract Name: "Therapy is Not For Us": Understanding Community and Self-Imposed Stigma on Mental

Health Help-Seeking Behaviors in Black University Students

In the U.S., research has shown that mental illness prevalence is rising among youth. While mental health awareness has also increased, both acceptance and severity of symptoms are not uniform among demographics. For example, previous literature shows that black populations tend to have more disabling symptoms, yet are less likely to utilize mental health care. The main objective of this qualitative study is to understand factors that impede and facilitate mental health help-seeking behavior in black ethnic groups. A supplemental goal is understanding the nuances among ethnic groups and genders regarding MHHS. We intend to meet these goals by answering the following questions: 1. What factors do black individuals consider when seeking formal and informal help? 2. When black individuals have positive attitudes towards mental health help-seeking, what are some reasons they still don't seek help? 3. Through the lens of the Theory of Planned Behavior (TPB), what common themes contribute to lower perceived behavioral control (i.e., confidence in one's ability to change a situation through actions) in black, U.S.-based university students? 4. What effect does living in a predominantly non-black community (PNBC) have on mental health help-seeking behaviors in black adults? Data was collected through an online survey. Results were analyzed using thematic analysis and interpreted through the TPB. Most participants stated that an unbiased support source (45.7%) and stigma surrounding mental health (30.5%) were factors when considering MHHS. For those who said they would not seek help, self-reliance, being uncomfortable with sharing personal issues, and prayer were common reasons. Lack of financial resources, perceived inefficacy of counseling, and reliance on parental/community approval were common themes that contributed to lower perceived behavioral control. Most participants (36.2%) felt uncomfortable seeking help in a PNBC due to fears of dismissal and discrimination.

Korbin Opfer

Discipline: English and Literature

Authors:

#1 Korbin Opfer

Abstract Name: Death By Beauty: Aesthetic Desire in Flaubert and Süsskind

This essay compares Gustave Flaubert's *Madame Bovary* and Patrick Süskind's *Perfume* to show how obsessive desire for beauty, when pursued for the purpose of possession leads not to revelation, but to moral ruin. Though Emma Bovary and Jean-Baptiste Grenouille differ in temperament, Emma is driven by romantic conceptions of beauty and Grenouille by detached aesthetic obsession, both characters treat beauty as an absolute and only, rather than one element of a balanced human life. Emma's longing to possess the romanticism of the novels she reads blinds her to reality, turning her romantic and spiritual yearnings and capacity for aesthetic experience into self-destruction. Grenouille's pursuit of olfactory perfection dehumanizes others while reducing beauty to an object that can be possessed and used to manipulate others. Both characters demonstrate how aesthetic desire for possession or embodiment, when uncoupled from morality and the lived world, becomes fatally misplaced. Their deaths, suicide, and ecstatic dismemberment respectively reflect each other as tragic culminations of aesthetic obsession. Through these dual downfalls Flaubert and Süskind criticize the traditional link between beauty and goodness, demonstrating that the unchecked pursuit of the sublime, or at least the attempt to own it, leads not to enlightenment, but to moral decay and death.

Johrdan Oppgaard

Discipline: Physical/Occupational Therapy and Speech Language Pathology

Authors:
#1 Kristi Oeding

Abstract Name: Examining the Representation in Children's Media of Hearing Aids and the Connection to Positive Self-Image

About 20% of children ages 12 and under experience some degree of hearing loss (Boston Hospital). Causes of children's hearing loss can be attributed to otitis media, congenital factors, certain illnesses, and more (ASHA). Hearing aids, devices fitted in or behind the ear which amplify sound, can be prescribed for children with hearing loss as one of multiple options (NIH). However, research shows that the majority of individuals who would benefit from hearing aids do not use one, which can be attributed to many different factors (NIH). Though hearing aids are not the only option for children with hearing loss, they are an important consideration for those who are recommended these devices, as early use of hearing aids can help facilitate crucial communication and social development skills (ASHA). However, not all children show eagerness to wear hearing aids, and some may even reject them. This research will study children's attitudes towards hearing aids, the representation of hearing aids in media, toys, and books, and how to promote children's positive-self image with hearing aid use. These results will help educate how to promote positive perception of hearing aids for all children and increase the comfortability of children with hearing loss in receiving these devices. This research will also be implemented into Camp Hearo, an aural rehabilitation camp for children focused around positive representation.

Samuel Oriola

Discipline: Interdisciplinary

Authors:

Abstract Name: Robust Group PCA for Separable Noise: An Argument for Subject-Level PCA With Whitening

Functional magnetic resonance imaging (fMRI) indirectly captures neural function with high spatial resolution and has driven discoveries in brain connectivity across age, gender, and developmental stages. As fMRI datasets grow, loss of subject-specific details can bias group estimates, limit replication, and exclude minorities. Group principal component analysis (PCA) is the de facto tool to aggregate individual data, but it varies across implementations. Tools like FSL and GIFT support group PCA (gPCA) and have shaped neuroimaging studies for decades. Yet, the impact of subject variability on group results remains unquantified. This study aims to identify optimal approaches for group dimensionality reduction while preserving the ground-truth mean information. Three GPCA implementations are considered: 1) simple concatenation, 2) concatenation with variance normalization, and 3) concatenation with subject-level PCA whitening. We manipulate three key parameters: 1) the proportion of total variance assigned to signal sources, 2) the variance profile, which determines the subjects emphasized at the group level, and 3) subject rank, which accounts for subjects with differing component manifold projections. We also study two types of additive noise: a simple case where noise is orthogonal to the signal, and a hard case where noise is not orthogonal to signal, and we investigate the threshold for variability retained during subject-level PCA whitening. Our results show that the ground-truth mean captures variability poorly for highly dissimilar sources across subjects, revealing that even the idealized ground-truth mean can bias inferences about atypical subjects. Additionally, in the hard noise case, there is no prevailing method; however, in the simple noise case, only subject-level PCA with whitening and no data reduction uniformly outperformed all other approaches relative to the ground-truth mean performance and preliminary results show increasing the number of subjects improves gPCA approximation. Future work will explore rank sensitive approaches to establish final recommendations for neuroimaging analyses.

Max O'Rourke

Discipline: Art History

Authors:

Abstract Name: How Virtual Reality Can Be Used to Further Our Understanding of the Urbino Studiolo

The Renaissance studiolo, Italian for study, or office, proves itself to be much more than a simple room with a desk. The studiolo in Urbino, Italy, once the office of the great humanist Federico da Montefeltro, and an excellent case study into the history of studioli, is one of the most celebrated examples from the Renaissance. The private chamber is lined with elaborate wooden inlay panels called intarsia and portraits of the great thinkers of antiquity. In addition to being used as a private study for the duke, it served as a display of Montefeltro's identity and values. By inspecting the space, we can gain insight into the duke's character, habits, and relationships. The original function of the studiolo has been somewhat obscured over time, especially since the palace was converted into a museum. To better understand and experience the studiolo as it once was, virtual reality (VR) will be used to recreate its historical context and significance within art history. Using the Urbino studiolo as a case study, my research aims to demonstrate how immersive technologies like VR change the way we analyze and experience historic spaces. To address this question, LiDAR scanning, photogrammetry, and 3D modeling have been used to create a high-resolution VR reconstruction of the Urbino studiolo. This model allows users to inhabit the space virtually, replicating the scale, atmosphere, and perspective encountered by its original visitors. By bridging Renaissance art history with VR technology within the field of digital humanities, this project demonstrates and concludes how immersive methods can enhance scholarship, enrich teaching, and make cultural heritage accessible to broader audiences.

Grace Orrick

Discipline: Psychology

Authors:

#1 Shawn Utsey

Abstract Name: Denominational Influences on Christian Nationalist Beliefs

Christian nationalism has gained increasing attention as a cultural and political framework that blends national identity with personal religious dogma, and traditional, conservative belief systems. This study investigates the relationship between Christian church denominations, and the likelihood of endorsing Christian nationalist systems of belief. Using a quantitative survey design, participants completed the six-item Cambridge Christian Nationalism Scale, which measures the degree to which individuals support the fusion of Christianity with American civic life and the role of religion and God in political and public spaces. Responses were analyzed to assess variations in Christian nationalism scores across denominational categories, including Baptist, Nondenominational, evangelical Protestant, mainline Protestant, Catholic, and other Christian traditions. Preliminary analysis indicates meaningful denominational differences in the endorsement of Christian nationalist beliefs, with some groups exhibiting significantly higher alignment with Christian nationalist ideology and others showing more center to left leaning ideologies. These findings contribute to a deeper understanding of how religious affiliation shapes sociopolitical attitudes and highlight the importance of denominational context in discussions of religion and national identity.

Alessandro Ortega

Discipline: Business

Authors:

Abstract Name: AI Adoption and Its Perceived Impact on College Education

Artificial intelligence is the fastest-growing technological field of the 21st century, and is influencing how we work, learn, and communicate. With its rapid integration across various industries, questions arise on its impact on the education system. The purpose of this research is to examine Americans' views on AI tool adoption and its impact on a college education. Furthermore, I am interested to test if these views vary by both age and level of education. To this end, I designed a 15 question survey and collected 447 responses using RepData. The results revealed that younger individuals use AI tools more often, compared to those aged 65 or older. Among education levels, those with some college and higher levels of education believe AI will bring more change to the college education system, compared to those with a high school education or less. These differences not only highlight pronounced generational and educational divides, but also raise critical questions about the future of the job market and the role of higher education. Younger and more educated individuals, who frequently use AI, are poised to benefit in a job market where AI competencies are increasingly essential. In contrast, lower adoption rates among older and less educated groups point to a growing risk of workforce displacement. The strong belief among college-educated respondents that AI will reshape education further suggests that academic institutions must adapt their curricula. Without integrating AI literacy, colleges risk failing to prepare students for a labor market already being transformed by AI.

Karla Ortiz

Discipline: Biology

Authors:

#1 Karla Ortiz

#2 Meriem Bendaoud

Abstract Name: Exploring the Antimicrobial and Biofilm Activities of Common Food Dyes

Synthetic dyes are widely used in the food industry to enhance the visual appeal of processed products, yet their interactions with microorganisms remain underexplored. While some dyes are biodegradable, azo dyes in particular can persist in wastewater and soil, leading to ecological consequences that threaten soil quality and aquatic ecosystems. This study evaluated the effects of commonly used synthetic food dyes, red, blue, and green, on microbial growth and biofilm formation using 96-well plate assays against multiple bacterial strains and one fungal strain. Red dye had little effect on the growth of most tested microorganisms, though it slightly inhibited *Staphylococcus aureus*. It also promoted biofilm formation in *S. aureus*, *Enterococcus faecalis*, and *Staphylococcus epidermidis*. Blue dye enhanced growth in several Gram-negative bacteria and in *Candida albicans*, although overall growth was minimal. In contrast, green dye consistently inhibited microbial growth, with most activity observed against *Streptococcus oralis*, *E. faecalis*, *Listeria monocytogenes*, and *S. aureus* at different concentrations. These findings highlight the diverse and sometimes opposing effects of synthetic food dyes on microbial physiology, which emphasize the importance of further research into their implications for human and environmental health.

Ruby Ortiz-Lopez

Discipline: Social Work and Human Services

Authors:

#1 Ruby Ortiz-Lopez

Abstract Name: Enhancing Student Success in APA 7th Edition: A Data-Driven Video Project for Social Work Education By Ruby Ortiz-Lopez

This Honors research project analyzes survey results identifying the most common areas where students struggle with APA 7th edition formatting and creates an instructional video offering step-by-step tips to improve their skills. Understanding and addressing these challenges helps students produce more professional, credible academic work and reduces formatting-related stress. Descriptive statistics such as frequencies and percentages will be used to identify the top survey responses and trends among students APA formatting challenges. Preliminary results included five qualitative responses from student participants. Other results indicated 76% reported being taught APA 7 in college. The majority feel confident in basic APA tasks like cover pages (28), title pages (28), and page formatting (24). However, students reported struggling most with annotated bibliographies (24), block quotes (23), and abstracts (18). Confidence levels were highest for title pages (53% extremely confident) and lowest for block quotes and annotated bibliographies. Despite challenges, 47% of students expect to graduate. Suggestions for improvement were limited, but some students expressed they are still learning or unsure how to improve. Most students have been taught APA 7, but significant gaps remain in applying complex formatting elements like annotated bibliographies, block quotes, and abstracts. Confidence is highest in basic elements like title pages and cover pages, but lowest in advanced formatting, suggesting uneven skill development. Graduate students and seniors made up the majority of participants, indicating that APA struggles persist even at higher levels of education. Student feedback was limited but indicated a willingness to learn and a need for clearer resources or ongoing support. The survey highlights the need for targeted educational support to build APA competence, especially in advanced writing skills. Findings are relevant to social work education by emphasizing the role of academic writing in preparing students for professional communication and documentation.

Ruby Ortiz-Lopez

Discipline: Social Work and Human Services

Authors:

Abstract Name: Assessing Communication Between Social Service Agencies and Rural Communities

This study aims to assess how communication methods impact residents' awareness and utilization of services provided by social service agencies in rural communities. Participants were recruited through the collaboration with Meals on Wheels, flyers, email communication, phone calls, and snowball sampling. A local social service agency assisted in the distribution of recruitment flyers to clients. Additional participants were identified through the distribution of flyers in local community spaces, including clinics, churches, and community centers. The purpose of the study is to assess the perception of communication between social agencies and clients in rural communities, identify existing obstacles, and evaluate the impact of communication on awareness and utilization of local services. The results inform effective communication with their social services. This indicates that participants had rated the Likert scale as "very effective" with their social services in their rural community (68%;n=17). Participants who received less services, felt more confident in knowing where to locate social service agencies. Also, participants who reported receiving more resources have higher confidence levels than person who has less resources. The student researcher ran a sample of goodness of fit to determine if there was a difference in the highest level of education completed

among participants. Results indicated there was a statistically significance in education level among participants ($\chi^2(5)=11.72; p<.05; p=.039$). The knowledge obtained from this study is important as it will provide alternative perspectives on how social service agencies can better engage with rural populations, particularly in terms of outreach, communication strategies, and client involvement. The results inform policy decisions, improve service delivery models, and enhance the overall effectiveness of social service programs in rural settings. This research contributes to a broader understanding of challenges and opportunities in rural service delivery, benefiting not only the participants but also the wider community.

Selina Osebre Yawson

Discipline: Sociology

Authors:

#1 Çağlar Çetin-Ayşe

Areeya Tandukar

Phat Lam

Abstract Name: From “Me” to “We”: Reimagining Vocation as a Shared and Inclusive Journey Through Student Co-Researcher Experiences

This project seeks to explore emerging insights from a community-based participatory research project embedded within Augustana Leaders in Vocational Exploration (ALIVE), a year-long program that invites sophomores to engage in sustained reflection on vocation, purpose, and belonging. Now in its fifth year, ALIVE has increasingly emphasized the relational and communal dimensions of vocational exploration. Responding to broader calls to move beyond individualized understandings of calling, this project examines how students and mentors navigate questions of meaning and contribution through shared practices of reflection, dialogue, and creative expression. Working alongside three student co-researchers - who simultaneously participate in ALIVE - we collaboratively designed the research questions, collected qualitative data through reflective journals, group conversations, participatory workshops, and creative artifacts, and engaged in group interpretation of the findings. Early results reveal how shared storytelling, intentional vulnerability, and creative engagement cultivate a deep sense of belonging and reshape participants' understanding of vocation from a solitary, self-directed quest into a collective, interdependent journey. In addition to presenting our initial research findings, we will reflect on our dual experiences as both ALIVE participants and co-researchers. This dual positionality offers a unique perspective into how collaborative inquiry supports personal growth while strengthening community connections. By drawing on our lived experiences, navigating uncertainty, building trust within a cohort, and engaging in communal meaning-making we aim to illustrate how ALIVE's model fosters purpose development through relationship-centred practices. Ultimately, this presentation highlights what ALIVE's evolving approach to vocational exploration reveals about nurturing purpose, belonging, and agency within a liberal arts context. Our hope is to contribute to ongoing conversations about how participatory, community-engaged models can expand vocational education to be more inclusive, relational, and responsive to the diverse experiences of students today.

Zoey Osho

Discipline: Psychology

Authors:

#1 Jessie Greenlee

#2 Sigan Hartley

Abstract Name: Parenting Stress and Couple Intimacy in Families of Autistic and Neurotypical Children

The current study examines whether parent gender, socioeconomic status (SES), and autism context moderate the relationship between parenting stress and couple intimacy. I hypothesized that parenting stress will be more strongly associated with lower intimacy in (1) families with autistic children compared to neurotypical children; (2) families with a lower SES compared to families with a higher SES; and (3) mothers compared to fathers. This is a secondary data analysis of data collected from 344 cohabiting couples, including both autistic and neurotypical children (aged 5–12 years; Hartley, Papp, & Bolt, 2017). Household income ranged from under \$40,000 to \$140,000+. The Personal Assessment of Intimacy in Relationships measure (Schaefer, et al., 1981) assessed relationship intimacy, and the Parenting Stress measure (Zarit et al., 1980) assessed parenting stress. Stress was negatively related to all types of intimacy for both mothers and fathers (all p values $< .01$), although the negative correlation between stress and intimacy did not differ between mothers and fathers. Stress and intimacy were also more strongly related in families of autistic children (r ranged from $-.12$ to $-.35$, all $ps < .01$) than in neurotypical families (r ranged from $-.08$ to $-.21$ and were not all significant). Finally, the association between stress and intimacy was non-significant in low-income families (\$40,000 or less), but significant in all other income brackets. These findings suggest that while there is a relationship between stress and intimacy in all families, there is a stronger negative correlation between stress and intimacy within families raising an autistic child, and within families with a higher SES, as opposed to families with a lower SES. These findings can help bolster further research surrounding stress-related interventions that could lead to more positive outcomes, such as increased intimacy and closeness within the parental relationship.

Deema Osman

Discipline: Nursing and Public Health

Authors:

#1 Leyla de Avila

#2 Ali Weinstein

Abstract Name: Examining the Impact of the COVID-19 Pandemic on Hospitalists' Work Well-Being and Desire to Practice Medicine

Background: The COVID-19 pandemic had profound effects on healthcare, particularly on hospitalists (physicians who specialize in the care of hospitalized patients). Hospitalists were exposed to high stress and heavy workloads during the pandemic, which may have influenced work well-being and desire to practice medicine. Because hospitalists have higher turnover than other specialties, understanding these impacts is critical to addressing burnout and retaining providers. Therefore, changes in hospitalists' work well-being and desire to practice medicine were examined before, during, and after the COVID-19 pandemic. **Methods:** Anonymous surveys were administered at three time points: 2019 (pre-COVID-19), 2021 (during COVID-19), and 2024 (post-COVID-19). Surveys were sent to hospitalists at a community hospital in a Washington, DC, suburb. Desire to practice medicine was assessed on a 0-4 scale (0=regret becoming a doctor, 4=very strong desire). Work well-being was measured with the Work Well-Being Scale, which consisted of five questions each using a 7-point Likert scale. ANOVAs investigated the changes over time on the hospitalists' desire to practice medicine and work well-being. Statistical significance was set at $p < 0.05$. **Results:** There were 45 participants pre-COVID-19 (42.2% female), 38 participants during COVID-19 (52.6% female), and 45 participants post-COVID (48.9% female). Work well-being statistically significantly changed ($p < 0.007$) over time, specifically it was lowest during COVID-19 (25.1 ± 7.4), but similar before COVID-19 (30.3 ± 7.8) and after COVID-19 (29.4 ± 7.3). Hospitalists' desire to practice medicine was not statistically significantly different over time ($p = 0.26$). **Conclusion:** Hospitalists experienced a decline in work well-being during COVID-19, yet desire to practice medicine remained stable. This divergence suggests that despite reduced work well-being, potentially due to inadequate staffing, long hours, and moral distress, their sense of

professional purpose may have been strengthened. Future research should examine factors that may sustain a desire to practice medicine independent of work well-being.

Deema Osman

Discipline: Nursing and Public Health

Authors:

#1 Daphne Bernal

#2 Iulia Fratila

#3 Liza Berdychevsky

Abstract Name: Developing a Grounded Theory of (Ex)Cannabis Users' Health Talk in Reddit Communities

Reddit has become one of the fastest-growing social media platforms with roughly 52 million active users daily. This platform allows people to create anonymous profiles where they interact with others or remain lurkers. Studies have found that social media platforms offer meaningful spaces for informal health communication and can empower individuals in their health decision-making. Studies have also looked at online health communication surrounding cannabis use and cessation, due to the widespread legalization and liberalization of cannabis. This research aims to understand the process of health communication online via the Reddit platform amongst (ex)cannabis users. The data were collected from four cannabis-focused subreddits (i.e., r/petioles, r/leaves, r/weed, and r/trees). This study used a netnographic approach and analyzed the data with constructivist grounded theory, moving through initial, focused, and theoretical coding. In total, 2532 original posts and comments were collected, and the current preliminary data analysis includes 628 coded posts. The data sheds light on the process and content sharing that exists in online cannabis spaces on Reddit. Specifically, people with faceless online profiles engage with one another from different cannabis use positions: (1) as current users, (2) as users who are interested in quitting or reducing use, or (3) as ex-users who have quit or moderated use. Within these online spaces (ex, users utilize Reddit as a channel for sharing and relating their experiences of cannabis-related health outcomes across mental, social, and physical well-being dimensions, as a source of supportive community (e.g., encouraging cannabis use goals), and for consulting with one another about harm reduction/abstinence strategies. Previous studies have also found that Reddit is used for discussing cannabis experiences and health information. However, researchers also warn of the risks of misinformation in these spaces. These findings can inform cannabis health education and expand knowledge about digital health literacy.

Natalie Osorio

Discipline: Biochemistry

Authors:

#1 Jason Withorn

#2 Archana Sudevan

#3 Elizabeth Boon

Abstract Name: Biophysical Investigations Into the Structure and Function of Pa and Bt Nitric oxide sensing Proteins

Nitric oxide sensing Proteins (NosPs) have been studied as important signaling molecules in various organisms. Particularly in *Pseudomonas aeruginosa*, NosP plays a role in heme binding and controlling the phosphorylation of NosP's associated histidine kinase, NahK. Recently, heme binding has been of particular

interest and how this is associated with the signaling pathways in bacterial biofilm formation. Computational structural characterization of *Pseudomonas aeruginosa* NosP predicts that heme binding occurs between the tri-symmetrical base and disordered cap regions. The cap is believed to open and secure the heme in position. Despite these predictions, the role of NosP's cap remains poorly uncharacterized. As a result, it was hypothesized that generating a NosP construct without the cap ($\Delta 208-301$) will diminish kinase inhibition and heme binding during in vivo and in vitro testing. To test this, capless, tagless, NosP was generated and purified, and the apo, ferric, and ferrous complex ligation states were assessed with UV-Vis spectroscopy. The inhibitory potential of these complexes with NahK was tested using HPLC analysis. The phenotypes downstream of NahK, such as the production of pyocyanin and swarming motility, were checked to see if the cap affects the ability of it to inhibit NahK. Interestingly, the in vivo data shows strong phenotypic evidence of the capless NosP exhibiting tighter inhibition, while the preliminary investigation into the capless mutant's heme binding properties show altered mechanics and reduced inhibition in vitro. Therefore, future work is needed to further understand how the heme binding plays a role in kinase inhibition.

Yasamin Osqueezadeh

Discipline: English and Literature

Authors:

#1 Yasamin Osqueezadeh

Abstract Name: The Privatization of Black History

My project rhetorically analyzes the presentation of African American history in two slave plantations in South Carolina: McLeod and Boone Hall. Researchers have written about the presentation of African American history in public and private plantations, evaluating their sensitivity, correctness, and effectiveness. Most concluded that both public and private plantations have a long way to go, citing the language and speeches of the administrations. However, there is little focus on plantations in South Carolina, which was the port of entry for the transatlantic slave trade, and few dissect the rhetoric of the plaques used across the plantations. Additionally, due to the new governmental efforts to defund public parks and censor American history, there have been few academic articles written about the effects of such regulations. My presentation focuses on the representations of African American enslaved history in plantations, comparing the information presented in Boone Hall, a private plantation, and McLeod, a county-owned park. During my time at these plantations, I found that both plantations censor their language to cater to a white-majority audience. This could especially be seen at Boone Hall, where the history was inaccurate, incomplete, and often romanticized the lives of planters and their relationships with the enslaved. In contrast, McLeod's presentation of slave history was more accurate and revolved around the experience of enslaved African Americans. Based on these findings, I argue that public parks have made an overall more concerted effort to properly represent and preserve the history of African Americans, but the current government administration's regulations will further censor the presentations of such history. I argue so by analyzing the rhetoric of the plaques presented at various public and private plantations, their websites, and event advertisements, tying those rhetorical analyses to governmental funding cuts, content reviews, and regulations.

Kathryn Ostgaard

Discipline: Biology

Authors:

#1 Leif Hembre

#2 Kate Landsteiner

Abstract Name: Does the Hemoglobin Level in Daphnia Affect Their Phototactic Response to Predator Cues?

Nutrient pollution and climate warming interact to promote intensified seasonal hypoxia in lakes by causing larger phytoplankton blooms and organic matter deposition in deep water, and stronger thermal stratification, which inhibits mixing of oxygenated water into deeper depths. The crustacean zooplankton *Daphnia* are capable of producing hemoglobin (Hb), which enables them to better scavenge dissolved oxygen and improves their ability to survive under hypoxic conditions. However, the trade-off is that expression of reddish Hb makes *Daphnia* more conspicuous and more vulnerable to predation by visually-oriented predators (e.g., fish). *Daphnia* typically perform diel vertical migrations (DVM) in which they migrate to deep water during the day to avoid visual predators, and ascend to the surface at night for grazing and to experience warmer waters. *Daphnia* are known to assess their predation risks and to modify their response to light (phototaxis) and DVM behavior by detecting chemical cues passively released from predators (kairomones). This study examined the relationship between Hb level in *Daphnia* and their phototactic response to media infused with kairomones from visual predators (fish), non-visual predators (larvae of *Chaoborus*, the phantom midge), and control media (no predator cues). *Daphnia* obtained from two Minnesota lakes were sorted based on Hb level and used in laboratory phototactic assays. Consistent with expectations, we found that high Hb *Daphnia* were significantly more negatively phototactic than were low-Hb *Daphnia* in the presence of fish kairomones, and that *Daphnia* were less negatively phototactic in response to kairomones from a non-visual predator (*Chaoborus*, the phantom midge). These results suggest that *Daphnia* are capable of optimally tuning their phototactic response and DVM behavior in response to the type of predation risks that they are experiencing and their own Hb level. Future research will expand the number of populations examined to assess how generalizable these findings are.

Dillon Otero

Discipline: Exercise Science and Nutrition

Authors:

#1 Masoud Moghaddam

#2 Timothy Werner

#3 Brent Fedorko

#4 Jessica Walter

#5 Lisa Marquette

Abstract Name: Effects of an 11-Week High Functional Resistance Training Program on Indices of Arterial Stiffness

Arterial stiffness is a systemic loss of elastic properties that significantly augment cardiovascular disease risk in adults. Investigations into specific behaviors and practices that influence arterial stiffness has been a priority in the past few years. Chronic aerobic and anaerobic exercise activity has consistently shown to attenuate or not influence markers of arterial stiffness in adults with chronic disease and otherwise healthy adults. Chronic high functional resistance training's effect on vascular compliance is less understood.

PURPOSE: To determine the effects of a chronic high functional resistance training program on pulse wave velocity and beta-stiffness index. **METHODS:** Participants (18-40 years old) were placed in a non-randomized fashion into high functional resistance training (HFRT) group ($n = 9$; ≥ 6 months of CrossFit experience; 4 female), or control (CON) group ($n = 8$; ≤ 6 months of exercise experience; 6 female).

Participants in the HFRT group trained at the same local facility 4-5 days a week, utilizing the same training program. CON group refrained from exercise during the study period. Body composition, 1,000 meter rowing test, deadlift 1 repetition maximum (1 RM), hemodynamic assessments and vascular compliance was assessed at baseline and follow-up. Repeated measures analysis of variance was used to examine within and between interactions on indices of arterial stiffness. **RESULTS:** There were baseline differences between groups in deadlift 1 RM (72.3 ± 18.2 kg mean difference (MD), $p < 0.01$), rowing time (143.8 ± 35.7 sec MD,

$p < 0.01$), and rowing average watts (153.8 ± 34.6 watts MD, $p < 0.01$). Following the intervention, seated diastolic blood pressure (DBP) increased only in the CON group (3 ± 4 mmHg MD, $p = 0.04$). No significant within and between group interactions were found in arterial stiffness variables. CONCLUSIONS: The findings indicate indices of arterial stiffness are not influenced by participation in chronic high functional resistance training

Onyedikachi Oti

Discipline: Engineering

Authors:

Abstract Name: 3D Printed and Phase Casted Bioabsorbable Interlocked Nail System for Segmental Bone Defect

This study was to evaluate bioabsorbable polycaprolactone–hydroxyapatite (PCL-HA) scaffolds and an intramedullary nail system for repairing critical-sized segmental long bone defects. The study utilized biocompatible and biodegradable materials—phase-cast PCL and PCL-HA—to fabricate scaffolds, nails, and screws for potential use in load-sharing fixation. There were three primary objectives: (1) fabricate porous PCL-HA scaffolds and an intramedullary nail system suitable for stabilizing a large tibial defect using polymer casting methods, (2) develop a custom targeting jig using stereolithography (SLA) printing to enable accurate delivery and fixation of the implant system within a goat tibia model, and (3) assess mechanical performance, biodegradation behavior, and BMSC compatibility of PCL and PCL-HA materials. The resulting bioabsorbable scaffold demonstrated cancellous-bone–range compressive strength, enhanced water absorption, and favorable degradation behavior. The targeting jig enabled accurate placement of the intramedullary nail and scaffold ex vivo, though screw strength remains an engineering challenge. Finite element analysis further showed reduced bone stress and acceptable deformation of PCL-HA components compared to titanium hardware. Ongoing in vivo evaluation aims to optimize mechanical stability while supporting osteogenesis using BMSC-seeded PCL-HA scaffolds.

Tyra Owusu-Sekyere

Discipline: Economics

Authors:

Abstract Name: When Work Comes Home: An Empirical Assessment of Remote Work and Urban Travel Behavior

This research examines how the rise of remote work is reshaping urban transportation demand across major U.S. metropolitan areas. As telework becomes more prevalent, especially following the COVID-19 pandemic, cities are experiencing notable shifts in commuting patterns, yet the magnitude and drivers of these changes remain insufficiently understood. Using panel data from 2018 to 2024, this study integrates information from the Bureau of Transportation Statistics, the Federal Highway Administration, and the American Community Survey to analyze how changes in the share of remote workers relate to vehicle miles traveled (VMT) and public transit ridership. The dataset includes additional controls—such as local gas prices, employment rates, and population density—to better isolate the effects of remote work on mobility outcomes. A fixed-effects regression approach is used to account for time-invariant differences across metropolitan areas, enabling the study to assess how within-city changes in remote work adoption correspond with shifts in transportation demand over time. Preliminary results indicate that increases in remote work are associated with lower

commuting intensity, decreased peak- hour traffic, and notable changes in transit ridership patterns, with variations observed across regions and industry structures. These early findings contribute to a broader understanding of evolving post-pandemic mobility trends and offer relevant insights for planners and policymakers seeking to design sustainable transportation systems, allocate infrastructure investments, and adapt transit services to new patterns of urban activity.

Miley Oxborrow

Discipline: English and Literature

Authors:

Abstract Name: Social Media's Influence on Teens' Perception of Romantic Relationships

Social media is a powerful force that influences how teenagers view relationships. Apps like Instagram, Snapchat, and TikTok often show couples in a setting that may be perceived as perfect. They are always going on dates, happy, and posting pictures to show their emotional connection. Posting these things gives the viewer the idea that a typical relationship should always be fun, romantic, and easy. Because of this, many teenagers strive to be the same when it comes to their relationships. When their relationships don't match the relationship standards, teenagers may feel disappointed in the relationship they're in. Expectations may not be met, resulting in arguments that may lead to stressed or fractured relationships. Social media may also provide incidents where toxicity and jealousy occur, which may be viewed as normal. This may cause a wall between a healthy environment and an unhealthy environment. This proposed research study poses the following central research question: Does social media's portrayal of romantic relationships influence teenagers' expectations of real-life relationships? Semi-structured interviews will be conducted in order to solicit feedback regarding what teenagers view and understand about online relationship representation. Even more, this study will explore how social media's portrayal of romantic relationships influences teenagers' expectations of real-life relationships through an approach designed to capture teenage perspectives. By engaging in-depth questions that go beyond surface-level observations, this research will uncover the ways social media shapes relationship expectations during developmental years. By exploring this question, this study joins a broader conversation about digital media's impact on relationship development, but distinguishes itself through its specific focus on experiences, platform-specific content analysis, and qualitative methodology designed to capture emotional nuance.

Sahasra Pabba

Discipline: Psychology

Authors:

#1 Sahasra Pabba

#2 Jennifer Frank

Abstract Name: Personal Ambition is Found to be the Primary Driver of Academic Competition in South Asian Magnet School Students

Academic competitiveness among high school students is shaped by cultural, social, and familial factors. This study investigates the various drivers of academic competition among South Asian students at Woodbridge Academy Magnet School, with a focus on parental involvement, generational status, and cultural ties to India. Using a comparative study-based design, students rated their level of academic competitiveness on a scale from 0 to 10 and responded to questions regarding their backgrounds and environments. Quantitative data

were analyzed using bar graphs and a one-way ANOVA to find patterns and relationships between academic competitiveness and the different factors that could potentially influence it. The initial ANOVA, which compared competitiveness across the different drivers, yielded a p-value less than 0.05, indicating a statistically significant difference among groups. However, the rest of the results, in relation to generational status, frequency of visiting the country of origin, and parental involvement, all resulted in insignificant values. These findings suggest that while variability in competitiveness exists within the sample, the measured cultural and familial factors do not independently account for these differences. Instead, the complexity of student motivation may be more strongly influenced by internal characteristics such as personal ambition and individual personality traits. Further research should be conducted using a mixed-method approach, adding qualitative components such as interviews or focus groups to better capture the motivations and experiences that shape academic competitiveness among South Asian high school students.

Ashley Pacheco

Discipline: Chemistry

Authors:

#1 Nathaniel Hidalgo

#2 Ahmed Awad

#3 Connor Blackwell

Nathaniel Hidalgo

Connor Blackwell

Abstract Name: Investigation of novel capecitabine derivatives as colorectal cancer therapeutics targeting HT-29 cells

Capecitabine (CAP (pentyl side chain) is a widely used oral chemotherapy drug for cancer patients, recognized for its three-step metabolism into the commonly employed chemotherapy agent, 5-fluorouracil (5-FU). Mouse carboxylesterase 2 (mCES2) and human carboxylesterase 2 (CES2) perform a de-esterification step in the conversion of prodrugs, converting the drug into the active 5-FU component, which is hypothesized to be 60 times faster than the previously targeted carboxylesterase 1 (CES1). On the basis of enhancing the speed of the first step of CAP metabolism, CES2 would be targeted; however, due to the lack of availability of a defined protein structure of CES2, mCES2 was used to hypothesize modification of the ester side chain, thereby affecting CAP's overall delivery speed. The binding affinities of a structurally modified CAP were computationally measured in ICM Molsoft. The hexyl CAP derivative displayed an average higher docking score in mCES2 than the original CAP when in the tested pocket. Computational toxicity data was collected using ProTox3 and SwissADME, in conjunction with binding affinity, and analyzed to identify differences between the derivatives. The hexyl derivative showed a promising result with a stronger binding affinity than the control CAP. Further testing via QSAR indicates a potential benefit for a proposed hexyl derivative, with a decreased predicted IC₅₀ when compared to the control CAP. The hexyl derivative's potential as an improved alternative to the pentyl group is also supported by remaining within toxicity constraints while displaying an increased binding affinity in comparison to the original pentyl group.

Aseel Packry

Discipline: Biology

Authors:

#1 Cancan Sun

#2 Qinglian Liu

Abstract Name: Assessing the Role of HSF in Regulating Aging

(Background) Heat shock factor (HSF) is a highly conserved transcriptional regulator in eukaryotes that activates the transcription of heat shock proteins essential for maintaining proteostasis during cellular stress. Thus, HSF coordinates chaperone networks to ensure proper protein folding and promote recovery from proteotoxic damage. Because age-associated decline in proteostasis is a hallmark of aging, HSF has been proposed to influence lifespan. However, the specific contribution of HSF activity to aging remains insufficiently understood. (Aim/Purpose) This study aims to determine whether alterations in HSF function affect longevity. Specifically, we sought to compare the chronological lifespan (CLS) of yeast expressing wild-type (WT) HSF versus mutant variants to assess whether HSF mutations extend lifespan or compromise survival relative to WT. (Approach/Methodology) CLS was measured using the DNY248 yeast strain, which requires exogenous HSF for viability. HSF WT and mutant alleles were expressed from His-marked plasmids, and 5-FOA counterselection was used to eliminate the URA3-based HSF plasmid. Following counterselection, single colonies containing HSF WT and mutant HSF were isolated and used to perform CLS assays. (Results) Preliminary data indicate that yeast expressing mutant HSF displays a significantly extended chronological lifespan compared to cells expressing WT HSF. This suggests that alterations in HSF function can influence long-term cellular survival. (Conclusions) These results support the idea that HSF contributes not only to acute stress responses but also to the regulation of aging. The identified mutation appears to enhance the activity of HSF, potentially improving proteostasis and thereby extending chronological lifespan relative to WT. These findings provide valuable insight into how modulating HSF may serve as a strategy to promote longevity.

Zacariah Padron Murrieta

Discipline: Biology

Authors:

#1 Catherine Vasquez

#2 Jil Tardiff

Abstract Name: W7 as a Therapeutic Modulator of Sarcomeric Dysfunction in a Hypertrophic Cardiomyopathy Model, R92W-cTnT

Hypertrophic cardiomyopathy (HCM) is a heritable cardiac disorder marked by hypercontractility, myofibrillar disarray, and increased risk of sudden cardiac death in young adults. Hypertrophic cardiomyopathy (HCM) is a disease of the heart muscle characterized by thickening of the left ventricular and impaired relaxation of the heart. Mutations in the cardiac thin filament proteins have been linked to the development of HCM. An HCM-linked mutation in cardiac troponin T (cTnT), Arginine-92-to-Tryptophan (R92W), has been shown to increase myofilament calcium sensitivity contributing to altered systolic and diastolic function. Current treatments for HCM are limited and to date only one FDA-approved drug, Camzyos, targets mutation-specific mechanisms, proving the need for precision therapeutics. Previous groups identified a calcium desensitizer W7, a small-molecule inhibitor that binds to TnC and alters cTnI-cTnC interactions and decreases calcium-induced activation of the thin filament. We hypothesize that calcium desensitization in R92W myofibrils via W7 intervention can reduce ATPase activity. To explore this, we isolated cardiac myofibrils from transgenic mouse models expressing the R92W mutation and conducted NADH-coupled ATPase assays under physiological calcium concentrations to assess functional contractile parameters. Our results demonstrate that W7 decreases sarcomere ATPase activity in R92W-mutant myofibrils. Future studies will investigate other mutations in the same cTnT residue, R92L, R92Q and the effects of W7 on ATPase activity. Additionally, we will be titrating different calcium concentrations to generate a curve of calcium vs ATPase activity to look at the effects of W7 on myofibril activation.

Ellie Paez

Discipline: Nursing and Public Health

Authors:

#1 Vincent Sutherland

#2 Olivia Lindly

Abstract Name: Language, Education, and Receipt of Therapy Services for Autism

Behavior therapies for autism help children to learn skills and adapt to new situations, but for families with limited levels of English proficiency and education, healthcare is difficult to access. Differential stigmatization of autism in certain communities may additionally affect parents' use of autism services for their children. This analysis focused on disparities in behavior therapy use for autistic children by primary household language (PHHL) (English vs. Spanish vs. other language) and parent education level (less than high school vs. high school or equivalent vs. more than high school) using 2022-2023 National Survey of Children's Health data. The sample included 4,612 children currently with autism ages 3-17 years. RStudio was used to compute descriptive statistics and a fit logistic regression model examining associations of PHHL and parent education with behavior therapy use. The model was adjusted for sex, age, race, household income, and insurance type. PHHL was not significantly associated with behavior therapy (Spanish: 95% CI [0.83, 3.26]; other language: 95% CI [0.41, 2.71]). Parent education level was significantly associated with behavior therapy use: parents with less than a high school education had 65% lower adjusted odds of behavior therapy use than parents with a completed high school education or equivalent (95% CI [0.18, 0.69]). The lack of data on households speaking non-English languages (n=290) in this sample may limit study findings. Measures to improve public health knowledge of non-English speakers in the U.S. could include comprehensive anonymity of responses, translation of surveying documents into languages other than English and Spanish, and consideration for low literacy levels more generally. Significant associations of parent education and behavior therapy use highlight the importance of referral, care coordination, and other supports to help parents with lower education levels access autism services for their children.

Rommel Pagkalinawan

Discipline: Biology

Authors:

#1 Kaitlyn Kinslow

#2 Jack Medlin

#3 Elizabeth Hiltz

#4 Haley Dewitt

#5 Alexis Thai-Nguyen

#6 Grady Fleming

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Robby Buck

Abstract Name: An Evaluation of Automated and Machine Learning Tracking Systems in Characterizing Negative Geotaxis in Zebrafish (*Danio rerio*)

Zebrafish (*Danio rerio*) serve as a prominent model in behavioral neuroscience, particularly for evaluating

stress and anxiety-like responses (e.g. negative geotaxis). The present study investigated negative geotaxis in adult zebrafish responding visually to mixed sex shoals in an adjacent tank. Subjects' responses were assessed using a 3-Chamber Open Tank Free Swim Task (3-COTFST) in which the subject swam freely in a central tank flanked by two stimulus tanks, each flanking tank contained either an alarmed or unalarmed shoal. Subjects had visual exposure to small shoals ($n = 4$) in each of the flanking tanks. One shoal is unalarmed while the alarmed shoal is exposed to 1.5 nM, 3.0 nM, or 5.0 nM concentrations of H_3NO . Digital videos were processed using EthoVision XT, a proprietary motion-tracking application, and DeepLabCut, an open-source machine-learning tool. Both platforms reliably quantified anti-predation responding, demonstrating a strong correlation between applications for spatial metrics such as cumulative duration in zone while other metrics had weaker, but still significant, correlations. Data from the Ethovision analysis provided significant main effects for condition and zone, confirming increased freezing and bottom dwelling at higher concentrations. Data from the DeepLabCut analysis offered superior resolution regarding individual variability, revealing specific Condition by Sex interactions for distance moved that were less distinct in standard tracking. While EthoVision provides a standardized, accessible platform ideal for reproducible group-level comparisons (quantal approach), DeepLabCut allows for flexible, fine-scale characterization of complex behavioral patterns (graded approach). These findings suggest researchers should select tracking software based on the specific need for rapid screening versus detailed analysis.

Rian Sydney Pagtakhan

Discipline: Economics

Authors:

#1 Rian Sydney Pagtakhan

#2 Guanlin Gao

Abstract Name: Financial Education Channels, Capability and Well-being: A Validated Survey Instrument

Approximately two-thirds of US citizens are financially unhealthy (Financial Health Pulse, 2024). This number is anticipated to be higher with ALICE (Asset Limited, Income Constrained, yet Employed) families in Hawai'i. Mainstream individual-centric financial education does not resonate with the host culture of Hawai'i where family and communal cultures are strongly valued. This study presents a validated, culturally appropriate survey instrument investigating various channels of financial education and its association with individual financial capabilities and definitions of financial well-being. Previous research shows a positive relationship between financial education and improved financial knowledge, attitudes, and practices (KAP), however less is known about how other channels of financial education, such as family socialization, may influence financial behaviors, financial well-being, and financial priorities. Our draft survey, based on existing literature, included measures of financial KAP, financial educational channels (including formal, such as direct schooling, and informal educational channels, such as via family and friends), self-reported financial well-being, socioeconomic status, and demographics. We use the Family Dinner Index (FDI), a measuring tool rating the time and quality of family mealtime interactions, as an indicator for family financial socialization. The survey will allow us to study how financial education channels influence individuals' definitions of well-being and how family contexts, particularly through the FDI, shape financial KAP. Our survey, which will be finalized through expertise review involving 40 scholars and cultural practitioners in the field, will be administered to adult and college student participants in Hawai'i during Fall 2026. Results of this study will offer insight for policymakers and practitioners on the proper financial education channels, contents, and best approaches for Hawaii and beyond.

Krishna Pahwa

Discipline: Biology

Authors:

#1 Sierra White

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#4 Nadine Hempel

Abstract Name: Investigating the Functions of DRP1 Splice Variants in the Brain and Skeletal Muscle

Mitochondria play a crucial role in cellular functions ranging from energy production to cell death. As such, maintaining mitochondrial health is essential. Mitochondrial health is dictated by a balance of two opposing forces: fission and fusion. Dynamin-related protein 1 (DRP1) is the key driver of fission, and DRP1 expression and activation changes have been associated with various disease states, including diseases of the brain and skeletal muscle, both tissues with high metabolic demand heavily reliant upon mitochondrial health. It is well known that DRP1 undergoes post-translational modification in the cell, but little research has investigated DRP1 splice variants. The Hempel Lab has previously demonstrated that certain DRP1 splice variants are differentially expressed in various tissues, with skeletal muscle and brain tissue expressing distinct splice variant profiles that differ from each other. Prior research has shown that exons 16 and 17 play a crucial role in DRP1 reliance on interaction with various fission adaptor proteins and the mitochondrial membrane. The question that remains, and what this project attempts to answer, is what interactions are favored by the different DRP1 splice variants in the brain versus skeletal muscle, and why? We have bred and maintained mice that uniquely express single DRP1 splice variants, the long variant, which contains both exons 16 and 17, and the short variant, which lacks exons 16 and 17. We then utilized these mice for skeletal muscle and brain harvests, which will be used for Western blots and co-immunoprecipitations to probe for various adaptor proteins used by DRP1 to facilitate fission. We expect that DRP1 variants will interact with/rely on different adaptor proteins. Specifically, we anticipate that the brain, which highly expresses the long variant, will rely on mitochondrial fission factor (MFF) more heavily when compared to the skeletal muscle, which highly expresses the short variant.

Jae Paik

Discipline: Biology

Authors:

Abstract Name: Understanding Mosquitoes' Plant Choices: Chemical Attractions Underlying Mosquito Phytophagy

With an estimated billion people impacted by malaria, yellow fever, and zika every year, the mosquito was declared the "World's Deadliest Animal" by the CDC in 2024. Mosquitoes have an exquisite sense of smell, widely studied for its role in locating human hosts for blood meals. However, mosquitoes also use their olfactory systems to locate and assess sources of plant sugar— an essential food for longevity and fecundity. In fact, only female mosquitoes feed on human blood for egg maturation, whereas all mosquitoes rely on plant sugar as a source of energy. Despite plant sugar being an essential nutrient source, relatively little is known about the identity of plants preferred by mosquitoes for their sugar meals. Unlike prior studies, this research utilizes molecular techniques to uncover the mosquito plant diet as found directly within the mosquito gut. In my research, I use wild-caught *Aedes aegypti* and *Aedes albopictus* mosquitoes, or the vectors for yellow fever, zika, dengue, and chikungunya. I first extract the DNA from the mosquito's digestive tract, then conduct PCR to amplify plant-specific sequences. Following, I use DNA sequencing to identify the plant species consumed by mosquitoes based on barcoding markers. Each plant species possesses a unique bouquet of scent chemicals, which may influence mosquitoes' foraging behaviors. To further investigate the chemical profiles of mosquito-attractive plants, I analyze its volatile organic compounds (VOCs) using gas chromatography-mass spectrometry (GC-MS). With GC-MS, I separate the chemical compounds within a

plant's odor bouquet to identify as well as quantify its relative abundances. By linking chemical profiles to mosquitoes' feeding preferences, this research helps determine which plant volatiles attract mosquitoes, providing insights into how odor-based mosquito traps can be improved. This work contributes to a broader understanding of mosquito feeding ecology, with applications for global public health and mosquito population management.

Santiago Pailhe

Discipline: Political Science

Authors:

#1 Santiago Pailhe

Abstract Name: The Impact of Ongoing Violence on Street-Level Bureaucrat Peacebuilding in Colombia

Successful implementation of a peace agreement can alleviate enduring systemic cycles of poverty, violence, and instability, significantly improving the well-being of millions of people. However, countries that have undergone a peace agreement are often highly volatile, which makes bureaucratic action ineffective and causes the implementation of post-conflict public policy to fail. Scholarly works have examined the nature of bureaucrats' work in the field, as well as their motivations to commit to implementing a peace agreement. Nevertheless, the literature has overlooked a crucial factor that could impact bureaucrats' work and hinder peace agreement implementation: ongoing levels of violence that persist within regions, created by multiple third-party actors, even after the agreement has been signed. This paper studies the Colombian 2016 Peace Agreement between the Colombian government and the FARC guerrilla to answer the following question: Does the level of ongoing violence within a region hinder the peace agreement implementation by street-level bureaucrats? The question is answered via a theoretical framework that posits street-level bureaucrat motivation as the causal mechanism through which local levels of violence (operationalized by the number of homicides) lead to fewer peace agreement implementation projects. This relationship is measured using a cross-sectional time series observational study with quantitative data analysis across the 170 municipalities included in the Colombian Territorially Focused Development Programs (PDET) public policy. The expected finding is a negative causal relationship between violence and the number of implemented projects. This research will shed light on how local levels of violence can hinder nationwide bureaucratic peacebuilding efforts and how external factors can have an impact on the motivation of street-level bureaucrats.

Ryder Paley

Discipline: Visual Arts

Authors:

Abstract Name: High Functioning: Understanding the Autistic Experience through Ceramic Tableware

Autistic people are often misunderstood for not being able to meet expectations without accommodations. Often, autistics look for strategies to get around such obstacles. Perhaps exposing an audience to ceramic objects that appear one way but function in a different way would be helpful in increasing understanding of the strategies that disabled people must use every day. The researcher designed uniquely functioning ceramic tableware to help the observer or user better empathize with the experience of autism. The researcher sought efficiency of design, ease of use, and something aesthetically pleasing whenever possible. Tableware pieces were designed and produced through wheel throwing, including cups, bowls, plates, jars, pitchers, and teapots. Each completed piece met one of the following criteria: looking non-functional but functioning in a

new way, looking like the average piece, e.g., a teapot, but functioning differently, a multi-functional piece, or exploring an unexpected property of the ceramic clay body, i.e., sound. The exhibition of the pieces will include two divided spaces. In the first space, observers will have a chance to interact with the pieces and think about their functions. In the second space, the audience will view the pieces as they were meant to function by seeing a video of people using the pieces during a party. The juxtaposition is meant to give viewers an insider glance at autism as an analogy to the ceramic hacks. In a world where individuals are valued for their functions, or what they produce that is valuable to others, pieces were designed to separate out the idea of the value of an object from its function. The hypothesis is that this analogy will be useful in helping viewers empathize with autistics' experience of being misunderstood.

Ritesh Palla

Discipline: Biology

Authors:

#1 Ritesh Palla

Abstract Name: Tissue-Specific Differences in Genomic DNA Yield and Oxidative Damage in Mice

The efficiency of genomic DNA (gDNA) extraction can vary considerably among organ tissues due to differences in cell composition and metabolic activity. This study quantifies DNA yield and oxidative nucleoside content across multiple mouse tissues to evaluate tissue-dependent variations in extraction efficiency. Although tissue-specific variation in oxidative DNA damage has been previously studied, the combined influence of extraction efficiency and nucleoside recovery is still not well defined. This project addresses that gap by comparing multiple tissues under identical handling and processing conditions. Samples were collected from three adult mice, with each organ divided into three 20 mg aliquots, yielding nine replicates per tissue type. The organs examined included kidney, liver, heart (whole and partitioned), lung, brain, gastrointestinal tract (whole and partitioned), testis/ovaries, and esophagus. High-molecular-weight (HMW) gDNA was extracted using the Monarch HMW DNA Extraction Kit for Tissue (NEB T3060), and concentrations were determined by NanoDrop spectrophotometry. All tissue handling and extraction steps were performed under cold conditions with frequent ethanol decontamination to prevent degradation and contamination. DNA hydrolysis was conducted as an effective procedure, in which isolated nucleosides can be accurately measured for oxidatively generated DNA damage. DNA hydrolysates were analyzed by LC-MS/MS to quantify deoxyguanosine (dG) and 8-oxo-deoxyguanosine (8-oxo-dG) as markers of oxidatively generated DNA damage. It is hypothesized that tissues with higher metabolic rates, such as liver and heart, will yield greater total DNA amounts but also exhibit higher levels of oxidatively generated DNA damage. The results of this study will establish baseline tissue-specific DNA yields and oxidation information. These baseline measurements could guide future studies evaluating tissue-specific responses to antioxidant therapies or aging-related oxidative stress.

Yashwant Pallapolu

Discipline: Computer Science

Authors:

#1 Michail Alexiou

Landon Mata-Fraire

Abstract Name: Strength in Simplicity: Evaluating Adversarial Transferability in Quantized Lightweight CNNs

Deep learning (DL) models are central to many vision-based applications, from facial recognition and autonomous driving to environmental monitoring, and are often deployed on edge or IoT devices with limited computational and energy resources. This necessitates the use of lightweight DL architectures for efficient processing, which in turn introduces new trade-offs between model efficiency and security. Among these challenges, adversarial attacks pose a unique risk, as they can be applied to physical objects in the form of patches and remain effective across viewpoints and lighting conditions. These attacks are generated by using the gradients of a neural network's loss function with respect to the input image to identify small pixel changes that cause misclassification. Studies have shown that such gradient-based attacks can transfer between DL models, meaning that an attack designed to fool one vision system can also deceive others. Prior work suggests that attacks crafted for standard Convolutional Neural Networks (CNN) transfer poorly to algorithmic lightweight variants such as Dilated CNNs. However, the effect of these attacks on structure-based lightweight models obtained through pruning or quantization requires further investigation. In this study, we focus on generating adversarial attacks using both standard CNN models and lightweight variants obtained through pruning and quantization and we evaluate their transferability between these models. We train and test our approaches on two datasets: (1) a high-resolution animal image dataset and (2) the low-resolution Fashion-MNIST dataset, to capture differences across varying levels of visual detail. Based on preliminary experiments, we expect that attacks crafted for standard CNNs will be notably less effective against pruned and quantized models. The results of this research will advance the understanding of CNN defense capabilities and how these are affected by architectural and algorithmic modifications, to assist in developing more effective defense strategies.

Preston Palmer

Discipline: Biology

Authors:

#1 Lathadevi Chintapenta

Abstract Name: Identifying Metabolites and Their Functions Found in Native and Invasive *Phragmites australis*

Phragmites australis is found in both North America and Eurasia. The Eurasian subspecies became invasive to North America in the 1800's. Millions of dollars have been spent annually in efforts to remove these invasive plants. In order to understand the similarities and differences between native and invasive *P. australis*, we analyzed the metabolites found inside them. We performed Liquid Chromatography-Mass Spectrometry analysis of native and invasive plant roots collected from five sites in Minnesota. These metabolites were sorted based on their presence and abundance in native plants, invasive plants or both. In order to further quantitate how much of these metabolites are present, they were also sorted by a logarithmic abundance ratio of invasive/native. Those with a negative ratio were found in greater abundance in native plants and those with a positive ratio were found in greater abundance in invasive plants. If the abundance ratio was between (-1) and (1), that data was excluded from the analysis. A total of 1290 metabolites were identified between all of the samples and a total of 446 were sorted. 58 were found strictly in the native plants, 13 were found strictly in the invasive plants and the remaining 375 were found in both. After determining the quantity of the metabolites, qualitative analysis was performed by considering their biological, cellular and molecular functions. Taking a look at the functions of these metabolites allows for a better understanding of how each of these plants survive and react to biotic stressors like pathogens and predators as well as abiotic stressors like temperature, drought, salinity and oxidative stress. These results will determine which metabolites are responsible for the spread and resistance of invasive *P. australis* as well as the metabolites that allow the native *P. australis* to remain present and healthy in their habitats.

Lillie Palmer

Discipline: Architecture, Construction Management, and Interior Design

Authors:

#1 Ehsan Sheikholharam

Abstract Name: Sculpting the Soundscape: Creating Refuge Spaces for Neurodivergent People

Loud honking, steady movement, constant chatter, and tumult. Cities are full of sound. For most people, this background noise fades away. Yet, for many neurodiverse individuals, these sounds can become overstimulating, exhausting, if not stifling. Clinical research has shown how a controlled environment can improve the neurodivergent experiences, especially when space filters sound in nuanced ways. However, such controlled spaces are not typically in reach in urban settings. How can we insert spaces for relief in urban life beyond clinical facilities? This design research explores the capacities of architectural interventions to create spaces for neurodivergent refuge. The challenge is that architecture is often approached as something to be seen and occupied. This research explores how we can intentionally sculpt sound to create restorative, yet sensory-inclusive retreats within urban environments. This work begins with the idea that sound can be designed. By using methods such as shaping geometries, surfaces, and natural buffers, architecture can turn noise into calm. This is achieved by diffusing, absorbing, reflecting, and reframing sound into a rhythm. This study focuses on how these spatial and acoustic strategies can help regulate sensory input, giving users a sense of calm, control, and grounding within the intensity of the city. This proposal develops a network of small, neuro-inclusive spaces that sit within the city while providing separation from it. In an effort to shift sound by creating transitions between intensity into quietness, techniques such as gravel paths, wood paths, water, and planted buffers will be used. This paper argues that architecture can act as an instrument for listening while also shaping how sound is perceived and felt. By reframing urban design through sound and sensory inclusion, this research imagines a city that doesn't just make room for quiet but essentially learns how to listen.

Disha Pamukuntla

Discipline: Engineering

Authors:

#1 Disha Pamukuntla

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Abstract Name: Floor Bacteria Mitigation: An Integrated Approach using DBD Plasma Jet and an Autonomous Robot

A study by the LCSVA Medical Center found that hospital floors are major hotspots for bacteria. While traditional disinfectants are effective, they contain harsh chemicals that have a negative impact on the environment, and they often have harsh chemicals that pose environmental and occupational health risks. We hypothesize that an autonomous system utilizing a Dielectric Barrier Discharge (DBD) plasma jets can be used as eco-friendly methods to eliminate surface bacteria on hospital floors. To test this, a locally fabricated DBD plasma torch was made using a glass dielectric barrier with two electrodes to generate a helium plasma jet (~15–20 slpm, ~3–4 kV, 20–40 kHz), and characterized it by measuring input power (~10–15 W) and performing emission spectroscopy to identify active radicals. A key objective was to determine and maintain the optimal torch-to-surface distance for effective sterilization throughout the robot's operation. An automated robot equipped with the plasma torch was also developed to scan the floor, it utilizes 80 mm Mecanum

wheels for omnidirectional movement at 5 ft/s and four 12V DC 37D 6.25:1 metal-gear motors. The chassis was fabricated from 0.375-inch thick extruded acrylic to ensure rigidity and safely support the payload, which includes the plasma drivers for three plasma torches needed for complete floor coverage, along with custom mounts. The robot's control system is built around an ESP32-WROOM microcontroller which enables both manual control (via a Bluetooth controller) for functionality and maneuverability. The final presentation will detail the full engineering design methodology, as well as the plasma characterization process, the mechanical and control system implementation, and the comprehensive safety plan. It will also include ongoing results from *E. coli* mitigation experiments conducted under stationary and moving conditions.

Jordanka Panggabean

Discipline: Chemistry

Authors:

#1 Rebecca Peebles

Abstract Name: Rotational Spectroscopy of Carbon Dioxide Clusters for Green Solvent Development

Many solvents that are used for industrial and synthetic purposes have caused deterioration and toxicity in the environment. The purpose of this project is to determine whether a fluid form of carbon dioxide (supercritical CO₂) would be an effective, environmentally friendly solvent, making industrial chemistry greener. This can be answered by observing how different compounds interact with carbon dioxide. Specifically, identifying molecular clusters of different sizes helps reveal the orientations and positions of molecules as they interact. The initial aim was to identify a cluster of three difluoroethylene (C₂H₂F₂, DFE) molecules with one CO₂. Difluoroethylene is a small molecule that can interact strongly with a range of different solvents. In a microwave spectrometer, gas is sprayed into a vacuum, causing molecules to cool and cluster together. Each cluster absorbs different frequencies of microwave radiation, producing a series of lines called a spectrum. The lines act like a barcode, giving a unique pattern that provides insight into how these molecules interact with each other and their specific arrangements. Analysis focuses on identifying distinct patterns related to the structure of interest among thousands of possible lines in the spectrum. Analytical tools in Python help identify groups of lines that go together, revealing patterns of large clusters. The project method involved recording a microwave spectrum of a DFE and CO₂ mixture. A computational chemistry program was used to predict the most stable cluster arrangement. Predicted structures were then used to estimate what the spectroscopic patterns would look like. Expected results included a 3 DFE:1 CO₂ cluster, but observations were not consistent with that. Further analysis led to a hypothesis that the structure may be a 3:2 cluster. Observed results showed that as clusters increase in size, the carbon dioxide and DFE molecules arrange themselves in a contrasting way, compared to smaller clusters.

Hannah Panicci

Discipline: History

Authors:

Abstract Name: Women's Participation in Anticommunism as a Benefit and Detriment

Though women played a significant role in shaping the domestic success of anticommunism during the 1950s, they are often left out of the historical discussion. By conducting original research on primary sources, I discovered that in fact, white middle and upper-class women propelled anticommunism, and that they did so

by relying on traditional, prescriptive gender ideals. At the same time, conservative women actually moved quite effectively into the public sphere, playing critical roles in politics and civic initiatives. Ultimately, conservative women set the stage for the emergence of the New Right. They did, however, ostracize and leave out progressive and liberal Black women, because they believed that racial equality was connected to communist ideology. Many fighting for civil rights had to limit their political participation out of fear of being accused of communism and even attacked. In contrast to white women, Black anticommunist women were motivated by their dislike of how the Communist Party adopted a patronizing approach to civil rights in order to draw in more members. Thus, conservative white and Black women at odds with each other. Further, working-class women differed from middle and upper-class women, especially those in unions, who advocated a more moderate stance. They supported the Communist Party's campaigns for greater social and labor benefits. Thus, by analyzing diverse women's different agendas in regard to anticommunist activity, we gain a more accurate understanding of women's vital role in shaping the national, postwar anticommunist movement.

Durga Meenakshi Panneerdoss

Discipline: Biology

Authors:

- #1 Tae-Kyung Lee
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Abstract Name: LIPA Inhibition Enhances the Therapeutic Efficacy of DNA-Damaging Agents in Ovarian Cancer Through Induction of ER Stress and Enhancing DNA Damage

Ovarian cancer (OCa) is the most lethal gynecologic malignancy in the United States, largely due to limited early detection and the development of chemoresistance following initial treatment. This highlights the need for improved therapeutic strategies. Recently, our team identified ERX-208, a novel molecule with strong activity against OCa cells. ERX-208 targets lysosomal acid lipase A (LIPA), inducing endoplasmic reticulum (ER) stress, disrupting protein synthesis, and promoting apoptosis. The objective of this study is to evaluate the potential of ERX-208 to enhance the efficacy of FDA-approved chemotherapeutics. We performed in vitro screening of 147 FDA-approved chemotherapy drugs in combination with ERX-208 to assess effects on OCa cell viability. Dose-response data were analyzed using SynergyFinder Plus. To validate synergistic effects, we conducted cell proliferation, colony formation, cell cycle, apoptosis, invasion, DNA damage, and comet assays. Preclinical studies using patient-derived organoids (PDO) and xenograft (PDX) models evaluated combination efficacy in clinically relevant systems. Drug-combination screening identified multiple synergistic pairs in OCa models. SynergyFinder analysis revealed strong sensitivity and synergy scores for several DNA-damaging agents. ERX-208 monotherapy inhibited OCa cell growth in vitro and in vivo, consistent with its induction of LIPA-dependent ER stress. Combination treatments with paclitaxel or cisplatin further amplified these effects, significantly reducing viability across OCa cell lines. Mechanistic studies showed enhanced gamma-H2AX accumulation, increased DNA damage, robust induction of ER stress markers, and reduced invasion following combination treatment. In PDO and PDX models, ERX-208 combined with DNA-damaging agents produced marked tumor suppression beyond monotherapies, confirming translational relevance. ERX-208 also reduced viability of therapy-resistant OCa models in vitro

and inhibited xenograft growth in vivo. These findings support ERX-208 as a potent ER stress-inducing agent that enhances the therapeutic efficacy of standard chemotherapies in OCa models. The patents surrounding ERX-208 are licensed to EтираRx.

Aidan Panter

Discipline: Computer Science

Authors:

#1 Aidan Panter Aidan Panter

Ayse Okatan

Abstract Name: Starlink-Based Navigation System for Fixed-Wing UAV

Conventional UAV navigation and control systems rely on short-range RF communication, imposing significant limitations on operational range, real-time control capabilities, and autonomous mission execution. While existing research addresses regulatory frameworks, communication relay strategies, and UAV positioning optimization for extended-range operations, a comprehensive and cost-effective solution integrating satellite-based Internet connectivity with web-accessible control remains absent from the literature. This project presents a Starlink-based navigation and control system for fixed-wing UAVs, enabling real-time telemetry monitoring and command transmission through a web-based interface accessible globally from any Internet-connected device. By leveraging low-earth orbit satellite connectivity, the system overcomes the range constraints inherent to traditional RF approaches while providing operators with a flexible, customizable control environment. The proposed architecture addresses the critical gap between current commercial drone limitations and the demands of extended-range autonomous operations, offering a scalable framework for UAV missions beyond visual line of sight.

Abhinav Panthi

Discipline: Nursing and Public Health

Authors:

#1 James Smith

Abstract Name: The Opioid Epidemic in America: How Science, History, and Policy Collide in a Crisis Repeating Itself

The opioid epidemic in America is a multifaceted, complex crisis shaped by historical, scientific, and policy failures. This paper examines the origins of the nationwide public health emergency that is the misuse of opioid medications and their evolution, by tracing the effects of pharmaceutical marketing in the 1990s and the rise of synthetic opioids, such as heroin and fentanyl. Through using current research on the neurobiology/chemistry behind addiction, effective treatments, and harm reduction strategies, the paper addresses the epidemic in a scientific and political light. Particular attention is given to recent federal decisions that cut funding for naloxone distribution and training, bringing awareness to the severity of the issue.

Yashwant Pantra

Discipline: Biochemistry

Authors:

#1 Yashwat Pantra
#2 Hang Pong Ng
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Abstract Name: KLF6 Enhances Macrophage-Mediated Inflammation and Atherogenesis

A hallmark event in the development of atherosclerotic plaque is the accumulation of lipid-laden macrophages in the subendothelial layers of affected blood vessels. Macrophages are key players in all stages of atherogenesis, including plaque initiation, growth, and rupture, as well as healing of ruptured plaques. In this context, macrophages are the principal innate immune cells that modulate atherogenesis by engaging in various processes, such as inflammation, extracellular matrix degradation, phagocytosis, and efferocytosis. In the current study, Kruppel-like transcription factor 6 (KLF6) deficiency attenuated proinflammatory gene expression in macrophages and experimentally induced atherosclerotic plaque development. In vivo studies showed that myeloid-KLF6 deficiency on Apoe-null background significantly curtailed high-fat/high-cholesterol diet-induced atherosclerotic lesion formation and macrophage abundance in atherosclerotic plaques. Integrated transcriptomics and Gene Set Enrichment Analysis showed that KLF6 deficiency significantly curtailed a large number of tumor necrosis factor (TNF)-induced gene targets, TNF-induced interferon- γ response, interferon- α response, and inflammatory response signaling in macrophages. At the molecular level, KLF6 promoted interferon regulatory factor 1 (IRF1) signaling to enhance TNF-induced proinflammatory gene expression in macrophages. Collectively, study results show that KLF6 promoted proinflammatory gene expression in macrophages and enhanced experimentally induced atherosclerotic plaque formation in vivo.

Dillon Pardue

Discipline: Exercise Science and Nutrition

Authors:

#1 Paul Miller

Abstract Name: Acute Effects of the Nordic Hamstring Exercise on Hamstring Contractile Function

Between 2001 and 2022, athlete injuries and corresponding time away from competition and training doubled. This occurrence led to a focus on injury mitigation among coaches and athletic medical personnel. The Nordic hamstring exercise (NHE) is used to specifically target the hamstring function. The NHE is typically executed using a very controlled cadence. Recently, an NHE variant has gained interest. This version uses a free-fall eccentric phase and rapid concentric braking phase and is referred to in the literature as the fast NHE (NHEfast). Hamstring load and risk of injury peaks during the late swing phase of sprinting. Early research suggests that training with the NHEfast may better address this concern than traditional NHE. It has also been suggested that when the NHEfast is performed, the participant experiences less fatigue. The purpose of this study was to compare the acute effects of the NHE and NHEfast on hamstring function and fatigue. In a randomized crossover design, 12 varsity football athletes completed two conditions (NHE and NHEfast). Each condition consisted of 3 sets of 5 reps. Hamstring function was measured at pre-NHE and 24, 48, and 72 hours post-exercise. Isometric hamstring strength was measured at 0.52, 1.04, and 1.57 radians of knee flexion, and concentric hamstring strength and power was measured at 1.04 rad/s and 3.14 rad/s on a Biodex isokinetic dynamometer. A one-way ANOVA was performed for each isokinetic and isometric condition. The analysis revealed no significant differences ($P > .05$). While there appears to be no contractile force differences, this study still may provide coaches and athletes information that can be used to plan training.

Marisa Parikh

Discipline: Interdisciplinary

Authors:

#1 Jeff Grim

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#4 Birgit Debeerst

#5 Patricia Appiah

Abstract Name: Student Success and Outcomes: An Analysis of Pell Eligible Students at Mason.

There are many questions around the various factors impacting student success in undergraduate studies. The following research study examined Pell Grant students at George Mason University to understand opportunities and potential barriers to student success. To do this, researchers conducted 18 focus groups with a total of 72 students ($N = 34$ Pell eligible students, $N = 38$ non-Pell eligible students). The goal of this research was to gather qualitative findings on current students' perspective on current events, college choice, belonging, academic experiences, work experience, success resources, and graduation preparation. Once data was collected, researchers conducted thematic analysis and coding to identify common themes and trends in responses across groups. Findings highlighted both general impacts and the differences between Pell and non-Pell eligible students. From the analysis, researchers discovered that Pell eligible students were more location-conscious and attempted to stay closer to home while in school. Furthermore, it was also discovered that Non-Pell eligible students were more interested in Mason based on its proximity to DC and that they

connected with faculty more based on research interests. Across both groups, researchers found that students connected more with faculty when they found them compassionate, many students had one to two jobs, and students utilized peers, family, and other existing relationships to seek help for college. The insights these findings provided serve as implications for overall student outcomes at universities.

Sophia Park

Discipline: Biology

Authors:

#1 Sophia Park

Abstract Name: The Abdominal-B and broad transcription factors function in dsf-expressing neurons to regulate egg laying in mated *Drosophila melanogaster* females

Previously, the Shirangi lab identified a set of neurons in *Drosophila melanogaster* that co-express the genes, dissatisfaction (dsf) and doublesex (dsx). These neurons are localized to the abdominal ganglia (AG) of the ventral nerve cord (VNC) and have been named the DDAG neurons, for the dissatisfaction-doublesex abdominal ganglia. Previous results have shown that the DDAG neurons regulate sex-specific behaviors, such as mating and egg-laying. For my project, I investigated genes that initiate double-sex activation in DDAG cells. In previous research, we used a dsfGal-4 to drive a UAS-dsx-RNAi, which blunted dsx mRNA transcripts in dsf cells. When females of this genotype were tested in an egg-laying paradigm, they significantly decreased egg laying compared to their wild-type counterparts. Using data from a recent single-cell RNA sequencing experiment, we identified thirteen highly expressed genes in the DDAG population, which could potentially initiate dsx activation. Using an egg-laying paradigm, I tested each of these identified genes with a dsfGal-4 driver, to see if I could recapitulate the egg retention phenotype. Two genes, Abdominal-B (Abd-B) and broad (br), led to a statistically significant decrease in egg-laying. We hypothesizes that Abd-B and br contribute to dsx acquisition in dsf cells and the proper development of DDAG neurons.

Hyewon Park

Discipline:

Authors:

#1 Dr. Cher Barta

#2 Ryan Grady

#3 Sarina Strnad

Dr. Cheri Barta

Abstract Name: Advising, Mentorship, and Community: A Low-Cost Model for Engaging First generation NCUR Researchers

Undergraduate research is a nationally recognized high-impact practice that enhances academic achievement, cultivates a sense of belonging, and increases student retention and persistence. These benefits are amplified when students have access to positive mentorship, collaborative inquiry, and opportunities to disseminate their work through venues such as the National Conference on Undergraduate Research (NCUR). Yet first-generation and limited-income scholars (FGLI) continue to access these opportunities at disproportionately low rates. These gaps widen during lean grant years, when funding constraints limit paid research placements, conference travel, and capacity to mentor undergraduates. This proposal responds to these challenges by

strengthening and adapting undergraduate research infrastructure to evolving conditions, with an explicit emphasis on both inclusion and excellence. At UW-Madison, the Center for Educational Opportunity (CeO) and the Office of Experiential Learning (OEL) have developed a holistic and equitable support model that serves first-generation and Pell-eligible scholars, using proactive advising, inquiry-based curricula, and early-entry research opportunities. This presentation will examine the effectiveness of multilateral partnerships among academic departments, research labs, and student-support units, student organizations in expanding affordable research opportunities using quantitative and qualitative analyses. Ultimately, this research seeks to advance national efforts to build sustainable, equity-centered pathways that empower GLI students to become the next generation of researchers, problem-solvers, and collaborative leaders.

Soyeon Park

Discipline: Economics

Authors:

#1 Soyeon Park

Abstract Name: Global Talent Flows and the U.S. Labor Market

The study analyzes how optional practical training (OPT) and STEM OPT programs in the United States function as structural mechanisms connecting international higher education and the U.S. labor market. Using SEVIS administrative data in 2024, the distribution of majors of more than 1.21 million international students and their participation in OPT/STEM OPT showed that 52% of international students majored in STEM and about 18% actually entered the U.S. labor market through OPT or STEM OPT. This shows that these programs are not just an extension of stay, but a key path responsible for the supply of high-skilled manpower in the U.S. According to previous studies, the 2008 STEM OPT extension policy significantly increased the selection rate and degree acquisition rate of STEM majors, and had a positive effect on maintaining high-skilled manpower in the U.S. In addition, the empirical evidence that about 40% of STEM OPT participants will later switch to H-1B visas shows that OPT is a major channel linking U.S. higher education and long-term employment. As a result of the comparative analysis, competing countries such as Canada, the U.K., and Australia have provided more predictable post-graduation routes and confirmed that the competition for global talent acquisition is intensifying. Overall, this study shows that OPT and STEM OPT play a key role in maintaining the US innovation economy by providing a pipeline of high-skilled personnel in engineering, computer engineering, and technology. These programs are not just student systems, but strategic policy tools that connect American universities and industries, increase productivity, and maintain the US advantage in global talent competition. Therefore, the stability and expansion of the OPT/STEM OPT path proves essential to maintaining long-term economic competitiveness in the United States.

Carly Parker

Discipline: Biology

Authors:

#1 Cristine Camp

#2 Adrian Courville

#3 Miranda Reed

#4 Rachel West

Abstract Name: Evaluating the Effect of Prenatal Cannabinoid Exposure on Placental Lipid Transport and Accumulation

As more states legalize recreational and medicinal cannabis, rates of cannabis consumption have risen across most demographics, including pregnant women. However, population studies suggest a link between prenatal cannabinoid exposure (PCE) and altered metabolic health of offspring. As the placenta is a key mediator of fetal metabolism, we hypothesized that PCE alters placental metabolism. In this study, pregnant rats were exposed daily to vaporized Δ^9 -tetrahydrocannabinol (THC; 100 mg/mL) or polyethylene glycol 400 (PEG; vehicle control) from gestational days (GD) 5-18. On GD19, fetuses and placentas were collected. Both fetal and placental weights were significantly higher in the THC group ($p < 0.05$), suggesting metabolic alterations. We next isolated RNA from placentas and performed RNA-sequencing. The PCE placentas had over 1,100 differentially expressed genes ($\log_2\text{foldchange} > 1$, $\text{padj} < 0.05$). Downstream gene ontology analysis showed enrichment of pathways related to lipid catabolism and protein-lipid complex formation. To assess corresponding protein changes, we quantified markers of placental lipid transport and catabolism using Western blotting. We found that the apolipoprotein, ApoE, was significantly elevated in the THC-exposed placentas ($p < 0.05$). To determine if changes in gene and protein expression corresponded with increased lipid accumulation in the placenta, we visualized lipid deposition using Oil Red O staining. THC-exposed placentas exhibited increased lipid accumulation compared to the PEG control group. This study establishes a link between PCE and increased lipid catabolism, protein-lipid complex formation, and lipid accumulation in the placenta. Additionally, increased placental ApoE is correlated with preeclampsia and preterm birth, suggesting a much larger role for PCE in placental dysfunction and adverse pregnancy outcomes. Overall, this work supports a role for PCE in influencing placental lipid metabolism, with potential consequences for fetal metabolic programming.

Gwenevere Parker

Discipline: History

Authors:

#1 Joseph Walzer

Ava Danzer

Abstract Name: Who's Land Project

"Whose Land?" is a podcast and public dialogue project that explores the histories of farming, land and migration between New York and Wisconsin, with an emphasis on land loss and dispossession. Working in collaborative community-scholar-student teams, the project aims to frame discussions around how land practices affect Indigenous, Black, white and Latinx communities today. The goal is to raise consciousness around issues of spatial justice and the racial dimensions of social belonging, facilitating dialogue across the "rural-urban divide," and envisioning models of reconciliation. Our initial research phases have led to the development of a digital map identifying and telling stories of important sites of BIPOC history and dispossession in Milwaukee. This coming Spring we will continue this work, examining these sites in more depth, collecting land records, exploring the genealogies of historic residents, conducting oral history research, and connecting with past and current community organizations. Four regionally-based field teams are currently working on this project: New York City, Rural New York (Central New York Finger Lakes region), Milwaukee, and Rural Wisconsin (southwestern and central eastern portions of the state). UWM hosts the Milwaukee team, headed by Joe Walzer (Cultures & Communities).

Faith Parker

Discipline: Biology

Authors:

#1 J. Chuck Harrell
#2 Emily Zboril
#3 Rachel Myrick
#4 David Boyd

Abstract Name: Antiestrogens present agonist activity in bone in the presence of osteoporosis resulting in a bone protective treatment option for estrogen receptor positive breast cancers

Breast cancer is one of the most significant causes of mortality among women and the second leading cause of cancer death in women. The estrogen receptor (ER) is a key oncogenic driver in the majority of breast cancer (BC). ER-positive BC is the most common molecular subtype of BC. Management of ER+ breast cancer varies depending on menopausal status. For premenopausal women, the goal is to suppress estradiol production from the ovaries with surgical oophorectomy and/or aromatase inhibitors. In postmenopausal women, endocrine therapy (ET) serves to suppress estradiol production from sources other than the ovaries. During the menopausal transition, estradiol levels decrease, resulting in a negative balance of the bone remodeling cycle, which can lead to osteoporosis. ET also leads to a decrease in estrogen and osteoporosis induced by ET in ER+ BC has become a concern. The purpose of this study is to identify ETs with context-dependent agonist/antagonist activity. In this study, ovariectomized NSG mice were treated with various antiestrogens over a 6-week period. Tamoxifen, Elacestrant, and Lasofoxifene were administered 5 times a week to the mice at doses of 50 mg/kg, 60 mg/kg, and 5 mg/kg (respectively). Fulvestrant was administered at 5 mg/dose once a week, and E2 was administered via a slow-release subcutaneous pellet. At the endpoint, sections of the femurs, tibias, and uterus were retrieved and interrogated by histology and histomorphometric analysis using micro-CT. From imaging, significant differences in bone density and trabecular thickness were observed between the E2 and treatment groups. Ongoing studies will utilize select models to determine agonist activity in bone, producing bone-protective effects from the antiestrogenic endocrine therapies. Data from this study will translate into novel ET treatment combinations that alleviate the osteoporotic effect induced by decreased estrogen from ET.

Kayli Parker

Discipline: Philosophy, Ethics, and Religious Studies

Authors:

#1 Kayli Parker
#2 Kelsey White
#3 Calvin Bradley Jr.
#4 Tiffany Redmond

Abstract Name: Perspectives on Simulation in Spiritual Care Education

Simulation has been widely used in medical education for the purpose of creating a controlled, safe environment for students to encounter realistic situations and practice essential clinical skills. Spiritual care providers (SCPs), commonly referred to as chaplains, are allied health professionals who attend to the religious, spiritual, and existential needs of people in healthcare settings. Despite the salience of clinical training and graduate-level education, there has been little research regarding the role of simulation in SCPs' professional preparation. VCU's Department of Patient Counseling utilizes simulation within their education programs and is one of a very few in the country training SCPs with this pedagogical approach. To explore how SCPs describe their experiences using simulation in spiritual care education, we invited Patient Counseling alumni to participate in a focus group and share their perspectives on the role of simulation in their professional preparation. Our qualitative study has conducted 1 focus group and has a second scheduled with a total of 7 alums; our team is currently recruiting for 2 additional focus groups for January. The focus groups will gauge perspectives of both alumni who have experienced simulation and those who have not. From focus group transcripts, we will conduct an inductive thematic analysis. Our poster will present the

themes in the data and discuss whether or not we see SCPs experiencing similar benefits as reported in research for other clinical professionals. We will make recommendations from our results for further research and considerations for simulation in spiritual care education.

kyla parks

Discipline: Gender, Ethnicity, Diversity, or Cultural Studies

Authors:

#1 Kerrie DeVries

Kayla Parks

Abstract Name: How race-based courses influence racial identity and sense of belonging for Black students at a predominantly white institution (PWI).

Our project examines how race-based courses influence racial identity and sense of belonging for Black students at a predominantly white institution (PWI). Through a survey of 140 students 67 Black and 75 non-Black we analyzed differences in representation, campus experiences, and interest in race-based classes. The findings reveal a clear disparity: while non-Black students overwhelmingly report feeling represented and connected to the university community, many Black students describe feeling underrepresented, overlooked, or disconnected from the broader campus environment. This gap raises important questions about the university's stated commitment to diversity and the lived experiences of its students of color. We also explored students' willingness to enroll in race-based courses. Many non-Black students expressed limited interest, often viewing these classes as unrelated to their academic or personal goals. In contrast, Black students showed strong engagement and described meaningful benefits from taking such courses. When focusing specifically on Black students' responses, the data indicates that race-based classes offer valuable spaces for exploring identity, processing shared experiences, and building supportive peer networks. Students reported that these courses foster deeper critical thinking, self-reflection, and community formation skills and supports that extend far beyond the classroom. Overall, our research underscores the significance of race-based curricula as tools for promoting inclusivity and supporting students of color at PWIs. These courses provide academic and social spaces where Black students can feel seen, heard, and valued in ways that general coursework may not offer. By sharing these insights, we aim to spark broader conversations about campus climate, representation, and the importance of curricular offerings that reflect the diverse identities of the student body. Our project advocates for institutional efforts to expand race-based courses and to create a more inclusive and supportive environment for all students, particularly those from marginalized backgrounds.

Joseph Parlier

Discipline: Chemistry

Authors:

#1 Jörg Woehl

#2 Brenden Chasteen

Abstract Name: Generalized Jones Matrices and Their Application in Point Spread Function Imaging

A deep understanding of image formation in optical microscopes is crucial for analyzing images and for the development of new approaches to imaging. This specific research topic focuses on the point spread function (PSF). The PSF depicts the three-dimensional diffraction patterns of a point-like source. Optical images can be thought of as consisting of distributions of these point sources so the PSF directly affects the resolution

and quality of experimental images. While there already exists theoretical frameworks for the PSF such as the Debye-Wolf PSF theory, they do not account for the digital spatial light modulators (SLMs) used in microscopy with adaptive optics. PhD student Brenden Chasteen and Dr. Jörg Woehl are currently developing PSF theory further to account for SLMs which could potentially allow for more accurate simulations of modern imaging techniques using adaptive optics. In Debye-Wolf PSF theory, a point source can be depicted by propagating plane waves. In microscopy however, there will often be many optical instruments that will end up changing or adjusting the propagation, phase, and polarization of these plane waves. As a result, it is important to track these adjustments using Jones matrices. A Jones matrix initially tracks two cartesian components following the assumption that the direction of propagation of a plane wave after it travels through an optical instrument does not change. However, this assumption is not always the case so PSF theory requires the use of Generalized Jones matrices. These matrices include the tracking of a third component that accounts for changes in propagation direction which is more applicable to optical instruments. Generalized Jones matrices are a fundamental part of PSF theory and an understanding of how they can be used for optical instruments is crucial for further developing PSF theory to account for SLMs.

Harshita Parmar

Discipline: Psychology

Authors:

#1 Joseph Gauntlett

#2 Chelsea Sawyers

#3 Lisa Straub

Abstract Name: Investigating Eye-Tracking and Genetic Biomarkers of Psychosis in Youth with Autism Spectrum Disorder

Individuals living with Autism Spectrum Disorder (ASD) are not the only group of patients who experience challenges with social relatedness and struggles with interpersonal relationships are associated with a range of disorders. While commonly associated with Autism Spectrum Disorder (ASD), these symptoms are also prevalent in individuals with psychosis. ASD and youths at-risk for subsequently developing psychotic disorders share unusual thought content, challenges with social interaction, and stereotyped behaviors. Due to the overlap in symptoms and experiences common to both disorders, misdiagnosis of ASD in youth displaying prodromal psychosis symptoms may be increased. This study aims to understand the association between eye-tracking deficits with individuals with ASD diagnoses, and their experience of psychotic symptoms.. This research study focuses on ASD and psychosis using two biomarkers, eye tracking and saliva, to identify which biomarkers are associated more with psychosis than with ASD. This could then be used to inform diagnostic tools used in differentiating ASD and prodromal psychosis in teenagers. This study recruits adolescents aged 13-17 with an ASD diagnosis. Data collection measures include saliva samples for genetic testing, a prodromal psychosis questionnaire asking about different experiences and how bothered the participant is by these experiences, the MATRICS Consensus Cognitive Battery (MCCB) which focuses on measuring cognitive functioning related to schizophrenia and other similar disorders, and lastly the smooth pursuit task which captures saccades using an eye-tracking camera. We will present an overview of the study design and preliminary data from the eye-tracking task.

Jack Parmeley

Discipline: Environmental Science and Sustainability

Authors:

#1 Hannah Petersen
#2 Jack Parmeley
#3 Layla Viera
#4 Isak Schwillie
#5 Lucas Gose
#6 Faith Pursley
#7 Peter Rassam
#8 Riley Benefiel
Michael Gerges
Sam Gowel

Abstract Name: Sustainable Aviation Fuel's Effect on Fluorocarbon Viton O-rings

In response to the alarming rise in aviation-induced CO₂ emissions, the commercial aviation sector has accelerated development of sustainable aviation fuels (SAFs) to mitigate soot and contrail formation, issues largely attributed to the aromatic content in conventional Jet-A fuels. SAFs - biomass-derived alternatives - are currently limited to a 50% blending threshold with petroleum-based fuels to compensate for aromatic losses during the hydrogenation process, a critical factor for maintaining seal-swell characteristics and other key fuel properties, including dielectric constant. This study investigated the impact of Jet-A-HEFA-SPK fuel switching on fluorocarbon O-ring seal integrity, a material considered highly resistant to chemical degradation. Multiple Jet-A, HEFA-SPK, and HEFA-SPK blends of ARO150 simulated O-ring exposure in a legacy engine drop-in model, using extended transition bath soaks. Post-exposure analysis was conducted using Thermogravimetric Analysis (TGA) and Dynamic Mechanical Analysis (DMA). TGA results revealed minimal fluorocarbon O-rings fuel absorption compared to nitrile seals; however, significant derivative mass loss shifts were observed during fuel switching, indicating potential elastomer chemical alterations. DMA results demonstrated that while unexposed and Jet-A exposed O-rings maintained consistent mechanical properties, switching from Jet-A to HEFA-SPK led to significant Young's modulus changes, suggesting possible polymer backbone or cross-linking modifications. Ultimately, although fluorocarbon O-rings exhibit minimal swelling differences, fuel switching induces detectable material changes, which may impact long-term seal performance. Furthermore, increasing aromatic content to 12% in HEFA-SPK did not fully restore baseline mechanical properties, suggesting that the FAA-mandated 8% aromatic minimum may not entirely mitigate long-term material degradation risks.

Valentina Parra

Discipline: Gender, Ethnicity, Diversity, or Cultural Studies

Authors:

#1 Valentina Parra

Abstract Name: @DarkHumor: Race-Blindness, Racism, and Racialization in Mexican Digital Discourse

Racialization, the process through which one is marked and treated as a certain race, can be complex and contradictory. My project uses a contemporary case study of satirical political discourse on social media during the 2024 Mexican presidential elections to document the ways in which racialization is operationalized without the explicit naming of race. The ideology of *mestizaje*, which touts the development of an exceptional "raceless" race through centuries of racial mixture in Latin America, is a core component of the Mexican identity. However, racism remains a central facet of Mexico's landscape, perpetuating the erasure and subjugation of the Black, Indigenous, and Asian presence and experiences in the country's national identity. Despite claiming unity, *mestizaje* sustains the race-blind conditions needed to ignore, deny, and disavow racism in Mexico. The public nature of social media can provide important insights into the process of racialization by providing an accessible view of popular reactions to racism. Digital satirical environments are rife with racist language, made permissible under the guise of dark humor. The novelty of digital social

network research, coupled with the recency of the 2024 presidential elections, signal an opportunity to address understudied phenomena. I focus on a racist political post by popular Mexican meme account @EsDeMamador on X (previously Twitter) on the day of the election. I utilize an intersectional framework to analyze an array of 56 pre-selected (sub)replies to the original post. Drawing from literature on ethics in the digital humanities, Critical and Computer-Mediated Discourse Analysis, post-colonialism, and Critical Race Theory, I illuminate how non-racial categories (i.e., class, political party, religion) are weaponized as instruments of racialization. These reflect, refract, and advance exclusionary national imaginaries. My findings accentuate how white supremacy, anti-Blackness, and anti-Indigeneity continue to permeate daily interactions in Mexico today, despite the country's alignment with race-blind ideologies.

Isabella Parra

Discipline: Physics and Astronomy

Authors:

Abstract Name: Measuring Lunar Crater Depths Using Photometric Shadow Analysis

Measuring the depth of craters on the moon is important because it can tell us an abundance of information about the moon, such as the moon's age, history, and composition. This project's goal is to measure the depth of various craters on the moon accurately. To achieve this, a CPC 9.25-inch Schmidt-Cassegrain telescope will be used, along with an STL-11000M CCD camera, to capture images of the moon. Images are taken through the Astrophotography Tool software, and they are processed using AstroImageJ, an astronomical photometry software. Within this software, images are cleaned using dark frames, bias frames, and flat fields. Images will consist of monochrome as well as full color. Observations are made during the waning and waxing phases. This timing is chosen for two main reasons. The first being that the moon's high position in the sky reduces the distortions the atmosphere naturally causes when light tries to pass through it. Second, this is when the terminator – or the line that separates the dark side of the moon from the sunlit side – is most distinct, causing prominent shadows more straightforward to measure. Observations will also occur over multiple sessions to lessen uncertainty and ensure the most accurate data is obtained. Using the lengths of the shadows the craters cast and the angle from which the light is coming in, the depth of the crater can be determined. Comparison of calculated depths and published reference values will determine accuracy. This work illustrates the capabilities of small telescopes within the astronomy field and provides further insight into the characteristics of the moon.

Emily Parris

Discipline: Psychology

Authors:

Abstract Name: Elements in Transition: The Evolution of First-Year Student Experience from Pre- to Post-COVID-19

The college years are a critical period for identity exploration and the development of independence separate from one's familial unit (Arnett, 2000). The "college experience" (a collective of central themes functionally universal to American universities across varying executions) facilitates opportunities for students to develop these skills and undergo the transition into young adulthood (Arness, 2000). The COVID-19 pandemic radically altered how students engaged with the college experience. Students battled increased rates of depression, anxiety, and boredom, struggled to maintain their physical health, and felt disconnected from

family, friends, and peers (Birmingham et al., 2023). Our goal is to compare key metrics across three First Year Seminar (FYS) cohorts (Fall 2019, 2021, and 2023) to better understand how the COVID-19 pandemic impacted the college experience. The key metrics being compared were belonging, academic inquiry, and time management. There were a total of 385 undergraduates who completed a comprehensive survey on a variety of topics related to the first year experience including involvement on campus, wellbeing, and assistance and the FYS course such as beneficial experiences and feedback for instructors and peer mentors. Due to the categorical nature of the data, chi-square analyses were employed. Results suggest that students' sense of belonging decreased during the pandemic ($p < .001$), which is further supported by the finding that less students joined clubs during that time ($p = .02$). Findings also indicate that students worked less during the pandemic ($p < .001$). Additionally, results showed that students studied less ($p = .04$) and attended tutoring less during COVID-19 ($p < .001$). Taken together, these outcomes demonstrate a pattern that the first-year student experience was negatively affected by the pandemic. This knowledge gained can be used to alter the first year experience in meaningful ways to meet current students where they are in this post-COVID-19 landscape.

caleb parson

Discipline: Biology

Authors:

#1 caleb parson

Abstract Name: Bridging the Gap: Empowering Vulnerable Populations Through Cosmetic Surgery for Genetic Malformities

Researchers dedicated to advancing science and health critically examine the risks and benefits of craniofacial surgery. Current literature emphasizes reconstructive surgery's potential to enhance psychological well-being and social inclusion for marginalized individuals. While these procedures carry inherent risks, their positive psychosocial outcomes—particularly in boosting self-esteem—are crucial for those facing stigma. The National Institutes of Health has identified psychosocial factors influencing decisions about reconstructive surgery across diverse sociodemographic groups, revealing barriers to timely treatment for craniofacial conditions. Reconstructive surgery is often misconceived as purely elective; however, for individuals with conditions like cleft lip and palate, these procedures are essential medical interventions that restore both physical function and dignity, fostering social integration. This research seeks to answer: “How do reconstructive surgery interventions for individuals with cleft lip and palate empower marginalized populations and enhance their well-being?” By examining the effects of these surgeries on individuals facing systemic healthcare barriers, we contribute to promoting health equity. This study employs a systematic review of published case series in the Journal of Universal Surgery focused on congenital abnormalities, analyzing secondary data on patient satisfaction and outcomes. Preliminary findings indicate significant improvements in speech, facial symmetry, self-esteem, and social integration. This research underscores the urgent need for outreach and educational initiatives in underserved areas, highlighting healthcare providers' roles in facilitating access to transformative interventions, thus empowering all individuals to receive the care they need and deserve.

Jennifer Parsons

Discipline: Interdisciplinary

Authors:

#1 Jen Parsons

Abstract Name: Evaluating the Efficacy of Food Recovery Network

In 2019, the United States Environmental Protection Agency estimated that 66 million tons of food waste was generated in the food retail, food service, and residential sectors. That same year, the United States Department of Agriculture estimated that 35.2 million people lived in food-insecure households. Food Recovery Network (FRN) is a non-profit organization that aims to reduce food waste on college campuses by donating excess, unserved food to local organizations that address food insecurity. This paper analyzes Lafayette College's FRN in Easton, Pennsylvania, as an eco-socio-technical system and specifically assesses its social costs and benefits to determine the value of FRN in reducing food waste and alleviating food insecurity. To estimate market and non-market costs and benefits, this study uses 2023 - 2025 data from the Lafayette FRN's food logs, community partner Safe Harbor, Lafayette's dining provider Parkhurst, and student survey responses. The data shows the number of people being fed, the type of food being donated, the amount of food being donated, the hours of labor designated to FRN, and students' willingness-to-pay, among other factors considered in this analysis. Findings will impact Lafayette FRN's decisions in its efforts to reduce food waste and food insecurity.

Parikshit Parsoya

Discipline: Physics and Astronomy

Authors:

#1 Parikshit Parsoya

#2 Jacob Skinner

#3 Sachith Dissanayake

Abstract Name: Synthesis and Characterization of Rare Earth Layered Borates $\text{Ba}_3\text{Ln}(\text{BO}_3)_3$, $\text{Ln}=\text{Gd}, \text{Nd}, \text{Dy}$

Rare-earth layered borate with the general formula $\text{Ba}_3\text{RE}(\text{BO}_3)_3$ has attracted attention due to its magnetic-ion arrangement in a triangular lattice motif. These materials are known to crystallize in two distinct structural types. For $\text{Ln} = \text{La}-\text{Tb}$, the compounds adopt a trigonal structure (type I) with space $R\bar{3}$. In contrast, for $\text{Ln} = \text{Dy}-\text{Lu}, \text{Y}, \text{Sc}$, the compounds may crystallize either in the same trigonal structure (type I, space group $R\bar{3}$) or in a hexagonal structure (type II) with space group $P6_3\text{cm}$, depending on the synthesis temperature. Previous studies have revealed a range of exotic magnetic behaviors in this family with $\text{Ln}=\text{Yb}, \text{Er}, \text{Tb}$ etc. In this poster, we present the synthesis of $\text{Ba}_3\text{Ln}(\text{BO}_3)_3$, with $\text{Ln}=\text{Gd}, \text{Nd}, \text{Dy}$, and discuss the structural and magnetic properties.

Sofia Passariello

Discipline: Interdisciplinary

Authors:

#1 Sofia Passariello

Abstract Name: Where the City Breathes: Exploring Urban Climate Resilience and Public Health Through Green Spaces in Vienna, Austria

Climate change, one of the most pressing issues society faces today, has driven a sharp rise in global

temperatures over the past two centuries. While its effects are worldwide, urban populations face disproportionate mental and physical health impacts: an urgent concern as two-thirds of the world's population is projected to live in cities by 2050. As a result, this case study in Vienna, Austria investigates how urban green spaces (UGS) support citizens' mental and physical health, and how civic engagement can help shape community development under climate change pressures. The study used a mixed-method approach including semi-structured interviews with project organizers, surveys, and participant observation. Initial findings include that there are strong themes connecting public UGS accessibility with physical activity and stress reduction, as well as thoughtful UGS designs that help to support urban cooling. The research also found that when citizens participated in community-supported urban greening projects they felt more motivated about creating environmental improvements and gained great mental satisfaction from having a say in shaping their neighborhood and neighborhood projects. This research offers valuable insights into sustainable planning and policy that is aimed at promoting public health through the development of UGSs. It also showcases how community-driven engagement with these spaces can strengthen climate resilience in cities.

Shivani Pasupuleti Roopesh

Discipline: Biology

Authors:

#1 LaMont Cannon

#2 Una O'Doherty

Abstract Name: HIV Integration Alters Host Gene Expression in CD4 T Cells: An RNA-Sequencing Study

Human Immunodeficiency Virus (HIV) establishes lifelong infection by integrating its viral DNA into the human host genome. According to the Centers for Disease Control and Prevention (CDC), approximately 1.2 million people in the United States are living with HIV, and nearly 13% are unaware of their diagnosis, underscoring the public health burden of viral infection. Chronic HIV infection is associated with cancer risk and genomic instability, driven in part by changes in host gene expression during viral replication. As HIV replicates in CD4 T cells, it integrates into transcriptionally active genomic regions that can further alter host gene expression. However, the extent to which integration orientation and genomic location influence host gene expression remains unclear. We aim to investigate how HIV integration impacts host gene expression by analyzing RNA-sequencing data from single-cell cloned CD4 T-cells. We use computational analyses to identify HIV integration sites, quantify chimeric splicing events, and examine changes in local gene expression. We hypothesize that sense-oriented integrations promote viral transcription and alter local host gene expression, whereas antisense integrations have less influence. Preliminary analyses show sense-oriented integrations within host genes such as RLF and ZNF292, accompanied by increased downstream exon expression relative to controls. By characterizing integration orientation and its impact on host RNA expression, this research advances understanding of how virus–host interactions drive transcription and may inform future therapeutic strategies targeting HIV persistence.

Jaylin Pate

Discipline: Psychology

Authors:

#1 Jaylin Pate

#2 Kimberly Lazarus

#3 Fantasy Lozada

Abstract Name: Analyzing the Impact of Positive Youth Development Programming on Youth Critical Consciousness

Youth Participatory Action Research (YPAR) promotes valuable skills among youth such as critical thinking, civic engagement, and critical consciousness. Critical consciousness helps youth understand the world around them and believe that they can create positive social change. Egalitarianism and perceived inequality are two aspects of critical consciousness. Egalitarianism, or the belief that all people deserve equal rights, is a key component of critical motivation. Perceived inequality, or the ability to recognize social injustice, is the foundation for critical reflection. In the present study, we explored the impact of a YPAR intervention, Youth Voices (YV), on key aspects of youth critical consciousness. The YV program was designed to engage youth in educational activities that scaffold their thinking to address inequities in positive youth development opportunities. Participants were 155 predominantly African American/Black adolescents (ages 13–19 years; $M_{age} = 15.94$, $SD_{age} = 1.36$) with participants distributed approximately equally between the intervention ($n=77$) and control groups ($n=78$). Using one-way ANOVA regression analyses and controlling for baseline scores, gender, and age, results revealed that YV youth demonstrated significantly higher post-test egalitarianism scores ($F[1, 149] = 4.19$, $p = .042$, partial $\eta^2 = .027$) and perceived inequality ($F[1, 150] = 3.97$, $p = .048$, partial $\eta^2 = .026$) compared to control group youth. Results indicate that the YV intervention had meaningful positive effects on critical consciousness, highlighting the importance of YPAR in building aspects of critical consciousness in adolescents. Future research should explore which specific program aspects effectively promote critical consciousness and strategies to implement them into youth development initiatives to better support young people in being catalysts for change. Overall, the data suggest that youth programs can have a meaningful impact on aspects of critical consciousness, and we should continue to invest time and resources in these interventions to further positive youth development outcomes.

Tanushree Patel

Discipline: Biology

Authors:

#1 Tanushree Patel

Abstract Name: How Iron Uptake Pathways Influence *Aspergillus fumigatus* Growth Across Different Iron Sources

Iron acquisition plays a critical role in the survival and virulence of *Aspergillus fumigatus*, an opportunistic fungal pathogen responsible for nearly 600,000 deaths each year. Invasive aspergillosis carries a mortality rate of 30–70%, especially among immunocompromised individuals such as organ transplant recipients, cancer patients, and those undergoing hematopoietic stem cell transplantation. In these patients, weakened immune defenses allow fungal spores to germinate and invade tissues, while excess iron can further enhance fungal growth and virulence. Understanding how *A. fumigatus* acquires and utilizes iron under such conditions is important for developing improved therapeutic strategies. This study examines how different iron uptake pathways affect *A. fumigatus* growth and metabolic activity. Wild-type (AfS77) and mutant strains lacking siderophore biosynthesis (Δ SidA), reductive iron assimilation (Δ ftrA), or both pathways (Δ SidA/ Δ ftrA) are being tested in media supplemented with Fe^{2+} , Fe^{3+} , heme, or hemoglobin. Fungal viability is being monitored using the Resazurin (RZ) assay in 96-well plates at 24, 48, and 72 hours. Data collection is ongoing, but early observations suggest that the disruption of iron uptake pathways leads to distinct growth patterns depending on the available iron source. These results aim to clarify the role of iron metabolism in fungal adaptation and may highlight new opportunities for antifungal therapy, particularly in iron-overloaded or immunocompromised patients.

Aayushya Patel

Discipline: Engineering

Authors:

#1 Aayushya Patel

#2 Manuel Espindola

Manuel Espindola

Abstract Name: Development of a Printable Six-Axis Robot with Embedded Control for Cold-Plasma Wound Therapy

Cold Atmospheric Plasma (CAP) has shown to accelerate the wound healing process. The healing mostly occurs due to the reactive radicals entrained in the plasma. The wound surface is exposed to the plasma jet in a controlled manner. However, manual scanning lacks precision, risking uneven dosage and possible damage to surrounding tissues. To solve this we designed, built and tested a 6-axis arm which is fully Open Source clinically used for plasma therapy. Complete mechanical designing has been accomplished using Fusion360 and 3D printed with carbon reinforced PLA. Analysis predicts a 1.2 Kg payload mass while maintaining constant repeatability of 0.2 mm. High resolution, closed-loop NEMA-17 motors with backlash-free gearboxes provide 4.5 Nm peak torque at shoulder & elbow remove the need of external braking. Each joint features a redundant encoder which will trigger mechanical hard-stops and software emergency-off at a position error of greater than 0.5deg. The control hierarchy features a Teensy 4.1 microcontroller to handle 1 kHz motion loops (PID). Whereas Raspberry Pi 5 is responsible for high-level trajectory planning and human-machine interfaces. The system operates in a real-time Linux kernel. To keep the CAP nozzle 5 ± 0.5 mm above the surface with a velocity of less than or equal to 15 mm/s and acceleration of less than or equal to 50 mm/s^2 , blended Jacobian inverse kinematics was employed. These limits comply with ISO 13482 personal care robots. MATLAB model simulation achieved 98% path tracking accuracy when performed on a 3D printed anatomical phantom (R=40 mm cylinder). Fabricated system is under testing and results will be presented in the conference.

Nirav Patel

Discipline: Engineering

Authors:

#1 Mubarak Mujawar

Abstract Name: Effect of Anode Size on the Properties of Constricted Hollow Anode Pulsed Plasma Source

With the advent of the ion thruster, burns requiring large velocity changes can be done with a fraction of the propellant compared to traditional chemical rocket engines. However, current ion thrusters produce thrust in the order of millinewtons and thus cannot be viable for launching vehicles or burns requiring velocity changes in a small amount of time. Furthermore, current ion thrusters experience grid and component erosion, where the two grids at the termination of the nozzle slowly erode due to particle impact and hot electrodes degrade due to high thermal load. This limits the life of ion engines, which require a long useful life to be practical. Additionally, current thrusters require lots of electrical power, often in the order of kilovolts, which requires large and heavy power supply components, detracting valuable payload mass. This research explores the use of a constricted hollow anode pulsed plasma source (CHAPPS) to generate high-density plasma in the constrained region to mimic the desired conditions in the ion thruster. Experiments are carried out in a vacuum chamber at operating pressure of 0.1-10 mTorr. Plasma is characterized by the Langmuir probe and emissive probe. Various electrode geometries are being tested to further optimize the density of the sinusoidal

plasma and thus achieve the best thrust density while avoiding the traditional pitfalls of electrode and grid erosion.

Pal Patel

Discipline: Biology

Authors:

Abstract Name: "Alarming Antibiotic Resistance in Gram-Negative Bacteria from Canada Goose Droppings as a Public Health Concern"

Canada geese (*Branta canadensis*) are abundant in urban parks and outdoor spaces, where their droppings may serve as reservoirs of pathogenic and antibiotic-resistant bacteria. Understanding the microbial composition of goose droppings is essential to assessing potential zoonotic risks in shared environments. This study tested goose droppings collected from Secaucus, Wayne, and Jersey City, three locations situated near different bodies of water, including a lake, a river, and the Hudson waterfront. Gram-negative bacteria were isolated on MacConkey agar, with lactose-fermenting and non-lactose-fermenting colonies identified. Antibiotic susceptibility was evaluated using the disk diffusion assay with eight different antibiotics, including penicillin, ampicillin, ciprofloxacin, and tetracycline, which are commonly used in clinical settings. Hemolytic activity was assessed on blood agar to determine pathogenic potential. A substantial number of isolates displayed resistance to multiple antibiotics. The blood agar assay also identified colonies with beta-hemolysis, indicating the presence of potentially pathogenic bacteria. These findings suggest that urban goose droppings can harbor antibiotic-resistant and harmful bacteria, posing health risks for communities in shared environments. Future research will use molecular identification of isolates through 16S rRNA sequencing to characterize resistance genes and virulence factors, and will expand testing to include Gram-positive bacteria and additional clinically relevant antibiotics.

Parth Patel

Discipline: Mathematics

Authors:

Clay Gransberg

Abstract Name: Theory of Panspermia using mathematical concepts

This research is based on the application of the SEIR (Susceptible-Exposed-Infected-Recovered) epidemiological model to study the theory of Panspermia. The theory of Panspermia is the hypothesis that life can be transferred via interplanetary mechanisms such as meteoroids, comets, or interstellar dust. By adapting the SEIR model to represent the stages of microbial survival, shielding, transfer, and successful colonization in extraterrestrial environments, we investigate whether the spread of life across astronomical distances can exhibit dynamics analogous to contagion spread in biological populations. Our model simulates the survival probabilities, and under certain conditions, panspermia-like transfer processes can display threshold behaviors and propagation patterns similar to epidemic outbreaks, offering a quantitative framework to evaluate the possibility of life dissemination beyond Earth. Ultimately, this approach strengthens the scientific basis for evaluating whether life could realistically migrate and take hold beyond its planet of origin.]

Misha Patel

Discipline: Biochemistry

Authors:

#1 Malini Harinath

#2 Nisha Shetty

#3 Pamela Moalli

#4 Amanda Artsen

Abstract Name: Extracellular Matrix Degradation by Severity of Pelvic Organ Prolapse

Introduction: Pelvic organ prolapse (POP), or descent of pelvic organs into the vaginal canal, affects up to 50% of women by age 50. POP is characterized by four stages of severity, with stage 1 representing mild prolapse and stage 4 representing complete prolapse. In POP, MMP2 and MMP9 degrade the vaginal extracellular matrix, while TIMP3 is an MMP inhibitor. This study aims to clarify the roles of MMP2, MMP9, and TIMP3 across POP stages. Methods: Full thickness vaginal biopsies were collected from patients with POP stage ≥ 2 and non-prolapse controls. Age within stage was matched by decade; closer matching was not possible within the study timeframe. We estimated 40 samples would provide 80% power with $\alpha=0.05$ to detect a moderate difference between groups. MMP9, MMP2, and TIMP3 were quantified by ELISA and compared between groups using Kruskal Wallis tests followed by Dunn post hoc comparisons. Results: Women with each stage of POP were older than controls (controls 48.8 ± 11.7 ; POP 62.5 ± 8.5 ; $p < 0.01$). MMP2 increased with increasing POP severity, with stage 4 patients demonstrating tenfold higher levels of MMP2 than controls ($p < 0.01$). MMP9 also increased across POP stages up to stage 3 (controls, 0.07 [IQR 0.17] ng/ug protein; stage 2, 0.25 [IQR 0.44] ng/ug protein; stage 3, 1.03 [IQR 1.36] ng/ug protein); then decreased in stage 4 (0.38 [IQR 0.81] ng/ug protein). Stage 3 and 4 patients exhibited more TIMP3 (0.63 [IQR 0.91] and 0.76 [IQR 0.91] ng/ug protein) than controls (0.09 [IQR 0.28] ng/ug protein) ($p < 0.01$). When controlling for age, TIMP3 remained elevated in later stages of POP ($p < 0.05$). Conclusions: ECM degradation increases with age and severity of POP through stage 3, while stage 4 may represent decreased remodeling.

Garv Patel

Discipline: Biology

Authors:

Abstract Name: Differential White Matter Correlates of Screen Time and Dialogic Reading in Children Born Extremely Preterm

Children born extremely preterm (EPT) are at risk for altered white matter development, affecting language and cognitive outcomes. This study examined the differential effects of screen time and dialogic reading on white matter connectivity in 4–6-year-old EPT and term-born control (CTL) children ($n=15$ per group). Language and cognitive assessments included EVT-2, PPVT-4, CELF-P, and WNV. Demographics were reduced using Factorial Analysis of Mixed Data (FAMD) and clustered to control for group variability. Diffusion MRI data were acquired on a 3T scanner and analyzed using q-space diffeomorphic reconstruction and diffusion connectometry. Results revealed greater white matter connectivity in frontal tracts in EPT children, while CTL children showed greater connectivity in posterior, motor, and language tracts. These patterns may reflect delayed motor and language development in EPT children and distinct neural effects of environmental exposures. This study highlights the utility of connectometry in detecting white matter differences and supports the need for larger, longitudinal studies to explore the impact of screen time and early interventions like dialogic reading.

Mahek Patel

Discipline: Biology

Authors:

#1 Brittany Rupp

#2 Kevin Byrd

Abstract Name: Evaluating Salivary Protein Stability for At-Home Inflammatory Diagnostics

Human biofluids can be utilized for fast and easy disease detection and monitoring to improve patient treatment. Although underutilized, saliva has gained attention as a diagnostic fluid because it is accessible, non-invasive, and rich in proteins, cytokines, and inflammatory markers that reflect both systemic and oral health. However, variations in collection techniques and sample processing can influence protein concentration and biomarker stability, impacting reproducibility essential for clinical applications. This study tests whether saliva can generate reliable proteomic profiles using a low-input, high-throughput inflammatory assay when samples are processed immediately versus after 12–33 hours of delayed storage. Understanding salivary protein stability is essential for developing at-home diagnostic workflows for chronic inflammatory and immune-related diseases. The primary hypothesis is that inflammatory proteins measured in saliva using the NULISA 250-protein panel will remain stable and reliably detectable across immediate, overnight, and 33-hour post-collection processing. A secondary hypothesis is that, if stability is maintained, saliva could serve as a viable non-invasive alternative to blood and tissue for monitoring immune activity relevant to systemic inflammatory conditions, oral health, and other chronic diseases. Saliva will be collected from healthy adults using unstimulated passive drool, centrifuged to remove cells and debris, and analyzed on the ARGO HT platform using dual-antibody proximity ligation. Protein detection rates, biomarker expression, and profile stability will be statistically compared between immediate and delayed processing. We expect delayed processing will result in a slight decrease in protein quantity, resulting in some proteins not reaching detectable levels. Findings will provide insight into the feasibility of saliva-based diagnostics beyond clinical settings, enabling at-home collection and broadening opportunities for monitoring immune and inflammatory conditions across diverse populations. By addressing a critical gap in proteomic research, this study has the potential to advance scalable, non-invasive approaches for personalized healthcare and chronic disease management.

Kush Patel

Discipline: Engineering

Authors:

#1 Raymond Neralla

#2 Akshita Ramesh

Freya Nardelli

Abstract Name: Universal Robotic Controller: A Wearable Sensor Sleeve for Natural-Motion Teleoperation of Any Robotic System

The development of new robotic systems often requires creating a custom control interface for each platform, adding significant cost, time, and complexity to research and engineering workflows. This project addresses that challenge by investigating whether a single wearable device can serve as a universal, intuitive control system for any robot operating within the Robot Operating System (ROS) framework. Existing literature and

current industry practices indicate a growing interest in natural user interfaces for robotics, including gesture control, motion tracking, and wearable sensing. However, most systems remain robot-specific or limited in flexibility. Our Universal Robotic Controller (URC) seeks to make a unique contribution by offering a platform-agnostic controller that translates a user's arm, wrist, hand, and finger movements into standardized ROS commands. This approach aims to create a seamless control method for diverse robotic and mechatronic systems, including manipulators, mobile robots, quadrupeds, humanoids, and aerial vehicles, without requiring custom control interfaces for each device. Our methodology includes designing and fabricating a wearable sleeve equipped with sensors such as IMUs, UWBs, flex sensors, and pressure sensors to capture fine-grained motion. Sensor data is processed through onboard microcontrollers, filtered for noise reduction, and mapped to ROS topics representing position, velocity, or gesture-based commands. We will test the URC across numerous robot types to evaluate accuracy, latency, ease of use, and cross-platform compatibility. We expect the URC to provide a unified, simple, and adaptable control system capable of real-time teleoperation of any robotic project with high positional fidelity. With this project, we aim to reduce development overhead and complexity for robotic systems, improve human-robot interactions, and enable more natural motion-based teleoperation systems.

Kush Patel

Discipline: Engineering

Authors:

#1 Freya Nardelli

#2 Akshita Ramesh

Raymond Neralla

Abstract Name: IMPRIMIS: Self-Driving Ground Vehicle with Real-Time Obstacle & Lane Detection for Adaptive Path Planning

The mass adoption of autonomous robots in package delivery systems is limited by safety challenges, software complexity, and the high cost of sensing hardware. Our project addresses these barriers by developing an autonomous ground vehicle with a computationally efficient and safety-focused onboard computing system. The vehicle can navigate to specified coordinates while avoiding obstacles and maintaining lane position, using an array of sensors to build a real-time map of its environment. Our software architecture is built on the Robot Operating System (ROS), enabling modular data processing and flexible hardware integration. Key subsystems include localization, mapping, and navigation. Localization combines a tracking camera, IMU, GPS, and wheel odometry to estimate the robot's position, orientation, and speed. Mapping integrates LIDAR and camera data to generate a dynamic representation of the surroundings. The navigation stack uses this map to compute efficient, collision-free paths to the target destination in real time. All of these systems operate entirely onboard, removing the need for external base stations. The robot includes extensive safety features such as physical and wireless emergency stops, status-indicating lights and speakers, and resettable fuses. Its T-Slot frame supports modular expansion, and hot-swappable batteries with a backup electrical system protect critical components and ensure constant operation. We conduct rigorous testing to validate safety, improve accuracy, and advance autonomous performance. Through this work, we aim to demonstrate a practical, scalable approach to safe and reliable robotic delivery systems that can help lower the barriers to widespread adoption.

Jay Patel

Discipline: Nursing and Public Health

Authors:

#1 Jay Patel
#2 Keith Brazendale
#3 Ethan Hunt

Abstract Name: Physical Activity and Anxiety in Hypertensive U.S. Adults: Findings from the National Institutes of Health All of Us Research Program

Hypertension is a highly prevalent condition characterized by a systolic blood pressure above 130 mmHg or a diastolic blood pressure above 80 mmHg. It presents a major cardiovascular risk, contributing to increased morbidity worldwide. Hypertension is commonly comorbid with mental health conditions such as anxiety, that can exacerbate cardiovascular outcomes and reduce hypertension treatment adherence. Engaging in regular physical activity can reduce symptoms of anxiety and improve cardiovascular outcomes, but studies using reliable wearable data in hypertensive populations remain limited. The purpose of this study was to examine the associations between physical activity data captured via Fitbit and clinically significant anxiety in hypertensive adults enrolled in the National Institutes of Health All of Us Program Dataset version 8 (2017-2023). Participants (n=1,972) were included for analyses if they had a diagnosis of both hypertension and anxiety reported in their electronic health record, were between the ages 18-91 years at the time of data collection, had at least seven valid days of Fitbit-measured physical activity data, and completed the Generalized Anxiety Disorder-7 (GAD-7) survey. GAD-7 survey data were dichotomized as either clinically significant (GAD-7 $\geq$ 10) or nonsignificant (GAD-7 $\leq$ 10). Logistic regression was performed to examine the odds of clinically significant anxiety for participants meeting or not meeting a clinically significant threshold of 7,500 steps per day. Models adjusted for age, sex, race/ethnicity, body mass index, and income. Participants meeting the 7,500 steps per day threshold were 39% less likely to have clinically significant anxiety (OR = 0.61, 95% CI: 0.43-0.84). These findings provide support for the role of regular physical activity as a strategy for improving both mental and physical health in hypertensive individuals.

Ved Patel

Discipline: Health and Human Development

Authors:

#1 Ved Patel
#2 Faika Zanjani

Abstract Name: Dementia Prevention: Effects of cognitive screening and community education

Dementia is a growing health problem that affects not only individuals but also families and their surrounding communities. My research and community engagement aim to increase awareness of the early warning signs, modifiable risk factors, and strategies for living well after a diagnosis with dementia. As part of this project, I have been working on creating educational slide shows for the local community to help them recognize the potential early risk factors that could lead to dementia later in life and how to prevent those. These presentations are designed to be accessible and empathetic, combining every part of understanding with practical tools for prevention, early detection, and financial approach. I am certified to administer the Montreal Cognitive Assessment (MOCA), which is a widely used screening tool that helps identify early cognitive changes such as mild cognitive impairment. These sessions would help make a connection between clinical evaluation, and this will encourage individuals to seek further assessment and adopt healthy lifestyle habits that support their cognitive strength. As part of the project, I also started developing a Dementia Prevention Badge that community members can earn. Certification creates an easy and encouraging way for people to engage with dementia education and feel recognized for taking steps to care for their cognitive well-being. As part of the certification process, individuals can earn the badge through Credly. Through the work with the VCU College of Health Professions and the Richmond Brain Health Initiative, the main goal of this project is to offer an understanding of the feasibility of telephone screening to catch signs of dementia

early and provide access to dementia education through Badge certifications. In addition to describing the process and development, the frequency of utilization and feedback from the participants will be reported.

Mayur Patel

Discipline: Biology

Authors:

- #1 David Fuentes
- #2 Evan Rudo
- #3 David Fletcher
- #4 Rodrigo Somoza
- #5 Jacob Calcei
- #6 James Voos
- #7 Tracey Bonfield

Abstract Name: In Vitro Models of Chondrocyte Inflammation to Evaluate for Therapeutic Testing

Introduction Osteoarthritis (OA) is a degenerative joint disease defined by chronic inflammation, chondrocyte dysfunction, and cartilage loss. Current OA therapies provide transient symptomatic relief but fail to alter the disease progression. Mesenchymal stem cells (MSCs) have shown promise in OA; however, work is needed to minimize clinical product variability. To study OA therapeutics, it is ideal to have an in vitro model that enables strategic monitoring of therapeutic functional capacity. In these studies, we developed a human chondrocyte model aimed at providing a tool to follow MSC function before in vivo testing. We hypothesize that knee chondrocytes can be utilized to develop an effective model for in vitro validation of MSC pre-clinical.

Methods To mimic the OA environment, human chondrocytes (AlloSource) were cultured in the presence and absence of human granulocyte-macrophage colony-stimulating factor (GM-CSF, 200ug/ml) under normoxic (21% O₂) and hypoxic (5%) conditions. Chondrocyte viability and metabolic activity were quantified using the WST-8 assays (Sigma Aldrich). Chondrocyte gene expression was quantified using qPCR for GAPDH (control), IL-6, COL2A1, and COL10A1 in duplicate, measuring cycle threshold differences from GAPDH (mean Ct $\pm$ SD, n=2).

Results GM-CSF stimulation induced metabolic stress in chondrocytes across both oxygen conditions, with WST-8 fluorescence increasing as the GM-CSF concentration was escalated. Real-time PCR (qPCR) analysis of chondrocytes treated with GM-CSF (200ug/ml) demonstrated a 2-fold increase in COL2A1, from 32.92 $\pm$ 0.04 mean Ct at baseline to 34.01 $\pm$ 0.05 with GM-CSF. COL10A1 collagen gene expression also increased 2-fold, from 32.78 $\pm$ 0.01 to 34.20 $\pm$ 0.02 with GM-CSF treatment. IL-6 exhibited no significant difference between treatment groups compared to GAPDH.

Conclusion These findings demonstrate the development of a promising in vitro model capable of evaluating anti-inflammatory therapeutics such as MSCs. This work has the potential to streamline therapeutic development for treating chondrocyte-based diseases such as OA.

Pranjali Patel

Discipline: Biology

Authors:

- #1 Aleksandra Foksinska
- #2 Matthew Might

Abstract Name: Identifying Target Pathways and Drug Repurposing Candidates for Syndromic Microphthalmia-12 (MCOPS12)

Microphthalmia Syndromic-12 (MCOPS12) is a rare genetic neurological disorder characterized by intellectual disability and motor dysfunction, including hypotonia, dystonia, and severe gross motor delay. It is caused by mutations in the Retinoic Acid Receptor Beta (RARβ) gene, which can result in either gain-of-function (GOF) or loss-of-function (LOF) variants. RARβ is highly expressed in the medium spiny neurons (MSNs) within the striatum and dopaminergic pathways, both of which play essential roles in motor control. A key variant of interest, p.Arg387Cys, causes a conformational change in the RARβ protein, increasing its affinity to retinoic acid (RA) and leading to excessive transcriptional activation. However, literature suggests that both GOF and LOF RARβ variants ultimately contribute to RA deficiency, resulting in consistent phenotypes across GOF and LOF animal models. As part of a collaboration with the Cure MCOPS12 foundation, the Hugh Kaul Precision Medicine Institute (PMI) is investigating therapeutic targets for MCOPS12. One pathway of interest involves mitochondrial dysfunction and MSN vulnerability caused by RARβ LOF, leading to the downregulation of the gene Pgc1α. A literature review and AI-assisted analysis using the NCATS Biomedical Translator AI tool identified several FDA-approved compounds with the potential to restore mitochondrial function through Pgc1α modulation. These findings will be compiled into a research report for the Cure MCOPS12 foundation to guide further preclinical testing.

Gracy Patel

Discipline: Computer Science

Authors:

#1 Gracy Patel

#2 Yash Patel

Yash Patel

Abstract Name: AI-Enhanced Creative Problem-Solving Tools for Higher Education and the Workforce

Artificial Intelligence (AI) is rapidly transforming how individuals learn, think, and solve problems, creating new opportunities for students to develop the creative and analytical skills needed in an evolving workforce. This project investigates how AI tools can support creative problem-solving by assisting users in clarifying challenges, generating original ideas, and developing practical solutions for academic and professional tasks. The central purpose of this project is to examine whether AI can function as an effective partner in creativity rather than a replacement for human thinking. The research focuses on widely accessible AI platforms, including ChatGPT, Copilot, and similar generative systems. A mixed-method approach is used: participants complete short problem-solving exercises, once without AI and once with AI support. Surveys and reflection prompts capture how AI influences idea generation, organization, and decision-making. Additional qualitative data are collected through open-ended responses that describe how users perceive AI's strengths, limitations, and impact on their confidence when approaching unfamiliar or complex problems. The study contributes to a growing conversation about responsible and meaningful integration of AI into higher education. While AI can accelerate brainstorming and offer diverse perspectives, it also requires careful use to ensure that students remain active thinkers and not passive recipients of automated suggestions. The project aims to identify best practices that encourage responsible use while enhancing creativity, originality, and problem-solving efficiency. Expected results include increased idea diversity, improved clarity when defining problems, and greater student confidence during early stages of creative work. These findings will be discussed in the context of preparing students for a technology-driven workforce where human creativity and AI-supported thinking must operate together. Ultimately, this project highlights how AI can expand access to innovative thinking and support students in developing the flexible, adaptive skills needed for future leadership and career success.

Tamanna Patel

Discipline: Psychology

Authors:

#1 C. Allen Gorman

#2 Sarah Tucker

#3 Joseph Himmeler

#4 Tanya Contreras

Abstract Name: Pathways to second chances: A multidisciplinary integrative review of 25 years of research on the employment of formerly incarcerated individuals

In this paper, we present an integrative review of the research literature on the challenges and opportunities surrounding the employment of formerly incarcerated individuals (FIIs). Our primary aim is to integrate 25 years of multidisciplinary evidence into vocational behavior scholarship, offering an employment life-cycle framework that identifies research gaps and practical implications for employers. Grounded in a multidisciplinary approach, we synthesize research across various domains, including criminal justice, psychology, sociology, law, economics, and management, to provide a holistic understanding of the systemic barriers that hinder FIIs' reintegration into the workforce. We introduce an integrative framework that examines the employment life cycle of FIIs, encompassing recruitment, selection, onboarding, development, and retention. We also highlight the critical role of social stigmatization, lack of access to vocational training, and the systemic disconnection between correctional institutions and labor market demands. Furthermore, our review emphasizes the importance of employer engagement and policy interventions in fostering inclusive hiring practices that support the successful reintegration of FIIs. We conclude with a call for future research and practical recommendations focusing on individual, organizational, and systemic factors that influence successful FII employment, highlighting the necessity of tailored vocational programs, social network support, and supportive workplace practices.

Manan Patel

Discipline: Engineering

Authors:

Abstract Name: Effects of Truncation on Vorticity of Delta Wings

Wing rock, an induced oscillation about the longitudinal/rolling axis, is one of the most serious issues that can be encountered in a delta wing aircraft. This oscillation, once it occurs, often exponentially grows in intensity, rapidly developing into an unrecoverable flight condition, which results in the catastrophic loss of the aircraft and endangers the pilot's life. The danger of this flight condition is compounded by the dramatic loss of lift that occurs when the oscillation is induced. The specific type of oscillation observed in this phenomenon is scientifically classified as a limit cycle oscillation. A vortex is a mass of fluid that spins around a central axis, forming a powerful, whirling current (just like tornadoes). While multiple factors contribute to this oscillation, the primary cause is rooted in the substantial asymmetry that develops in the opposing streamwise vortices. Within a range of speeds and Angle of Attack, one of the vortex breakdowns occurs earlier than the other, which results in asymmetry of vortices and leads to a self-sustaining loop of oscillating lift forces beneath the wing, resulting in wing rock. This vortex phenomenon has been well documented in earlier studies related to traditional pointed delta wing designs. The current study explored one of the possible solutions, to use a Truncated Tip Delta Wing, to prevent the induced oscillations resulting in wing rock. This design change was inspired by configurations emerging in hypersonic and high fuel efficiency aircraft. However, exceptionally little research has been carried out on them. Dye flow visualisation was utilised to understand the vortex dynamics on truncated delta wings. The additional leading-edge vortex stimulated the

merging of opposing streamwise vortices and aided in avoiding limit cycle oscillations. All in all, the current work bridged the gap by circumventing wing rock to create safer future aircraft.

lekhan patel

Discipline: Nursing and Public Health

Authors:

#1 Lekhan Patel

Abstract Name: Mapping Pediatric Provider Deserts: Visualizing Rural Health Disparities Across Georgia

Behind every data point is a child waiting for care. In Georgia, the gap between where children live and where pediatricians practice reveals an invisible crisis one that geography alone can predict. This research maps pediatric care accessibility across all 159 Georgia counties to uncover how place shapes a child's chance at health. Using data from the Health Resources and Services Administration, the Georgia Department of Public Health, and the Georgia Board of Health Care Workforce (2023–2024), pediatric provider-to-child ratios were calculated, mapped by county, and classified as rural or urban using U.S. Census definitions. The results expose a startling truth: 63 counties in Georgia have no pediatricians at all, leaving thousands of children dependent on distant, delayed, or emergency care. Urban counties averaged nearly four times more providers per 10,000 children. By transforming these disparities into vivid, data driven maps, this project reframes access to care as not just a logistical issue but a moral one. It argues that visualization is advocacy: that policymakers can no longer ignore what they can now see. This research calls for targeted interventions telehealth expansion, rural provider incentives, and community-based health programs to bridge the divide between where Georgia's children are born and where they can finally be cared for.

Priyanka Patel

Discipline: Psychology

Authors:

#1 Priyanka Patel

#2 Oxana Palesh

Abstract Name: Exploring the Link Between Hot Flashes and Body Image in Breast Cancer Patients Undergoing Chemotherapy

Background: Cancer treatment for breast cancer (BC) can trigger vasomotor symptoms such as hot flashes. Biologically, hormonal changes and disruption in thermoregulation can reinforce a sense of illness, while psychologically, the hot flashes may induce feelings such as loss of control and dissatisfaction with one's body, contributing to negative body image. Both hot flashes and depression have been independently linked to poorer body image. Methods: 141 women diagnosed with BC (stage I-III), experiencing insomnia, and receiving chemotherapy were recruited for a clinical trial assessing a behavioral intervention for insomnia. Patients completed demographic and medical information, European Organisation for Research and Treatment for Cancer Quality of Life Survey (EORTC), and a daily sleep diary to report frequency of hot flashes and depression weekly average levels. Partial correlations were performed to determine the associations between hot flash frequency and EORTC body image questions, while controlling for depression. Results: 46.1% of BC reported presence of hot flashes, and 75.38% of BC reported feeling some level of depressive symptoms. Depression was significantly correlated with hot flashes ($r = 0.211$, $p = 0.013$). Hot flash frequency was significantly correlated with lower overall EORTC body image scores ($r = -0.202$, p

=0.018), as well as greater dissatisfaction with one's body ($r = 0.179$, $p = 0.037$), and difficulty looking at oneself naked ($r = 0.257$, $p = 0.003$). Patients with hot flashes were also significantly younger ($M = 47.23$ vs. 52.42 years, $p = 0.004$) compared to patients without hot flashes. Conclusion: Average hot flash frequency was significantly associated with more negative body image scores among breast cancer patients undergoing chemotherapy after controlling for depression. These findings display the association of vasomotor symptoms, particularly hot flashes, and body image perceptions during cancer treatment. Future research should explore the biopsychological mechanisms underlying this association and interventions to target symptom management.

Naiya Patel

Discipline: Biology

Authors:

Abstract Name: The Effect of Simulated Microgravity on Bacterial Resistance in Clinically Relevant Antibiotics such as Vancomycin and Ampicillin

As humans prepare for long-duration spaceflight, understanding how microgravity affects antibiotic resistance is essential for safeguarding astronaut health. Vancomycin, a first-line antibiotic used to treat *Enterococcus faecium* infections, plays a vital role in preventing disease. During spaceflight, astronauts' gastrointestinal microbiomes are exposed to a harsh environment of increased radiation and physiological stress from the microgravity, which can weaken the body's immune defenses. Having a dysregulated immune system in an isolated environment—such as the International Space Station, where medical resources are limited—poses a risk for infections and the growth of vancomycin-resistant *Enterococcus* (VRE). This research delves into how antibiotic resistance in relevant clinical medications, such as vancomycin and ampicillin, changes under simulated microgravity. Studies supported by NASA have shown that certain bacteria, including *Enterococcus faecium* and *Staphylococcus aureus*, reveal alterations in gene expression and increased antibiotic tolerance under microgravity conditions. These studies generally use rotational vessels or two-dimensional clinostats to mimic the microgravity conditions on Earth. Results from the Biodesign Institute at Arizona State University indicated that the minimal inhibitory concentration (MIC) increased by fourfold as it went from $8 \mu\text{g/mL}$ under normal gravity to $32 \mu\text{g/mL}$ under the simulated microgravity. This finding affirms that it took more vancomycin under the microgravity conditions to halt bacterial growth, suggesting that *E. faecium* develops a higher resistance to the antibiotic in microgravity. These findings highlight the importance of continued research on the antibiotic resistance of significant disease-preventing drugs under microgravity. Deepening insight into how space conditions influence bacterial behavior and the effectiveness of medications is crucial for improving medical protocols and astronaut health, in the support of humanity's expansion beyond planet Earth and the advancement of planetary sciences.

Neelam Patel

Discipline: Psychology

Authors:

#1 Natalia Grossi Ferreira

#2 Ashley Groh

#3 Jennifer Bohanek

Abstract Name: Relations Between Emotional Attributions in Maternal Narratives and Infant Attachment

The transition to motherhood is marked by emotional complexity as mothers adapt to meet infant needs. Reflective functioning (i.e., ability to interpret children's behavior by considering their thoughts and feelings) has been linked to sensitive caregiving (Rutherford et al., 2023). Moreover, the outward expression of emotions influences the development of infant attachment patterns (Sroufe, 2005). This study explores mothers' expressions and attributions of emotions in reflections about motherhood and their association with their child's attachment. First-time mothers wrote ten narratives reflecting on perinatal experiences (positive, challenging, and milestone) during pregnancy and at 4, 8, and 12 months postnatal. At 12 months, infant attachment was observed using the Strange Situation Procedure. Conversations were coded for emotion language. To capture the frequency of mothers' references to emotional states or reactions, an instance-based coding system was employed (Syed & Nelson, 2015). Utilizing a consensus coding approach (Bohanek et al., 2025), a team of researchers coded each instance of emotion, indicating whether it was attributed to the self ("I was happy") or to another, thereby indicating reflective functioning ("She was happy"). The total number of self-attributed and other-attributed emotion words in each story will be used in analyses. We selected mothers of infants from different attachment categories—secure (N = 4), avoidant (N = 4), resistant (N = 4), and disorganized (N = 4)—to examine whether maternal emotion language differed across categories. We found that mothers of securely (v. insecurely) attached infants included less reflective functioning (indicated by a lower other-to-self emotion word ratio). Greater use of self-focused emotion words might reflect the mother's better understanding of her own emotional experience, which has been found to support secure attachment (Main et al., 1985). Identifying emotions linked to insecure forms of infant attachment may help inform early interventions designed to support mother-child bonds during critical developmental stages.

Krish Hareshbhai Patel

Discipline: Engineering

Authors:

#1 Krish Hareshbhai Patel

#2 Jonah Henry

#3 Lorenzo Cremaschi

#4 Zhihua Jiang

Abstract Name: Effect of Mineral Fillers on The Drying Time of Cellulose Fibers When Using a New Energy Efficient Drying Method

Paper manufacturing is one of the world's most energy-consuming industries. Lumber processing consumes approximately 7,200TWh of electricity annually, approximately 4% of world's usage. Drying processes account for 64% (4,698TWh) of this energy. Industrial processes involve grinding lumber into a water-saturated pulp. Typically, a dilute suspension of fibers is formed in water and then rolled into water-saturated sheets. After pressing, these sheets contain 60% water content. Reducing the water content further is an energy-intensive process because water molecules in cellulose fibers are retained by hydrogen bonding, Van-der-Waals forces, electrostatic interactions, and hydrophobic effects. This study investigated a novel dehydration process designed to accelerate the drying of cellulose-fibers while reducing energy consumption compared to heated roll-to-roll paper machines. The new drying process operates on the principle of di-electrophoretic, extracting excess water molecules within the fibers. Building on previous work from the author's laboratory, this presentation addresses the research question of quantifying the decrement in drying time when fillers (CaCO₃) are used in handsheets. The tests utilized TAPPI standardized hardwood-pulp handsheets. The air humidity varied from 50-95%, and the flow velocity was 2 m/s. Two high-voltage electrodes were designed, fabricated, and tested. Preliminary results showed that commercial printing paper containing fillers yielded a dehydration rate of over 30% whereas the dehydration rate of TAPPI handsheets ranged between 6-18%. The experimental results also indicated that, up to a certain level of sample moisture content, the newly developed drying method presented in this work required less energy to remove moisture from the sample compared to thermal heating. This was because it was efficient to selectively pick and move the water molecules away from the fibers than to heat up the entire system to overcome latent heat. The

experimental findings served as the basis for further experimentation and techno-economic analysis of the electrostatic-assisted paper drying technology.

Krishna Patel

Discipline: Biochemistry

Authors:

#1 Shaun Mahony

Abstract Name: Understanding the Role of FOXA1 and FOXG1 in Regulating Chromatin Accessibility

Transcription factors (TFs) regulate gene expression through interactions with both DNA sequences and the surrounding chromatin environment. While many transcription factors rely primarily on intrinsic sequence preferences, pioneer factors have the ability to engage nucleosomal DNA and promote chromatin opening. These contrasting behaviors highlight the influence of chromatin context on transcription factor function, even among proteins with conserved DNA-binding domains. The Forkhead (FOX) family exemplifies this concept. Although FOX proteins share a highly conserved DNA-binding domain, only paralogs such as FOXA1 act as pioneer factors, whereas others like FOXG1 do not. This raises a key question about how paralogs can produce distinct regulatory outcomes in the same cellular environment. Understanding these differences in the FOX family is essential for explaining how developmental gene expression pathways are shaped and how specific TFs perform specialized regulatory functions. To investigate how these paralogs influence chromatin structure, we analyzed chromatin accessibility following the induction of FOXA1 and FOXG1 in mouse embryonic stem cells. An ATAC-seq workflow was used, including quality control, alignment to the mm10 reference genome, read filtering, peak calling with MACS2, and downstream visualization. We also performed motif discovery and comparison with TF binding data (ChIP-seq) to determine which newly accessible regions represent direct FOX factor targets. Results indicate that for both TFs previously accessible sites become more accessible, and also that the TFs open a varying amount of previously closed sites after induction. Overall, our findings demonstrate differential chromatin opening activities between FOXA1 and FOXG1 and indicate the role of chromatin context in shaping paralog-specific regulatory activity.

Prachi Patel

Discipline: Biology

Authors:

#1 Hee Kyung Lee

#2 HaoSheng Sun

Abstract Name: Elucidating Chromatin Remodeling Mechanisms in Learning and Memory Across Development

Post-mitotic neural plasticity is the ability for mature, non-dividing neurons to functionally adapt and learn in response to environmental changes across the lifespan. Although fully differentiated, neuronal function can still be influenced by developmental stage-specific changes in gene regulation. Chromatin remodeling enables neural plasticity by altering gene accessibility through loosening or tightening of chromatin structure. Chromatin accessibility is thought to support experience-dependent transcription in mature neurons. However, across many organisms, the mechanisms by which specific chromatin remodelers influence learning and behavioral adaptation in fully differentiated neurons remain unclear. *Caenorhabditis elegans* (C.

elegans) is an ideal model because its neurons are post-mitotic after L1, chromatin remodeling genes are conserved, and mutants exhibit stage-specific learning deficits, suggesting developmental modulation of chromatin function. In this study, we examined eight chromatin regulator mutants representing diverse chromatin-modifying functions — including histone acetylation and methylation — with several expressed in neurons and implicated in transcriptional mechanisms relevant to learning, focusing on the L4-to-adult transition, a developmental window marked by dynamic changes in chromatin remodeler expression (Sun & Hobert, 2021). Learning was assessed using aversive olfactory conditioning, in which animals associate an attractive odorant with starvation. Wild-type worms formed a negative association, showing a significant decrease in chemotaxis. Interestingly, some chromatin remodeling mutants failed to form this association, showing no significant decrease in chemotaxis to the odorant after conditioning. These same mutants also exhibited blunted locomotor maturation: wild-type worms normally increased forward movement and decreased reversals to support the L4-to-adult transition, whereas this refinement was diminished in the mutants, suggesting a link between neuromaturation and learning capacity. To validate these findings, temporal control of chromatin regulator function between the L4 and adult stages will be performed using the auxin-inducible degron system. Overall, this work contributes to understanding how chromatin regulation shapes experience-dependent learning in post-mitotic neurons.

Charmi Patel

Discipline: Anthropology and Archaeology

Authors:

#1 Marie Vergamini

Abstract Name: Aging Bones Across Species: A Comparative Study of Skeletal Degeneration and Interventions in Humans and Non-Human Primates

Skeletal aging is a growing health concern as our populations live longer. It is characterized by decreased bone mineral density (BMD), changed bone structure, and an increased risk of osteoporosis. These changes contribute to frailty and a reduced quality of life in older populations. Rhesus macaques (*Macaca mulatta*) serve as a valuable comparative model for understanding human bone aging because they share similar physiology, lifespan patterns, and age-related degenerative processes. Here, we examine and connect insights from peer-reviewed literature to identify cross-species patterns of skeletal decline and to evaluate how sex, environmental factors, and intervention strategies influence bone loss. The analysis incorporates studies examining age-related shifts in BMD, cortical thickness, and overall skeletal structures in both humans and non-human primates. Across species, current research shows parallel declines in bone strength with age, with females exhibiting faster rates of loss linked to hormonal changes. Environmental factors, such as diet quality, level of physical activity, and living conditions, consistently shape the severity and trajectory of skeletal degeneration. Evidence from experimental studies on nutritional, hormonal, and lifestyle interventions, including vitamin D supplementation and structured exercise, demonstrates measurable improvements in bone health, although outcomes vary based on sex, age, and baseline health status. These findings suggest that skeletal aging results from the combined effects of biological and environmental influences that operate similarly across primate species. A clearer understanding of these shared patterns can improve how we predict bone-related conditions like osteoporosis throughout a person's life and support more targeted and preventative approaches to maintaining bone health across the lifespan.

Diya Patel

Discipline: Biology

Authors:

Abstract Name: The Influence of Epigenetic Modifications in the Intergenerational Transmission of PTSD

Post-traumatic stress disorder (PTSD) is a trauma and stressor-related psychiatric condition whose effects can extend beyond individuals directly exposed to traumatic events. Growing evidence suggests that epigenetic mechanisms, heritable changes in gene expression that do not alter DNA sequence, play an important role in the intergenerational transmission of trauma-related vulnerability. This presentation examines three major epigenetic processes implicated in PTSD inheritance: DNA methylation, histone modifications, and RNA regulation. Research on populations exposed to extreme trauma, such as Holocaust and genocide survivors, shows that altered methylation patterns at stress-related genes can be transmitted to offspring, contributing to dysregulation of the hypothalamic pituitary adrenal (HPA) axis and increased sensitivity to stress. Animal studies further demonstrate that paternal stress can reprogram sperm through changes in DNA methylation, small noncoding RNAs, and retained histone marks, leading to measurable effects on offspring behavior and stress responsivity. Although each epigenetic mechanism has been studied independently, emerging research highlights extensive crosstalk among pathways, suggesting a complex and dynamic regulatory network underlying transgenerational trauma effects. Epigenetic insights hold promise for improving diagnostic markers and informing targeted biological interventions, however, such approaches raise concerns about off-target effects and the potential to disproportionately affect trauma-exposed or marginalized populations. Importantly, not all inherited epigenetic changes are maladaptive-- some may promote resilience and adaptive stress responses. Ultimately, effective PTSD treatment and prevention will require integrating biological, psychological, and social perspectives. As the field advances, epigenetic research offers a powerful framework for understanding how trauma and resilience can be transmitted across generations, shaping future strategies for personalized mental health care.

Isha Patel

Discipline: Biology

Authors:

- #1 Jacob Hallesy
- #2 Nicolas Morales
- #3 Rebecca Mathew
- #4 Varun Kodali
- #5 Ananya Chillara
- #6 Jonnel Edwards
- #7 Donatas Kraskauskas
- #8 Madhavi Puchalapalli
- #9 Jennifer Koblinski
- #10 Rakesh Kukreja
- #11 Rakesh Kukreja
- #12 Anindita Das

Abstract Name: Effect of Triple Therapy with Sildenafil, Rapamycin, and Doxorubicin in a Mouse Model of Breast Cancer

Breast cancer is one of the most frequently diagnosed cancers in women in the United States. Although the chemotherapy drug, Doxorubicin (DOX), is widely used for breast cancer, it leads to the development of drug resistance and multi-organ dysfunction, including severe cardiac complications. Our previous studies revealed that Sildenafil (Sild, Phosphodiesterase 5 inhibitor) potentiated the antitumor efficacy of DOX, while ameliorating DOX-induced cardiotoxicity. Additionally, rapamycin (Rapa, an inhibitor of the mammalian target of rapamycin, mTOR) protects the heart against myocardial injury. In this study, we examined whether a novel combination therapy with Sild and Rapa can mitigate DOX-induced cardiotoxicity, potentiating its chemotherapeutic efficacy. Female Balb/c mice were orthotopically implanted with 4T1-Luc murine breast

cancer cells. After 10 days, tumor-bearing mice were treated with Sild (1.4 mg/kg/daily, p.o.) and Rapa (0.25 mg/kg, twice weekly, i.p.). DOX was administered intraperitoneally 5 times (3 mg/kg, twice weekly, total 15 mg/kg). Tumor growth and body weight were monitored twice weekly for up to 42 days after implantation. 18 days after completing DOX treatment, cardiac function was assessed using echocardiography, then hearts and tumors were collected for further studies. Myocardial apoptosis was examined by TUNEL assay of the paraffin-embedded cardiac sections counterstained with Actinin (marker of cardiomyocytes). DOX treatment reduced tumor growth and weight, which were attenuated by Sild+Rapa cotreatment. DOX significantly reduced cardiac function in tumor-bearing mice compared to control groups. Notably, cotreatment of Sild+Rapa with DOX effectively restored the cardiac function in the tumor-bearing mice. TUNEL assay of cardiac sectioning displayed higher cardiomyocyte apoptosis in DOX-treated mice, which was suppressed with Sild+Rapa cotreatment. Cotreatment with Sild and Rapa may represent a novel strategy to reduce cardiotoxicity associated with DOX, simultaneously enhancing its chemosensitivity, with potential significance for breast cancer patients undergoing chemotherapy.

Shaivil Patel

Discipline: Computer Science

Authors:

#1 Shaivil Patel

#2 Ziteng Wang

Abstract Name: Development of an Iterative Gait Cycle Detection Method Using Video Based Pose Data for Gait-based Early Autism Screening

Gait-based autism screening methods could be more accessible, scalable, objective, and easy to deploy. Reliable gait cycle identification is a critical step in a gait-based autism screening application being developed by the research team I belong to. My work is to create a gait cycle detection algorithm for extracting meaningful gait features from smartphone videos. We process pose estimation signals from running MediaPipe on real recordings of children walking in natural environments. Our approach combines signal analysis with an iterative strike-fitting scheme. First, we trim the beginning, end, and turning portions of each recording to isolate straight walking. Within each segment, we force the algorithm to place a specific number of right and left heel strikes. These strike positions must be roughly evenly spaced, must alternate between sides, and the counts must follow the condition that the difference between right and left is no more than one. For each possible configuration of strike positions, we compute a strike fitness score. This score measures how close the proposed strike positions are to the nearest peaks in the raw signal, such as peaks in a composite leg motion curve that indicate a true heel strike. The score is then normalized by the number of strikes. We repeat this process while varying the number of expected strikes and eventually keep the configuration with the lowest score. We propose a novel definition of the fitness score to reflect the true structure of the gait cycle, while remaining robust to noise in the pose data. Computational experiments have shown our method works well on various videos. Enhancement in process includes machine learning models to improve accuracy across different walking styles. By producing cleaner and more reliable gait cycles, this work supports downstream gait feature extraction and gait-based autism screening models.

Discipline: Health and Human Development

Authors:

#1 Hansen Mansy

#2 Zane Samiessoulh

#3 Eshal Mehmood

Zane Samiessoulh

Eshal Mehmood

Abstract Name: Effects of Musical Tempo on Cardiovascular and Neural Activity

Heart-rate variability (HRV) has been documented to correlate with several health measures, including autonomic nervous system longevity and athletic performance. Although increasing age has not been shown to affect resting heart rate, there is a steady decline in HRV over time, which serves as a biological marker of aging and autonomic nervous system function. Additionally, men who exercise regularly tend to have higher HRV, suggesting a mitigation of the typical age-dependent decline. Previous research has proposed that music may produce physiological effects, such as changes in cardiovascular parameters or emotional state, yet little is known about the quantitative influence of different musical tempos on these physiological measures. The present study aims to examine the effects of high-tempo and low-tempo music on blood pressure (BP), heart rate (HR), heart-rate variability (HRV), and electroencephalogram (EEG) readings. HR and BP are well-established indicators of physiological change, and the addition of HRV and EEG may offer further insight into autonomic and neural responses to music. Participants will complete an institutional review board (IRB)-approved protocol. All major musical variables are held constant to protect internal validity. Genre, instrumentation, and volume will be fixed for every participant, and all subjects will listen to one of two preselected classical piano pieces. The goal of this study is to better characterize how musical tempo influences physiological and neurological markers and to contribute to a deeper understanding of music's role in modulating autonomic nervous system activity.

Nidhi Patil

Discipline: Biology

Authors:

#1 Kristoffer Valerie

Abstract Name: Characterization of Genetically Matched p53 Mouse Glioma Cells and the Impact of ATM Inhibitor Radiosensitization on the Tumor Immune Response

ATM (ataxia telangiectasia mutated) kinase plays a critical role in regulating the DNA damage response (DDR), including cell cycle checkpoints, DNA repair, apoptosis, and the response to certain growth factors and hormones. ATM kinase phosphorylates >700 proteins in response to ionizing radiation (IR) including the tumor suppressor p53. The Valerie lab has explored the use of ATM inhibitors to radiosensitize glioma in preclinical studies for more than a decade resulting in a clinical candidate ATMi (AZD1390) and a phase I trial at VCU-MCCC and other medical centers. Our earlier results showed that human mutant p53 glioma tumor models grown in immunodeficient mice were preferentially radiosensitized over p53 wild-type resulting in >50% survival of the former but short of a 100% cure. Whereas glioma is considered to be a 'cold' tumor, unresponsive to immune therapy, it is believed that wild-type p53 tumors have a more favorable tumor immune environment (TIME) than mut-p53 tumors. Therefore, how do we maintain effective ATMi radiosensitization and at the same time turn glioma into a 'hot' tumor? To determine the role of p53 in glioma

ATMi radiosensitization and the TIME requires an immune competent tumor model in order to apply immune checkpoint blockade (ICB). Therefore, we generated a genetically matched mouse glioma cell pair only differing in p53 status. We found that the expression of p53 gain-of-function (GOF) mutant R172H (R175H in human) in p53 wild-type mouse glioma cells inflicted a pronounced phenotypic change in line with a metabolic shift known as the “Warburg effect” associated with p53 mutant tumors, including elevated release of lactate and pH acidification, abrogation of the G1/S checkpoint, increased growth rate, mesenchymal cell appearance, and increased cell migration in vitro. We are currently determining the role of p53 in the glioma TIME and impact on ATMi radiosensitization and immune therapy.

Genevieve Patterson

Discipline: Film/Photography Studies

Authors:

Abstract Name: The Racism Hiding Under Society's Bed

This paper is searching for the hidden voices within horror and an ode to all minorities who have died first so that the white characters could survive. This paper looks into films that have aimed to rewrite the racial stereotypes commonly used in horror movies and how they did it. This paper is an evaluation of racial commentary within the American horror genre and what thematic elements have helped flourish this cinematic discussion between the films and their audiences. This evaluation looks at both the strengths and shortcomings of certain films that have been incorporated into racial discussions and their overall impact. To start the evaluation two subgenres will be under investigation on their potential cohesion with the horror genre and the ability to enhance the depth of the commentary presented in the films. Then Stephen King's power with horror adaptations will be questioned and the positives and negatives of his impacts will be reviewed. Rounding out the research component of this essay, the commonalities between scores and filming techniques will be dissected to better comprehend their roles within the commentary being made and how it can all be used to teach commentary. Finally, three horror films will be cross examined with the information that was researched and examined for the components that made their commentary strong. Scary Movie's mocking nature will be compared with Circle's bluntly liberal approach in attacking all -isms which will also be compared to Sinners's racial villain and cultural approach in order to predict which style resonates best with particular audiences based on their strategies.

Abigail Paul

Discipline: Philosophy, Ethics, and Religious Studies

Authors:

Abstract Name: Nothing vs. Everything: Do We Give Less When We Have More? A Brief History Of Interpretation On The Rich Young Ruler

The story of the Rich Young Ruler (RYR), which is present in all three synoptic gospels, is one of Jesus' most well-known stories and receives extensive attention within the Church's history of interpretation. Upon examination, there is an interesting interpretative contrast regarding the Church's understanding of Jesus' command to the Rich Young Ruler (RYR) depending on the Church's historical and financial context. The pre-Constantine church (a persecuted religious sect) interpreted Jesus' command literally; however, the post-Constantine church (an eventual national religion with monetary influence) began to view this passage with an allegorical interpretation. This stark contrast reveals a possible link between the socio-economic context of

ancient Christian interpreters and their resulting interpretation of Jesus' command. In my paper, I am going to address a couple of questions: did the context of ancient interpreters affect their interpretation of "sell all your possessions"? If so, how? How does John Wesley's theology of wealth synthesize with ancient interpreters? Did the institutionalized status of the Church—and the financial power it brought—play a role in shifting the Church's understanding of generosity (particularly when considering the RYR)? To answer these questions, I am going to present a case study that analyzes one pre-Constantine and one post-Constantine interpreter's understanding of the RYR—both of whom will be synthesized with John Wesley—and consider the influence that financial power has on the interpretation of Jesus' command. The end goal of this case study is to better understand the potential influence of economic status within the historical understanding of wealth and generosity—which in turn presents a call for contemporary churches to analyze how their own socio-economic status may influence their theology of wealth.

Gladys Paulino

Discipline: Psychology

Authors:

#1 Marilyn L. Piccirillo

Abstract Name: Understanding Relapse After Treatment: A Synthesis of Individual and Social Predictors

Background: Relapse after discharge from residential substance-use treatment is a major challenge to long-term recovery. Both individual (e.g., symptom severity, coping skills, motivation for change) and relational factors (e.g., family functioning, social support, recovery environment) influence post-treatment outcomes. While predictors have been identified, our understanding of their relation to long-term outcomes is limited, as prior studies typically track these predictors only short term (1-3 months). Effectively preventing relapse requires leveraging comprehensive datasets, like NTIES, that measure individual, social, and treatment-related predictors over a crucial 12-month follow-up period, filling this critical knowledge gap. Objective: This project will use NTIES data to identify key individual and relational predictors of relapse outcomes over 12 months following discharge from residential substance-use treatment. Methods: This study utilizes the NTIES dataset to examine long-term relapse predictors, analyzing outcomes for 4,411 participants with 12-month follow-up. We examine individual factors (e.g., symptom severity, self-esteem) and relational factors (e.g., social support, recovery environment) on relapse and, statistical analysis employs linear regression to assess predictors of relapse at the 12-month mark. Results: We anticipate that higher symptom severity, lower coping skills, and reduced motivation for change will be associated with increased relapse risk at 12 months post-discharge. Additionally, weaker social support, poorer family functioning, and less stable recovery environments are expected to predict higher relapse rates in the long term, strengthening the evidence base beyond typical short-term (1-3 month) follow-up periods. Discussion: This project will clarify the factors most strongly associated with long-term relapse (at 12 months) after treatment discharge. Understanding these persistent predictors is crucial for guiding effective discharge planning and developing long-term recovery support strategies. Identifying consistent patterns across the rigorous NTIES data allows us to fundamentally improve sustained recovery outcomes and influence clinical practices and policy decisions.

Lillian Paulitz

Discipline: Psychology

Authors:

#1 Lillian Paulitz

#2 David Cox

Abstract Name: Impact of Guardian Death During Childhood on Cluster B Personality Disorder Development

There are a number of factors that go into the development of personality disorders. Researchers have investigated what factors provide a risk for developing personality disorders. We are investigating guardian death, during childhood in particular, as being a risk factor for the development of cluster B personality disorder traits, which include: Borderline Personality Disorder, Histrionic Personality Disorder, Narcissistic Personality Disorder, and Antisocial Personality Disorder. Past research, such as Lahti (2012) and Brennan (2002), have explored the connection between separation of parental figures and the development of personality disorders. According to research, like Brennan (2002), Pert (2010), Wilcox (2010), involving parental death and the psychological repercussions have shown that it can lead to developmental traits such as those related to personality disorders. Drawing on this evidence, we are investigating the relationship between guardian death during childhood and developing cluster B personality disorders. We used the The Personality Inventory for DSM-5, otherwise known as the PID-5, the Short Dark Triad, and the Dirty Dozen Scale to assess dark triad traits such as narcissism, machiavellianism, and psychopathy. Central research questions are, “will participants who report death of a guardian during childhood score higher for Cluster B personality disorders, specifically dark triad traits, compared to participants who didn’t report guardian death?” With this question we can investigate if there’s a correlation between guardian death during childhood and the development of a cluster B personality disorder within the subject. Deliberation of the risk factors in developing personality disorders is essential to discussing preventive or predictive measures of developing a personality disorder. Considering the relationship between trauma and their contribution to developing personality disorder traits, we can further investigate how guardian death impacts specific aspects of personality disorder development such as Cluster B personality pathology.

Lillian Paulitz

Discipline: Psychology

Authors:

#1 Lillian Paulitz

#2 Megan Kaiser

#3 Joanna Salapska-Gelleri

Abstract Name: The Impact of Masking on Stress Reactivity in High-Functioning Autistic Adults

Autism spectrum disorder (ASD) is characterized by struggles with social communication, restricted interests, and repetitive behavior (American Psychiatric Association [APA], 2022); however, these struggles are not always noticeable. One might purposely hide these struggles in order to fit into a neurotypical society. Autistic individuals can achieve this through masking. Masking is the conscious or unconscious suppression of autistic traits to make oneself appear not autistic in social situations (Cremone et al., 2023). We are investigating the stress reactivity while masking in high functioning autistic adults. In order to assess the stress reactivity of masking with the galvanic skin response we used previous studies as a template. GSR also referred to as electrodermal activity (EDA), and skin conductance response (SCR) is the momentary change in skin conductivity in reaction to an emotionally arousing stimulus and is a widely used biometric indicator of stress (Jovanovic & Norrholm, 2016, pp. 292–316). Drawing on this evidence, we are investigating the stress reactivity of masking in high functioning autistic adults, specifically in the FGCU community. To assess the degree of Autistic traits within participants we used a survey consisting of the Autism Quotient, otherwise known as the AQ, Ritvo Autism Asperger Diagnosis Scale Revised, otherwise known as the RAADS-14, and Camouflaging Autistic Traits Questionnaire, otherwise known as CAT-Q. We predict that participants scoring higher for autistic traits, will show more stress reactivity during masking relative to participants scoring lower for autistic traits as measured by an eye tracking and galvanic skin response assessment. Research indicates that the use of masking behavior among ASD adults is used in protective ways to support their preventive or predictive mental health and physical outcomes. Considering the

relationship between masking and its contribution to a physiological stress response, we can further investigate how masking impacts high functioning autistic adults.

Theodore Pawlik

Discipline: Biology

Authors:

#1 Andrea Perreault

Abstract Name: Differences in the Epigenetic Landscape of Diffuse Large B-Cell Lymphoma (DLBCL) and Hodgkin Lymphoma (HL)

Cancer is an aggressive disease characterized by the uncontrolled growth of cells caused by improper gene expression. Lymphoma is a type of cancer involving the lymphatic and immune systems. This cancer affects young and old people alike, and subtypes like Diffuse Large B-Cell Lymphoma (DLBCL) and Hodgkin Lymphoma (HL) have high rates of remittance and resistance. Furthermore, recent advances in the field of genomics have changed the way we understand and study cancer. By looking at methods of regulating gene expression without altering the underlying DNA sequence, called epigenetics, researchers are beginning to piece together a more comprehensive understanding of the mechanisms by which cancer develops. This project aims to look at the differences in epigenetic mechanisms between healthy cells and those affected by DLBCL and HL using publicly available data in both cell lines and patient-derived samples for each disease state of interest. By integrating patient-derived data with cell line data, this project aims to create a perspective that is an accurate representation of the in vivo epigenome, while maintaining a standard of comparison throughout the variability of patient samples due to the stability and consistency of most cell line epigenomes. This data will allow us to compare which genes are being transcribed (RNA-seq), where chromatin is open vs. closed (ATAC-seq), and potential regulatory elements (ChIP-seq). Ultimately, looking at these three data types in an integrative format creates a more comprehensive view of the disease. This project expects to uncover underlying factors that may explain why DLBCL and CHL present so differently despite sharing the same cell of origin. These results could be used to help create precision treatments and discover biomarkers that can predict prognoses.

Jenna Peace

Discipline: Nursing and Public Health

Authors:

#1 Jenna Peace

#2 Alexis Davis

#3 Brandye Nobiling

Alexis Davis

Abstract Name: Predictors of Retail Tobacco Compliance Violations in a High-Smoking Rural County

This study examines tobacco retailer compliance, with a focus on community factors that may influence violations. Somerset County, Maryland, is home to approximately 24,910 residents, 59.7% of whom reside in rural areas, and 17.5% of the population is under the age of 18. With adult smoking rates twice the state average, the county faces a substantial health concern (University of Wisconsin Population Health Institute, 2025). Tobacco usage is established at an early age, with 9 out of 10 current cigarette smokers starting before the age of 18 (Centers for Disease Control and Prevention, 2024). Understanding retailer compliance is

therefore critical for lowering community-level tobacco use and reducing youth access. Total violations in fiscal year 2024 showed a sharp 90% increase, while fiscal year 2025 reflected a more moderate 50% change after the second quarter. These fluctuations raise important questions regarding enforcement activity, the involvement of youth cadets in compliance checks, and broader trends in law-enforcement warnings. Notably, convenience-store chains accounted for a disproportionate share of the county's violations. This prompted questions about whether larger retailers feel less deterred by fines or can easily reopen under new storefronts. Variation between towns suggests that compliance may depend on geographic and structural factors. This can include the degree of rurality and the ability of enforcement teams to consistently and effectively reach the most remote areas. These findings underscore the need to consider tobacco compliance in rural regions, particularly those with vulnerable youth populations and high smoking burdens.

Kya Peaks

Discipline: Psychology

Authors:

#1 Kya Peaks

#2 Dr. Erica Russell

Abstract Name: Exploring the Effect of the Black Superwoman Scheme on the Criminalization of Black Women's Emotional Responses in the Justice System

Black women in the United States experience disproportionate criminalization compared to white women. Studies propose a cause for this disparity is systematic racism and the legacy of slavery. The longstanding oppression of black individuals in America has paved the way for an intersectional impact for black women. A cultural framework shaped by this history is the Black Superwoman Schema (BSS), promoting emotional suppression and self-reliance among black women. However, the BSS is a coping mechanism that can fail. So, because black women already face systemic bias and criminalization in the justice system, the combination of suppressed emotions and pervasive stereotypes can lead to misinterpretation. Therefore, leading to arrests and denial of victimization. This project aims to suggest that the BSS may function as an unseen mechanism that fuels criminalization. However, empirical research has not yet explored this link – which makes this project a call for future research. The research in this project will be conducted using an integrative literature review. The first component synthesizes existing literature on the BSS framework and its effects psychologically and socially. The second component examines the criminalization of black women in the justice system through existing literature and publicly available body camera footage (as it relates to aggression and resistance). The final part integrates both components to theorize how the BSS and criminalization relate. Overall, this project's goal is to serve as a intersectional argument for the need for future research on the relationship between the BSS and the criminalization of black women in the justice system. This is due to the high rates of criminalization of black women and the lack of a specific answer. This project calls for exploration and identification of stereotypes that lead to criminalization of black women.

Mason Pearce

Discipline: Biology

Authors:

#1 Neha Potnis

Abstract Name: Do Environmental Pressures Induce Natural DNA Uptake in the Plant Pathogenic Bacteria Belonging to the Genus Xanthomonas?

Horizontal gene transfer (HGT) is a process by which bacteria exchange genetic material, and this is proposed to be the process that is the driving factor for evolution of the pathogen. HGT occurs three ways in bacteria- natural transformation, transduction, and conjugation. Genome comparisons of plant pathogenic bacteria show evidence of horizontal genome transfer and these HGT events can be traced back to the mode of transfer. While transduction and conjugation have been experimentally demonstrated in different bacterial genera, natural transformation has been found only in few bacterial genera, and only two so far in plant pathogenic bacteria, namely, *Ralstonia* and *Xylella*. However, the fact that large regions of the chromosomal genome appear to be under exchange among the genomes of closely related bacteria, it is possible that bacteria belonging to other genera also have ability to undergo natural transformation, yet we do not know exact conditions under which this transfer occurs. Here we are assessing the favorable conditions under which the DNA uptake occurs via natural transformation in the genus *Xanthomonas*. So far, we have not observed a detectable uptake under different salt concentrations or under the apoplast and epiphytic mimicry environments, but additional optimization of stressors is being done to see if this changes. The findings from this study are expected to enhance our knowledge of unexplored modes of genetic exchange in *Xanthomonas* and the conditions that favor this method.

Gabriela Pedulla

Discipline: Psychology

Authors:

Abstract Name: From Shared Gaze to Shared Ideas: The Development of Joint Engagement Over Video Chat in Early Childhood

Infants are born into an increasingly social world, and they begin to engage in it right away. Joint visual attention (JVA), two parties jointly focusing attention on a common, physically present object, is a milestone in development. Approaching toddlerhood, children develop the ability to think and communicate in the abstract (rather than about only tangible things, as in the case of JVA). This study focuses on the less studied concept of joint engagement, which occurs when dyads or triads engage in a topic, event, or idea that isn't physically present. This study will compare bids of joint engagement between children and grandparents over Zoom to bids of joint visual attention. I will evaluate which of the two categories children respond to and initiate more themselves with age. Video recordings will be coded to mark the number of bids occurring in the interaction. Joint engagement bids will be designated if the initiator (grandparent, child, parent) initiates a conversation relating to past events, future events, explanations of concepts, internal state, open-ended questions, connections between physical objects and absent objects, or culture. A bid is deemed successful if the recipient verbally responds within context, shares gaze with the initiator, or nods in response. Using ANOVA analysis, I expect to find that children in the older age group, 3.5-5 years, will initiate more joint engagement bids than the younger age group, 1.5-3.5 years; whereas younger children will initiate more joint visual attention bids than the older group (main effects of age). I also expect to see a difference in gender, with girls initiating joint engagement more than boys by the time they reach the older age bracket (interaction). Uncovering joint engagement from toddlerhood to childhood is crucial to understanding how children begin to immerse themselves in their social environments with increasing complexity.

Karissa Pelichet

Discipline: Psychology

Authors:

#1 Karissa Pelichet
#2 LaBarron Hill

Abstract Name: Sex Differences in the Association between Reflective and Anticipatory Coping

Race-related vigilance is a pattern of anticipatory coping in preparation for future experiences of racial discrimination. Rumination is the repetitive focusing on memories or events that cause negative emotions. Research has shown maladaptive coping methods like rumination are risk factors for depression and can increase stress responses both physiologically and psychologically. While black men may face more systemic and structural forms of discrimination, black women have been shown to face more variable and interpersonal forms of discrimination. There is a clear relationship established between racial discrimination and poorer mental health but more needs to be done to examine the interworkings of the factors that cause this. There is also evidence that women experience more depression than men. This difference may be due to coping style, and is the target of our investigation. In a sample of 52 black men and women we examined the sex differences in the associations between race related vigilance and rumination (and its subscales, brooding, depression, and reflection). We found a strong positive relationship between race-related vigilance and rumination and rumination's depression subscale present in women that was not present in men. We also found an association between race-related vigilance and trait anxiety that was present in women but wasn't present in men. This could mean that though men endorse more race-related vigilance, women through rumination, are more likely to have poorer mental health.

Abby Pellacani

Discipline: Biology

Authors:

#1 Christopher Brower
#2 Winnie Mirembe

Abstract Name: Dissecting UBR5 Recognition of TDP43 Fragments

In many forms of neurodegeneration, the human Tar DNA-binding protein 43 (TDP43) undergoes proteolytic cleavage resulting in fragments that can form toxic oligomers and aggregates within cells. Our lab has discovered that cells utilize a multi-layered approach for recognizing and degrading these proteolytic fragments to prevent harmful aggregates. Here, we are investigating their clearance by the E3 ubiquitin ligase N-Recognin 5 (UBR5) pathway. While UBR5 is known to ubiquitylate proteolytic fragments bearing positively charged N-terminal amino acids such as arginine, we have found that UBR5 can recognize TDP43 fragments irrespective of the N-terminal residue. From this, we hypothesize that UBR5 recognizes TDP43 fragments through interactions with mono-ubiquitylated lysine residues. To investigate this, we carried out site-directed mutagenesis to both create a lysine-lacking (non-ubiquitable) mutant fragment by replacing all lysine residues with arginine as well as to determine lysine priority by making individual Lys to Arg mutations. These constructs will be used to dissect the mode of UBR5 binding.

Iris Peluso

Discipline: Psychology

Authors:

#1 Lauren Myers
#2 Gabrielle Strouse

Abstract Name: Joint Visual Attention between grandparents and grandchildren through video chat during structured activities

Joint visual attention (JVA) is a coordinated focus on the same object between individuals, with the intent to share an experience with the other person, which can be developmentally important for young children. The central question of this research is to study how children establish and follow JVA through a Zoom call and how different structured activities can facilitate JVA. Prior research (McClure et al, 2018) has shown that starting at around 9 months of age, infants can establish JVA and follow gaze through a video chat. This study included children ages 18 months through 5 years as a period when JVA is developing. Triads of a parent, child, and grandparent were randomly assigned one of three conditions (control, read, play). Triads were instructed to complete eleven Zoom sessions, with the first and last sessions being a baseline and final session with no instruction and the middle nine sessions being structured activities designed to facilitate JVA. Triads in the control condition were not given specific instructions and were asked to video chat as they usually would. Observational coding was done on the videos to categorize instances of bids for JVA along with the initiator and recipient, whether the bid was successful, reason for success, if the object was visible, and the type of JVA (whether the object of focus was on the initiator or recipient's side of the screen). It is expected that the structured activities will lead to more child-initiated bids for JVA than those in the control condition, and that play activities will be more successful for younger children whereas book reading will be more successful for older children. These results may be used to instruct caregivers on the most engaging developmental activities for young children and remote partners to use during video chat sessions with one another.

Rolando Pena

Discipline: Psychology

Authors:

#1 Rolando Pena

Abstract Name: Somatization, Anxiety Sensitivity, and Contamination Fears in Latino Young Adults: The Moderating Roles of Cultural Stress and Family Conflict

Contamination fears are a common feature of obsessive-compulsive symptoms which are generally considered to be influenced by individual psychological factors. However, young Latinos often report higher rates of somatic distress as well as persistent cultural and familial stressors, which may shape how bodily sensations related to illness or contamination are experienced and interpreted, further influencing the development and maintenance of contamination-related fears. The present study examines associations between somatization and anxiety sensitivity with contamination fears in young Latino adults, and whether they are shaped by cultural stress and family conflict respectively. Data were collected from 421 Mexican-heritage young adults via the UTRGV Department of Psychological Science's Research Participant Pool (August-December 2023). Participants completed measures of somatization, anxiety sensitivity, contamination fears, family conflict, and cultural stress. Moderation models were conducted to examine whether family conflict and cultural stress shaped the links between somatization or anxiety sensitivity and contamination fears. Descriptive statistics indicated mild somatization ($M = 10.24$, $SD = 6.23$), low anxiety sensitivity ($M = 6.15$, $SD = 5.17$), low contamination fears ($M = 2.5$, $SD = 2.38$), moderate family conflict ($M = 9.97$, $SD = 2.53$), and moderate cultural stress ($M = 50.40$, $SD = 19.99$). Family conflict significantly moderated both the somatization-contamination fears ($p = .004$) and anxiety sensitivity-contamination fears ($p = .002$) associations, whereas cultural stress only significantly moderated associations between somatization-contamination fears ($p = .035$) and not anxiety sensitivity-contamination fears ($p = .058$). These findings emphasize the importance of familial and cultural contexts when examining contamination fears among young Latinos. Individuals who report higher levels of somatization or anxiety sensitivity may be particularly vulnerable to contamination fears in contexts marked by family conflict or cultural stress. These

results highlight the need for culturally-responsive assessment and interventions that address somatic experiences and family dynamics.

Zoe Penner

Discipline: Biochemistry

Authors:

#1 Samantha Katner

#2 Kevin Zheng

#3 Victoria Greene

Abstract Name: Investigating Glycosaminoglycans in Glioblastoma Tumor Cells

Glioblastoma multiforme (GBM) is one of the most common and aggressive forms of brain tumors, often resulting in a poor prognosis for patients. Due to the limited effective treatment options, there is an urgent need for a deeper understanding of the cellular signaling pathways of GBM cells to develop new therapeutic targets. Proteoglycans are proteins found on the cell surface and in the extracellular matrix of GBM cells. Glypicans 1 and 3 are a type of proteoglycan that are involved in cell growth and proliferation for GBM cells. Both glypicans have glycosaminoglycan (GAG) chains, which are sugars that contain repeating disaccharide units. These GAGs impact the function and structure of the glypicans, often assisting in the regulation of cell signaling, growth, and migration. For this study, we learned cell culture techniques and used a Blyscan assay to measure the concentration of GAGs on the cell surface for multiple GBM cell lines. We quantified and compared the total number of GAGs on the cell surface of GBM cells containing glypicans 1 and 3 to GBM cells that lack glypicans. A higher presence of GAGs on the surface of cells lacking the glypicans could indicate the importance of this class of proteoglycans for the GBM cellular processes.

Makenna Penrod

Discipline: Philosophy, Ethics, and Religious Studies

Authors:

#1 Makenna Penrod

Abstract Name: The Effect of America's Colonization on Hawaii's Epistemology and Metaphysics: A Contrast of Hawaii's Presence in the World Fairs in 1867 and 1965

By contrasting Hawaii's presence at the 1867 and 1965 World Fairs, it becomes evident that American colonization significantly altered Hawaii's epistemology and metaphysics. Shifting the nation's self-representation from an independent, sovereign nation to a commodified and domesticated territory that fit the American narrative. Within the assimilation of Hawaii, natives lost sight of the epistemology and metaphysics that shaped Hawaiians, and carried them into the impactful sovereign nation they once were. The Western perspective found that Hawaiians were not in alignment with the traditional perspectives that shaped Western culture. Americans deemed Hawaiian knowledge and understanding as inaccurate and invaluable to progression within American society. The majority of Hawaii's metaphysics is grounded in religion, while religion and metaphysics that did not fit into a Christian framework were disregarded during the colonization of Hawaii. Both Hawaiian epistemology and metaphysics were orally passed through generations, as the language went unwritten until Westerners had Hawaiians do so for biblical translations. Because of the oral traditions, many pieces of Hawaiian epistemology and metaphysics were lost during the annexation process. Prior to annexation, Hawaii is seen in the 1867 World Fair as a sovereign nation, grounded in its impactful

epistemology and metaphysics. As opposed to the presence of Hawaii as an American state in the World Fair in 1965, where it is apparent that their epistemology and metaphysics have assimilated into a Western perspective.

Varsha Penumalee

Discipline: Biology

Authors:

- #1 Hane Chen
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- #5 Mathula Thangarajh

Abstract Name: Reaction-Time Variability in Duchenne Muscular Dystrophy: Cross-Sectional and Longitudinal Analyses Across Development

Background: Reaction-time variability (τ) reflects fluctuations in cognition and relates to executive-function disruption. Although cognitive differences are well documented in Duchenne muscular dystrophy (DMD), developmental patterns of τ and comparisons with normative samples and mutation subgroups remain limited. Objectives: This study aimed to: (1) compare τ between age-matched DMD and normative groups; (2) assess τ differences between proximal vs. distal mutations; (3) evaluate one-year longitudinal change; and (4) examine associations between τ and BRIEF executive-function T-scores. Methods: τ was estimated via bootstrap resampling for NIHTB-CB Flanker (congruent, incongruent) and Dimensional Change Card Sort (color, shape) tasks. Group differences were tested using Wilcoxon tests, one-year changes with paired Wilcoxon tests, and longitudinal subgroup comparisons with two-sample t-tests. Associations with BRIEF scores were quantified using Spearman correlations. Results: Seventy-two boys with DMD completed baseline testing, and 37 completed one-year follow-up; normative data included 1,441 participants. τ distributions were positively skewed in both groups. Compared with age-matched norms, τ was elevated in DMD during middle childhood for DCCS Color ($p = 0.006$) and during early adolescence for Flanker Congruent ($p < 0.001$), Flanker Incongruent ($p = 0.000$), and DCCS Color ($p = 0.033$). Mutation-site differences were modest, with significant effects only for DCCS Color in middle childhood ($p = 0.029$) and Flanker Congruent in adolescence ($p = 0.03$). Longitudinally, Flanker Incongruent τ decreased over one year in middle childhood ($p = 0.00078$). Higher τ correlated with higher BRIEF Global Executive Composite scores across tasks ($p < 0.05$). Conclusions: Boys with DMD show increased τ relative to peers, particularly in adolescence. Mutation-site effects are limited, and τ in inhibitory control improves over one year. Higher τ aligns with greater executive-function difficulties, supporting τ as a sensitive cognitive marker in DMD.

Meghna Penumudi

Discipline: Biology

Authors:

- #1 Abygail Newton
- #2 Bryana Whitaker Hardin
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- #4 Nina Baumgartner
- #5 Andrew Hardaway
- #6 Elizabeth Lucas

Abstract Name: Sex Differences in Estrogen Receptor Alpha Expression in Glucagon-like Peptide-1 (Glp-1) Releasing Neurons

Glucagon-like peptide-1 (Glp-1) is centrally produced by preproglucagon (Gcg) neurons in the nucleus of the solitary tract (NTS) and plays a key role in suppressing appetitive behaviors. Preclinical studies suggest estradiol, the primary ovarian estrogen, also suppresses feeding and enhances Glp-1's anorexigenic effects. Although previous studies have identified estrogen receptor alpha (ER α) within male NTS-Gcg neurons, the extent of this relationship in females has remained unclear. Using immunofluorescence staining in adult male and female Gcg reporter mice, we examined ER α and Gcg expression and colocalization in the NTS. While overall densities of Gcg neurons and ER α -expressing cells were similar between sexes, females showed a higher proportion of Gcg neurons expressing ER α , and vice versa, suggesting stronger estradiol influence in the regulation of Glp-1 neurons in females. Next, we assessed whether local estradiol synthesis via aromatase, the enzyme that converts testosterone to estradiol, contributes to this mechanism. Immunofluorescence staining revealed higher aromatase expression in the NTS of males compared to females, indicating greater use of local estradiol production in males. These results contribute to what is known of estradiol and Glp-1's synergistic relationship by revealing sex differences in ER α colocalization. The higher proportion of ER α within Gcg neurons in females suggests that estradiol's anorexigenic effects may be more directly mediated in females than previously recognized. Additionally, identifying greater aromatase expression in males adds a new understanding to this relationship, indicating that local estradiol synthesis could compensate for lower ER α expression. These findings refine current models of estradiol and Glp-1 interaction by highlighting sex-specific regulatory mechanisms. Future research includes exploring how these mechanisms change across aging, particularly during menopause when circulating estradiol declines. Understanding whether potentially reduced ER α signaling in Gcg neurons or compensatory aromatase activity contributes to postmenopausal weight gain and metabolic dysfunction could reveal novel targets for age-related obesity interventions.

Yann Penvern

Discipline: Economics

Authors:

#1 Kuang-Chung Hsu

#2 Zhen Zhu

Abstract Name: The Impact of Gas and Oil Drilling Activity on Natural Gas Prices and Productivity

This study examines how gas and oil drilling activity affects U.S. natural gas prices and evaluates whether rig counts help explain or predict short-run movements in Henry Hub prices. Natural gas markets have become sensitive to both commodity price fluctuations and shifts in drilling intensity, yet the short-run relationship between rig activity, prices, and productivity remains unclear. Motivated by earlier research documenting co-movement between drilling levels and energy prices, we investigate whether similar patterns arise in weekly data and whether rig counts contain predictive information for natural gas price changes. Our dataset merges weekly Baker Hughes rig reports, which include total, gas-directed, and oil-directed rigs, with Henry Hub natural gas prices and WTI crude oil prices from the U.S. Energy Information Administration. Using this combined dataset, we begin with descriptive statistics and time-series graphs to illustrate week-over-week percentage changes in drilling activity and natural gas prices. These exploratory tools allow us to visualize short-run movements and identify periods in which rig activity and prices appear to shift together. To analyze co-movement and directionality more formally, we use correlation analysis and Granger causality tests to determine whether past changes in rig counts help forecast natural gas prices and whether price movements precede later adjustments in drilling activity. Our preliminary findings reveal modest but noticeable correlations between drilling activity and Henry Hub prices. The Granger causality tests show limited short-run predictive power from rig counts to natural gas prices, while price changes show stronger effects on subsequent changes in drilling. Overall, this project contributes to ongoing discussions about the

responsiveness of U.S. natural gas markets by providing evidence on short-run interactions between drilling activity and prices. The work offers a clean dataset, a transparent empirical workflow, and results that support future research on market dynamics, rig productivity, and short-run supply responses in natural gas production.

Brianna Perea

Discipline: Mathematics

Authors:

#1 Brianna Perea

#2 Declan McGurk

#3 Sean Fang

#4 Shusen Pu

Abstract Name: Kumaraswamy Exponentiated Odds Ratio Family of Distributions

Continuous statistical distributions are essential for analyzing a wide range of datasets. In this project, we introduce the Kumaraswamy Exponentiated Odds Ratio Family of distributions, a new approach for generating flexible continuous models. By incorporating the exponentiated odds ratio, the proposed family gains greater flexibility and adaptability, which are important features when fitting modern datasets. We present the mathematical properties of the new family and provide simulation studies for its submodels. To assess how well the model fits these types of data, we apply several advanced estimation techniques. Simulation studies using Maximum Likelihood, Least Squares, Weighted Least Squares, Maximum Product Spacing, Cramér–von Mises, and Anderson–Darling methods confirm the robustness and efficiency of the proposed model. Real datasets further confirm that the Kumaraswamy Exponentiated Odds Ratio Family outperforms several existing distributions, demonstrating its relevance in both theoretical and applied statistical work.

Thomas Perez

Discipline: Art History

Authors:

#1 Kathleen Chapman

#2 Samuel Kessler

Abstract Name: Anita Berber: Nackttanze and Liberation in the Weimar Republic

Nackttanze, or nude dancing, stands at the pinnacle of bodily liberation. This form of expression, which involves the eurythmic practice of translating sound into movement without the constraints of clothing, explores themes of gender and corporeality through performance. However, this paper examines how the oppressive environment created by a rising fascist regime limited the bold defiance of the movement, focusing on the notorious Weimar-era dancer, Anita Berber. The underground atmosphere of the Nackttanze style of performances challenged dominant concepts of eroticism and theatre. Understanding these themes is crucial for grasping the context of the German interwar period, a time marked by instability and a dangerous sociopolitical landscape. By closely analysing Berber's illustrious performances, the paper offers a reframed lens on her artistry. Additions of queer and feminist theory are used to contextualise the temporal and haunting constraints Berber and her contemporaries faced as acts of both literal and metaphorical spiritual transgression from a 21st-century perspective. Berber's delicate balancing act between ecstasy and vice, the

radicalism of dance as an art form, and its imprints on cultural memory are approached through the lens of a critic's relationship with space and language. This paper will explore the lyrical qualities of theatrical documentation as a means of capturing sensory ephemerality by delving into the nuances within Berber's performance. Various theatrical reviews, primary works by Anita Berber and a few of her contemporaries, and literature on nude dance reveal how resistance and vulnerability intertwine within the intimate and foreign realms of gender expression and cabaret theatre during interwar Germany.

Coraima Perez Portillo

Discipline: Interdisciplinary

Authors:

#1 Amelia Baker

#2 Abeer Kayser

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Abstract Name: Research Barriers and Mentorship Quality

Undergraduate research is widely acknowledged as a high-impact educational practice, contributing to students' academic success, professional readiness, and retention (Bhattacharyya et al., 2018). However, disparities persist in access, mentorship quality, and institutional support, with many students reporting uncertainty about how to access opportunities (White et al., 2023). Prior research has found that stipends significantly influence participation, especially among underrepresented students (Edwards et al., 2024; Messier et al., 2013). Other studies underscore the critical role of mentor accessibility and supportive research environments (Behar-Horenstein et al., 2010; Byars-Winston et al., 2023). Little research has examined the impact of these identified barriers on undergraduate students who have and have not engaged in research. This project aims to assess barriers, perceptions, and opportunities surrounding undergraduate research participation across Kennesaw State University. A mixed-methods survey was distributed university-wide to investigate students' experiences with mentorship, awareness of research opportunities, and structural challenges. This project focuses particularly on the equity of access, the effectiveness of mentor relationships, and institutional visibility and communication for students engaged in research and those who are not. While data collection is ongoing, preliminary results indicate that student researchers rated their research mentors highly, particularly in serving as positive role models ($M = 4.53/5$) and fostering a welcoming research environment ($M = 4.53/5$). The most reported obstacles to research participation were external commitments ($M = 3.66/5$), lack of time ($M = 3.61/5$), and lack of awareness of opportunities ($M = 3.48/5$), suggesting that competing priorities and limited knowledge of options may hinder student engagement. These findings identify that actionable recommendations to university leadership, such as mentorship training, stipend programs, and centralized research resource directories, can further improve undergraduate research participation. The ultimate goal is to broaden participation, improve student outcomes, and strengthen the culture of undergraduate research at Kennesaw State University.

Katherine Perez-Nesmith

Discipline: Biology

Authors:

#1 Jasmin Palmer

#2 Emma Melton

#3 Elysa McMillan

Abstract Name: Investigating the Effects of FTY720 in an In Vitro Model of Post-Traumatic Fibrosis

Post-traumatic fibrosis is an abnormal response to tissue repair that results in the excessive formation and deposition of extracellular matrix, leading to the formation of fibrotic tissue. The Sphingosine 1-Phosphate (S1P) pathway is activated during tissue regeneration, but its role in the formation of post-traumatic fibrosis is still largely unknown. FTY720 is an agonist for the S1P receptors and blocks S1P signaling. Here, our goal was to investigate the effects of FTY720 in an in vitro model of human post-traumatic fibrosis. Human bone-marrow mesenchymal stem cells (BM-MSCs) were treated with transforming growth factor beta 1 (TGFβ; 10 ng/mL) for 24 hours and FTY720 [1 nM to 100 nM]. Cell viability was assessed by the MTT assay. Expression analysis for the fibrotic genes COL1A1 and COL3A1 was performed by q-RT-PCR. Statistical analysis was performed using a two-tailed Student's t-test. Cell viability was significantly reduced $\geq 25\%$ following [30 nM] or higher concentrations of FTY720 compared to the control (Control: $100\% \pm 0.0\%$; TGFβ: $91.9\% \pm 4.9\%$, $p=0.10$; TGFβ+FTY720 1 nM: $98.0\% \pm 9.0\%$, $p=0.74$; TGFβ+FTY720 5 nM: $90.7\% \pm 3.3\%$, $p=0.04$; TGFβ+FTY720 10 nM: $95.5\% \pm 15.1\%$, $p=0.66$; TGFβ+FTY720 20 nM: $90.6\% \pm 8.9\%$, $p=0.21$; TGFβ+FTY720 30 nM: $75.1\% \pm 5.6\%$, $p=0.02$; TGFβ+FTY720 50 nM: $70.2\% \pm 8.3\%$, $p=0.03$; TGFβ+FTY720 100 nM: $69.0\% \pm 12.6\%$, $p=0.05$). COL1A1 and COL3A1 were slightly modulated following FTY720 treatment compared to the control (COL1A1: Control: 1.0 ± 0.0 ; TGFβ: 1.7 ± 1.5 ; TGFβ+FTY720 5 nM: 1.3 ± 0.7 , $p=0.56$; TGFβ+FTY720 10 nM: 1.2 ± 0.7 , $p=0.75$ and COL3A1: Control: 1.0 ± 0.0 ; TGFβ: 1.5 ± 0.6 , $p=0.34$; TGFβ+FTY720 5 nM: 1.3 ± 0.8 , $p=0.68$; TGFβ+FTY720 10 nM: 1.1 ± 0.6 , $p=0.87$). Altogether, our results support the notion that lower concentrations of FTY720 did not demonstrate significant cytotoxicity in BM-MSCs, and that the S1P pathway may play a role in the process of human post-traumatic fibrosis. Supported by: NSF BRC-BIO (award# 2334535).

Aaron Pergler

Discipline: Biochemistry

Authors:

#1 Michael Elder
#2 Stephanie Kim

Abstract Name: Chemical Analysis of RAD-140 from U.S. Retailers Reveals Chemical Impurities and Safety Concerns

This research examined the purity of RAD-140, a selective androgen receptor modulator (SARM) sourced from online retailers, to elucidate the dangers of purchasing these compounds from non-federally regulated sources. In a recent systematic review, Vignali et al. documented more than 30 reports of SARM-related adverse events, with the majority involving drug-induced liver injury. In response to similar events, several years ago Van Wagoner et al. examined the chemical composition of commercial SARMS, finding that 25% included undisclosed substances. Building on these findings, this study hypothesized that RAD-140 from a supplier reputed for high purity would align closely with published chemical characteristics, while other samples would differ significantly in melting points and ultraviolet (UV) absorbance. Samples from three prominent U.S. suppliers, selected based on search visibility and user discussions, were analyzed using melting point determination, UV-visible spectroscopy, and color assessment for comparison with literature values of pure RAD-140. Results revealed statistically significant melting point differences ($p < 0.05$; power 0.73–0.77) between two suppliers' samples, with one also showing divergent UV absorbance spectra. All samples displayed variable colors in raw and melted forms. These findings show inconsistent RAD-140 purity across suppliers, with one sample aligning with expected characteristics, another meeting standards unexpectedly, and the third suggesting impurities. Furthermore, this study generated secondary findings of accurate and reproducible melting point and UV absorbance values for RAD-140 that are not adequately

substantiated in the existing literature. These results highlight the inconsistent quality of commercial SARMS and the risks of purchasing from unregulated sources.

Unnathi Peri

Discipline: Engineering

Authors:

#1 Paulina Trevino

#2 Jeremy Warren

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#4 Heather Hayenga

Abstract Name: In-Silico Analysis of Tensile and Compressive Stress-Strain in Idealized Arteries

Cardiovascular disease (CVD) is the leading cause of death worldwide, with atherosclerotic plaque rupture serving as the primary trigger for heart attacks and strokes. Because rupture occurs in regions of elevated mechanical stress, characterizing the arterial stress-strain environment is essential for predicting rupture-prone sites. Our laboratory has previously investigated plaque stability and arterial curvature using intravascular ultrasound imaging, evaluating effective von Mises stress and Lagrange strain. However, these analyses did not account for circumferential plaque location within curved arteries, a factor that may influence rupture risk. This study aims to compute and compare effective, tensile, and compressive stress-strain distributions in curved, idealized arteries by simulating combinations of curvature parameters. The artery model included three layers--the adventitia, media, and the plaque--each assigned physiologically accurate material properties. A pressure of 120 mmHg was applied to simulate systolic blood pressure in a cardiac cycle. A total of 185 simulations were performed, representing combinations of six percent-stenosis values, four curvature magnitudes, and nine curvature directions. For each case, median von Mises stress and Lagrange strain were computed using the tensor outputs from FEBio and separated by arterial layer. Median axial and radial tensile and compressive components were also calculated. Preliminary findings suggest that increasing percent stenosis generally decreases effective stress and strain within the arterial wall. Additionally, plaques located along the outer curvature exhibited reduced stress-strain magnitudes, indicating that circumferential positioning influences local mechanics. As expected, radial stresses and strains were predominantly compressive, while axial components were predominantly tensile. Plaques on the inner curvature experienced greater compressive loading, potentially elevating rupture risk. Current limitations include mesh resolution and plaque-generation variability. Future directions will be improving mesh density and plaque modeling in order to validate these trends.

Jenna Perkovich

Discipline: History

Authors:

#1 Jenna Perkovich

Abstract Name: Roman Infrastructure and the Christian Narrative

Scholars have studied the spread of Christianity throughout the Roman Empire since the events themselves, focusing mainly on the extensive missionary force that operated during that time. While this focus is widely accepted, it raises questions about the methods employed by the missionaries and why they were so successful. Roman infrastructure significantly shaped early Christian missionary efforts by providing access

across the vast expanse of the Empire. This expansion led to a notable shift in Christian narratives, transitioning from apostolic persuasion to an institutional voice, which played a crucial role in Christianity's success and eventual dominance within the Empire. This concept was examined through the lens of the Roman city of Corinth, mentioned in multiple accounts in the New Testament and significantly impacting the functioning of the Pauline Church. Research was conducted using the limited physical and technological resources available within a remote setting, utilizing the databases of the University of Kentucky and Wheaton College. The conclusions reached differ from those found in previous research, leading to a unique perspective and contribution to the field. Ties were identified between the infrastructural advancements of the Roman Empire and the changes in Christian narratives. The missionaries' ability to travel long distances facilitated a shift from emotional, persuasive narratives to more institutionalized ones. This change is evident in various early Christian texts addressing Corinth, particularly in Paul's Letters to the Corinthians and 1 Clement, where the transformation occurs largely as a result of actions within the Corinthian Church.

Camberlee Perkowski

Discipline: Biology

Authors:

#1 Marosh Furimsky

Abstract Name: Exploring Ethanol's Impact on Zebrafish Embryonic Development as a Model for Fetal Alcohol Syndrome

Fetal Alcohol Syndrome (FAS) is the leading preventable cause of birth defects, with approximately 10% of pregnant women globally consuming alcohol. This results in an estimated 120,000 children born with FAS each year. To better understand the consequences of prenatal ethanol exposure, we turned to model organisms, specifically zebrafish, which have previously proven to be valuable in explaining the developmental impacts of ethanol. By conducting controlled studies, we were able to identify critical windows of vulnerability and explore the dose-dependent effects of ethanol exposure, which are difficult insights to capture in human clinical studies. We examined a range of ethanol concentrations (0%, 0.5%, 1%, 1.5%, and 2%) and exposure durations (4.5-10, 10-24, 24-48, 48-72-, and 4.5-72-hours post-fertilization), and various anatomical measurements were taken to assess the impact of ethanol on development. Our findings indicate clear dose- and time-dependent severity of abnormalities. Through this analysis, we have demonstrated the utility of zebrafish as a model for studying FAS and have enhanced our understanding of how embryonic exposure to ethanol disrupts development. These findings highlight the critical importance of avoiding prenatal ethanol exposure to help eliminate an entirely preventable condition.

Nidhi Perla

Discipline: Biology

Authors:

Abstract Name: Oxygen, Sleep, and the 24-Hour Clock: Understanding an Overlooked Biological Link

Sleep and circadian rhythms are essential for human health, yet most research has focused on light as the primary cue that synchronizes the body's internal clock. Oxygen, despite being a fundamental component of cellular metabolism, may also play a significant but understudied role in regulating sleep and daily biological timing. This project reviews current findings on how changes in oxygen availability, both low oxygen (hypoxia) and elevated oxygen (hyperoxia), affect sleep quality, hormone rhythms, and the molecular

pathways that help maintain the 24-hour cycle. Studies from high-altitude environments and obstructive sleep apnea consistently show that hypoxia leads to fragmented sleep, reduced slow-wave and REM sleep, and altered nighttime melatonin levels, reflecting the brain's sensitivity to oxygen and the activation of hypoxia-inducible factor 1-alpha (HIF-1 α). This pathway interacts with core circadian clock genes, including BMAL1, CLOCK, PER, and CRY, linking oxygen levels to daily physiological rhythms. In contrast, emerging animal studies suggest that mild hyperoxia may deepen restorative sleep and improve recovery from physiological stress, though long-term human research is still limited. Together, these findings indicate that oxygen may act as a subtle environmental signal capable of influencing sleep architecture and circadian timing. Understanding this relationship may have implications for sleep medicine, high-altitude physiology, and potential therapeutic strategies aimed at improving sleep and aligning the internal clock.

Griffin Jonathan Perry

Discipline: Psychology

Authors:

#1 Natasha Tonge

#2 Griffin Jonathan Perry

Abstract Name: Exploring How a Conversational Agent Responds to Different Mental Health Symptoms: An Iterative Approach to Codebook Creation for Assessing ChatGPT's Mental Health Safety Guardrails

Introduction Healthcare is becoming increasingly advanced, with new technologies such as Artificial Intelligence (AI) offering innovative ways to address health concerns. However, there has been little research exploring the possible pitfalls of AI for vulnerable patient populations, specifically those with mental health concerns. Past research has demonstrated that the safety guardrails of conversational agents like ChatGPT, which are the monitoring systems that try to keep AI responses within safe and ethical boundaries, are not well-suited to detect psychological distress. The current project aims to expand upon these gaps by exploring ChatGPT's safety guardrails when presented with experimentally manipulated types of mental health concerns (i.e., depression, anxiety, and stress). **Methods** Four research assistants role-played help-seeking users to create transcripts (N = 420) reflecting a specific symptom type and severity. Each profile was created based on specific items and item-level Likert scores from the 21-item Depression, Anxiety, Stress Scale. These determined both the symptoms displayed (e.g., depression) and the intensity of the language (e.g., if severity = 3, they reported symptoms occurring daily), ensuring consistency in symptom presentations. As data collection is completed, we are piloting the codebook, which assesses response types (e.g., walks you through a coping skill) and the presence of guardrails (refers you to professional help). We will code the statements following the codebook and report our preliminary findings on the frequencies of presence of guardrails. **Expected Results** The results to be presented include the frequency distribution of how often ChatGPT 1) suggested seeking professional help and 2) expresses having human-like characteristics (i.e., ChatGPT referring to itself as a real person, such as stating "I'm right here next to you") Additionally, we will examine if distributions differ by symptom type. Findings will improve our understanding of ChatGPT's behavior in sensitive contexts and how guardrails can be improved.

Griffin Jonathan Perry

Discipline: Nursing and Public Health

Authors:

#1 Griffin Jonathan Perry

#2 Michelle Williams

Abstract Name: Factors Predicting Knowledge of Pre-Exposure Prophylaxis (PrEP) in College Students: Understanding the Role of PrEP-Related Stigma

Introduction Pre-exposure prophylaxis (PrEP) can reduce the risk of contracting HIV by ~99% if used as prescribed, making its uptake vital to ending the HIV epidemic. However, the scaling of PrEP has been slow in many target populations, including sexual minority men, transgender and gender expansive individuals, young women, and ethnic/racial minorities. These populations may be slower to adopt PrEP due to limited access to and awareness of resources. Multiple health behavior theories, such as the Health Belief Model and the Knowledge to Action Framework, posit that knowledge is the first necessary step for health-related behaviors to ensue. There is a lack of research aimed at exploring PrEP knowledge among college-age populations, despite the availability of accessible campus healthcare resources. The aim of this project is to address these gaps by examining the factors predicting knowledge about PrEP among college students.

Methods Sample size is projected to be ~350. Undergraduate students will complete a web-based survey assessing PrEP knowledge, PrEP-related stigma, provider trust, mistrust of healthcare systems, PrEP attitudes, and community support around PrEP. We will employ multiple linear regression to examine how multiple factors influence PrEP knowledge. Subsequently, we will run a moderated multiple regression to examine the role of stigma on these relationships.

Expected Results We hypothesize that positive attitudes towards PrEP, higher trust, lower mistrust, and higher community support will predict PrEP knowledge. However, we also theorize that there will be noticeable differences in the strength of different predictors. Lastly, we hypothesize that these relationships will be buffered by PrEP stigma.

Conclusion Results from this study will improve our overall understanding of factors influencing students' acquisition of PrEP knowledge. Understanding acquisition will help guide future research to improve campus sexual health interventions and identify distinct points of outreach during college to promote PrEP uptake.

Mackenzie Perry

Discipline: Political Science

Authors:

#1 Mackenzie Perry

#2 Jessica Carew

#3 CJ Fleming

Abstract Name: Race & Bias in the Courtroom

The lack of representation in the courtroom for Black Americans is a prevalent issue that contributes to race-based sentencing disparities. There are many assumed reasons why sentencing or determination of guilt may be harsher for Black Americans compared to White Americans. Systemic racism and potential bias among judges and jurors may heavily impact the outcome of a case for a minority defendant. By compiling my findings of perceptions and realities of racial disparities by role in the courtroom — judge and jury — we can develop a clearer understanding of the moving parts in the courtroom and the contribution they have in producing racial inequities in the justice system. Using a mock trial survey that I created myself, this project will test whether respondents perceive less racial bias in the judicial system when there is greater racial diversity among judges and jurors. Additionally, this project will examine respondents' judgment of the guilt or innocence of Black defendants in the context of varying racial compositions of judges and jurors.

Aadya Reddy Pesara

Discipline: Psychology

Authors:

#1 Micah Marshall
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Abstract Name: Beyond Monoracial Frameworks: Understanding Predictors of Suicide Ideation and Behaviors in Multiracial Youth

The Multiracial population in the U.S. is the youngest of any racial group, and experience a heightened risk for suicide (Garcia et al., 2019). However, a recent review indicated that only 11 articles to date have focused on suicide among Multiracial adolescents, and the majority tested ethnic-racial differences, rather than mechanisms underlying suicide (Williams et al., in press). This is a critical area that warrants investigation. In order to prevent suicide among this population, it is imperative to understand Multiracial youths' challenges and resilience; however, these topics are often neglected in research that is framed from a monoracial lens (Harris, 2016). For example, in the 11 aforementioned studies, Multiracial youth were only a part of a larger sample, and not one study focused on the impact of specific Multiracial challenges on suicide (Williams et al., in press). To address these gaps, the current study tested whether Multiracial challenges (Multiracial youths' experiences of others' surprise and disbelief regarding racial heritage, lack of family acceptance, and identity-based challenges) and skin tone satisfaction predicted suicide ideation and behaviors (i.e., suicide ideation, suicide plan, and suicide attempt). Participants in the current study were 644 Multiracial adolescents 13 to 17 years of age. We tested hypotheses using Mplus. Results indicated that skin tone satisfaction predicted less suicide ideation and suicide plans. Others' surprise and disbelief regarding racial heritage did not predict any suicide outcome. Lack of family acceptance and Multiracial identity challenges predicted greater suicide ideation, plan, and attempts. The pattern of findings suggests that suicide ideation and behaviors among Multiracial individuals may be more strongly influenced by stressors that undermine identity coherence or belonging.

Chiara Pesce

Discipline: Engineering

Authors:

Abstract Name: Improving Embedded Calibrations in Low Cost Sensing for Air Quality

The need for calibration of sensors in the low-cost sensing (LCS) research space is recognized. Outside research however, there is a common incorrect assumption that sensors from manufacturers produce accurate temporal trends and consistent behavior across units. This work will aim clarify why that assumption fails, highlight the need for greater communication and propose a stronger framework for embedded calibrations. Calibration is typically executed in two ways: embedded data analysis (EDA) or retrospective data analysis (RDA). EDA is typically performed by the manufacturer pre-market and is proprietary while RDA is performed post-market on collected datasets. These approaches are fundamentally different and non-equatable. EDA applies an instantaneous, one-dimensional linear operator fitting an input to an output; RDA

is performed with respect to an entire dataset, adding time as a dimension of information. Since low-cost sensors have limited onboard memory and computational power, EDA is typically performed using multivariate linear regression. However these calibrations can only predict behavior included in the training set, limiting the model's ability to extrapolate. Additionally, unstable coefficients in the model can introduce calibration artifacts into data such as elevated baselines or diverging sensor trends between units. These artifacts are often overlooked or poorly communicated and can be misleading in data analysis. My proposed framework to improve EDA utilizes a ridge multivariate linear regression variant that holds predictor coefficients to a specified sign and considers nonlinear predictors. The model is investigated with respect to CO and CO₂ sensors and compared to similar models: evaluating performance metrics such as MBE, r-squared, root mean squared error (RMSE) and numerical conditioning. My findings suggest this method is effective at reducing calibration artifacts. Utilizing this framework in conjunction with proper communication on EDA methods would reduce the impact of misleading sensor data and allows for more clarity in the usage of LCS.

Sylvia Pesch

Discipline: Nursing and Public Health

Authors:
Julia Black
Satoi Ueda

Abstract Name: Sleep Issue Indications in Commercial Driver Medical Examination Reports

Commercial vehicle operators must be certified medically fit to drive on public highways at least every 2 years. The Commercial Driver Medical Examination (CDME) is used to evaluate commercial drivers' health and ability to safely perform their jobs. Obstructive sleep apnea (OSA) has been identified as a risk factor for drivers' safety on public roads, as OSA is linked to cognitive impairment, daytime sleepiness, and other health issues. However, there are no formal criteria for a medical examiner to decide when a driver with a sleep issue should receive an overnight sleep study used to diagnose OSA. In a study using data from 2005-2010, the CDME identified a sleep issue in only 20.7% of drivers who later had a positive diagnosis of moderate or worse OSA. These data were collected prior to a 2005 congressional mandate implemented in 2014 by the Federal Motor Carrier Safety Administration (FMCSA), which required specialized training and registration for medical examiners. We analyze data from 2018-2020 to assess the change in screening effectiveness of the CDME since the implementation of this mandate. We can accomplish this by examining changes in prediction performance measures such as sensitivity. Our dataset was created by combining written comments from CDME reports with OSA diagnostic test results. A key feature of our analysis was using regular expressions to identify sleep-related issues in examiner and driver notes. We then added this information to the existing dataset. The preliminary results of our work show minimal improvement in CDME screening effectiveness, despite the congressional mandate. The CDME continues to be ineffective at identifying sleep issues in drivers. A secondary analysis goal is to examine differences in CDME screening effectiveness across healthcare provider types (MD, DO, PA, APN, etc.).

Alexis Peshehonoff

Discipline: Environmental Science and Sustainability

Authors:
Makaylei Huggins
Bernard Muich

Abstract Name: Project G.L.E.N.

Project G.L.E.N., formally known as “Enhancing Tornado Research: A Case for Transitioning the Enhanced Fujita Scale,” is an ongoing initiative aimed at advancing tornado research through the development and deployment of an unmanned tornado probe. Through the Gale Level Environmental Navigator (G.L.E.N.) probe, a remote-controlled unit equipped with specialized meteorological sensors and innovative design features, we aim to collect real-time, onsite data from within tornadoes. This approach allows for direct measurement of internal atmospheric conditions such as wind speeds, pressure fluctuations, temperature, humidity, and other storm dynamics while removing human risk from tornado interception, significantly enhancing the safety of storm research. Additionally, while current tornado ratings rely heavily on post-storm damage surveys, which may not accurately reflect the full strength or behavior of a tornado, Project G.L.E.N. seeks to provide a more objective basis for tornado classification, bridging the gap between damage-based assessments and recorded metrics. The project’s initial phase focuses on localized data collection to validate sensor performance, refine instrumentation methods, and optimize probe design. Collected data from our final, revised design will be analyzed for statistically significant trends, providing the empirical foundation for potential enhancements or revisions to the Enhanced Fujita (EF) Scale.

Braetan Peters

Discipline: Psychology

Authors:

#1 Mat Gendle

Abstract Name: Neurobehavioral outcomes following a forced abstinence from smartphone use

Smartphone users frequently report anxiety when separated from their phones (Panova T and Carbonell X 2018), often experience compulsive behaviors related to device use and engagement with social media (Sarman A and Çiftci N 2024), and may describe their experience as a “cell phone addiction” (Merlo LJ et al. 2013). Concern is increasing regarding the compulsive components of cell phone use, as well as potential negative effects such use may have on the brain (Lin H-M et al. 2022). Individuals reporting compulsive cell phone use can experience harmful effects to their relationships, finances, and safety (Merlo LJ et al. 2013). An important related phenomenon that is pervasive within social media culture is the unfavorable experience of the Fear of Missing Out (FoMO) on potential experiences, resources, and connections (Alutaybi A et al. 2020, Zhang Y et al. 2023). As cell phones are easily accessible, turning to devices and engaging with social media is a frequent reaction when experiencing FoMO (Zhang Y et al. 2023). Uncertainty remains around if smartphone use promotes states of addiction similar to substances such as alcohol and cocaine, and additional research is needed. In an investigation of a targeted population of adults who experienced forced abstinence from cell phone use resulting from voluntarily engaging in extended travel experiences in remote locations, this study utilized multiple standardized self-report survey instruments (Addiction Potential Scale, CORE Short Form, Mobile Phone Problem Use Scale, Problematic Use of Mobile Phones Scale, Bergen Social Media Addiction Scale, Fear of Missing Out Scale, and Problematic Internet Use Questionnaire) to investigate behavioral outcomes associated with a period of being separated from their phones. These findings will contribute to the understanding of maladaptive cell phone use and provide additional information regarding the similarities and differences between these behaviors and substance dependency.

Honey Peters

Discipline: Biology

Authors:

#1 Solomon Meraz

#2 Dana Lee

Abstract Name: The Frequency of Microplastics in the Bats of Oklahoma

Our research sought to measure the prevalence of microplastics within the bat populations of Oklahoma and see if there was a significant difference in plastic accumulation between bat species. The bats used were acquired from different parts of Oklahoma from 2023-2024. These bats were submitted to the Oklahoma State Department of Health for rabies testing and then deposited in the University of Central Oklahoma Natural History Museum, where we were able to dissect them and collect their feces. The feces of 40 bats were examined under a microscope in search of any form of microplastics. Reference images of microplastics were used to identify possible plastics. Our results showed that 25 (62%) of the samples examined had some form of particulate plastic and when the samples were categorized by species, we found that there was a significantly higher percentage of evening bats (*Nycticeius humeralis*) contaminated with microplastics than other species of bats examined (eastern red bats, *Lasiurus borealis*, and big brown bats, *Eptesicus fuscus*). We are currently revamping our procedures and broadening our sample size. Firstly, we will be collecting the bat's feces, intestine, and lungs. This will allow us to see if there is evidence of microplastics not only in the bat's diet, but within the bat's tissue. While collecting our samples, we will also ensure that our samples are in glass vials, and all plastic surfaces are covered with aluminum. We will start using potassium hydroxide (KOH) to ensure all organic matter is dissolved. With what is left over, we will run it through an infrared (IR) spectrometer, so that we will be able to identify the exact type of plastics found. With these improved procedures, we will be able to discern how many and of what kind of microplastics are affecting our local bat populations.

Susanne Peters

Discipline: Economics

Authors:

#1 Alex Marsella

Abstract Name: CAHOOTS Program Effect on Disorderly Conduct and Drug Arrest Rates in Eugene, Oregon

I study the impact of the CAHOOTS program - a response program led by health workers to police calls regarding mental health and drug related crises - on arrest rates in Eugene, Oregon, using difference-in-differences and synthetic difference-in-differences regression methods. This is where the difference in pre-treatment means between treatment and control groups are subtracted from post-treatment means of both groups to infer the effect of the CAHOOTS program on my dependent variables. I analyze agency-year data for Oregon police departments, examine disorderly conduct and drug arrests (overall and by race), and assess identification via graphical parallel trends. The results show an insignificant increase in arrests for disorderly conduct and a significant increase in drug arrests after the implementation of CAHOOTS. These findings imply that health-based police programs, such as CAHOOTS, may lead to an increase in drug arrests, improving the detection of those crimes and individuals not receiving the help needed.

Bri Peterson

Discipline: Education

Authors:
#1 Lynn Gilbertson
#2 Cody Marie Busch

Abstract Name: Supporting Student Use and Evaluation of AI Image Generation

This study explores the accuracy and benefits of the use of artificial intelligence (AI) generated images in educational assignments. Prior research highlights the need for structured frameworks and training that empower the critical evaluation of AI outputs to ensure reliability and promote ethical use. In this study, an assignment from an undergraduate course required students to generate images for a Picture Identification Test for Hearing-Impaired Children and evaluate their experience using image-generating AI. Students recorded their prompts, output, and modifications needed to retrieve their desired images, determining the accuracy of the AI-generated images. A series of Likert scale questions were used to report the correctness, composition, and contextual relevance of the images produced. Students then reflected on the image-generating process, considering how the integration of AI in the assignment prepared them for future clinical practice. It is expected that the AI evaluative and reflective elements of the assignment will support students' technology fluency with image-generating AI and support relevant application and critical thinking for career readiness.

Conner Petty

Discipline: Computer Science

Authors:
#1 Ridwan Noel

Abstract Name: On Brain-To-Text Translation: The Ability to Predict Text from EEG Data

Brain-to-text translation is a relatively new concept within the fields of machine learning and neuroscience. It employs machine learning models to capture complex patterns in brain signals and translate brain activity into text. Most earlier studies used electroencephalography (EEG) data for this purpose, while others relied on functional magnetic resonance imaging (fMRI) or magnetoencephalography (MEG). In this work, we aim to determine whether brain-to-text translation can be achieved using end-to-end convolutional neural network (CNN) and attention models trained entirely from scratch. Our motivation stems from the fact that earlier work in this field often relies on pretrained models, and some employed teacher forcing during training. We used the ZuCo 2.0 dataset, specifically the natural reading portion, to train our models. Due to computational and time limitations, we used only 5 samples per subject (90 total) to train two models with identical architectures. One model used an unbalanced split of the dataset and achieved a word error rate (WER) of 71.88%, while the other used a balanced split and achieved a WER of 79.37%. The techniques employed show that it is possible to translate EEG data into words using basic CNN-Attention architecture with connectionist temporal classification (CTC) loss. For tokenization, we used byte-pair encoding (BPE) and did not apply beam-search decoding to improve output correctness. These results provide evidence that meaningful patterns are captured by the model within EEG data and that the model is not merely guessing or hallucinating its predictions.

Alexandria Pezzano

Discipline: Exercise Science and Nutrition

Authors:

#1 Alexandria Pezzano
#2 Olugbenga Balogun
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Abstract Name: Inhibitory Effects of Garlic Scape Extract on Intestinal Carbohydrate Digestion and Absorption In Vitro

Hyperglycemia increases the risk of developing type 2 diabetes and other metabolic complications. Regulation of carbohydrate digestion and glucose transporters in the intestine is critical for controlling postprandial blood glucose. Garlic scapes (*Allium sativum* L.), the flower stalks of garlic plants, are commonly discarded as agricultural byproducts. However, it contains valuable nutrients and bioactive compounds with potential health-promoting effects. This study identified the best garlic scape cultivar for North Carolina and examined its extract on intestinal carbohydrate digestion and glucose uptake. Twenty-four hard-neck garlic cultivars were evaluated for scape yield traits and total phenolic content (TPC). Scapes were digested in vitro and extracted with 70% ethanol to obtain digested garlic scape extract (dGSE). Bioactive compounds of the dGSE were analyzed by LC-MS/MS and SPME-GC-MS. The dGSE's effects on in vitro intestinal carbohydrate-hydrolyzing enzyme activity, glucose uptake, and the expression of sodium-glucose cotransporter 1 (SGLT1) and glucose transporter 2 (GLUT2) in Caco-2 cells were examined using enzymatic, fluorescence, quantitative PCR, and western blot analysis, respectively. Music was selected as the best cultivar, with allicin and deoxyalliin as major bioactive compounds. dGSE inhibited the carbohydrate-hydrolyzing enzymes α -glucosidase, sucrase, maltase, glucoamylase, and α -amylase in a dose-dependent manner, with inhibition comparable to or greater than that of 1 mg/mL acarbose at low concentrations. dGSE at 40 μ g/mL decreased SGLT1 and GLUT2 by 32% and 30%, respectively. Consistent with this, glucose uptake was inhibited by dGSE, regardless of the presence of sodium. Taken together, garlic scapes may be a potential food for alleviating postprandial hyperglycemia.

Colin Pham

Discipline: Economics

Authors:

#1 Yan Li
#2 Maxwell Murphy
#3 Sarah Schrauth
#4 Luke Plagens

Abstract Name: Modeling Seasonal Dynamics of Influenza in Wisconsin

Seasonality is a defining characteristic of many epidemiological time series, reflecting recurring patterns that repeat at regular intervals. Accurate characterization of these patterns is essential for influenza surveillance, forecasting, and public health planning. This study examines the seasonal dynamics of influenza incidence in Wisconsin using laboratory-confirmed case data from 2021–2025 provided by the U.S. Centers for Disease Control and Prevention (CDC). We systematically compare four approaches for modeling weekly time-series data: seasonal dummy variables, Fourier-based harmonic regression, Seasonal ARIMA models, and generalized additive models (GAMs) with spline-based smoothers. While a few recent studies (Yang et al., 2020; Zhu et al., 2022) have applied GAMs with splines to explore meteorological effects, our study is among the first to use this flexible modeling approach to capture the underlying seasonal structure of respiratory infection data. Results indicate that the spline-based GAM consistently outperforms the alternative

methods. It captures shifting peak timings, asymmetric seasonal curves, and multiple inflection points, the features that more rigid approaches, such as seasonal dummies and Seasonal ARIMA, cannot fully represent. Importantly, no evidence of overfitting was observed. The findings also suggest that influenza seasonality in Wisconsin has become more variable in the post-COVID era, emphasizing the need for adaptive, data-driven modeling strategies. By identifying the most effective method for near-term influenza modelling and forecasting, this study provides practical guidance for epidemiologists and public health practitioners in temperate regions. Overall, our research demonstrates that spline-based GAMs enhance influenza surveillance, improve operational forecasting, and advance understanding of evolving regional epidemiological patterns, offering a robust alternative to traditional time-series methods for contemporary influenza dynamics.

Minh-Anh Pham

Discipline: Health and Human Development

Authors:

#1 Kyle Wiley

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Ann Ding

Abstract Name: Peripheral Cytokine Levels Predict Adverse Birth Outcomes in Pregnant Women

A healthy pregnancy must immunologically balance pathogen response and maternal-fetal tolerance. Adverse birth outcomes have various established distal risk factors, but proximate biological mechanisms are mostly unknown. Our goal is to analyze whether antenatal inflammation, measured by peripheral cytokines, can predict (1) gestational age at birth and birth weight percentiles and (2) preterm and low birth weight incidence. Peripheral blood samples were obtained from 98 pregnant Latina women living in Southern California through the Mothers' Cultural Experiences longitudinal study and analyzed using multiplex assays to determine the levels of cytokines at two timepoints (timepoint 1, <18 weeks gestation; timepoint 2, 20-33 weeks gestation). Questionnaires were administered to assess mothers' experiences during pregnancy at timepoint 3, 0-7 months postpartum. The relationship between cytokines and outcomes was analyzed using linear and logistic regression, with nonparametric covariate balance propensity scoring. At timepoint 2, higher levels of Th2- and Th17-derived cytokines, as well as individual cytokines IL-8 and IL-10, were associated with shorter gestation. Th2- and Th17-derived cytokines at timepoint 2 were also positively correlated with the incidence of preterm birth (<37 weeks) and low birth weight (<2500g). We found no effects for Th1-derived cytokines. Because Th2 cytokines are often interpreted as anti-inflammatory during pregnancy, and Th17 as extracellular pathogenic inflammation, our results reflect simultaneous upregulation of both anti- and pro-inflammatory responses associated with adverse birth outcomes. A possible interpretation is that as pro-inflammatory responses increase in response to extracellular infection, anti-inflammatory responses may also increase to protect the fetus. The upregulation of these opposing immune forces may ultimately contribute to or signal earlier parturition. More research is required to better understand whether the interplay between these opposing immune responses contributes to adverse birth outcomes.

Sean Pham

Discipline: Psychology

Authors:

#1 Melenie Ledezma
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Melenie ledezma

Abstract Name: Early environmental enrichment improves Autism Spectrum Disorder (ASD) symptoms in a mouse model of ASD

Approximately, 1 in 31 children in the United States is diagnosed with Autism Spectrum Disorder (ASD), a neurodevelopmental disorder marked by social communication deficits, social interaction impairments, and repetitive behaviors and/or interests. Delayed cognitive and motor skills as well as increased anxiety and stress are also apparent. To date, off-label use of pharmacotherapies do not directly address underlying ASD pathology. The current study uses a mouse model of ASD to determine mechanistically how early exposure to environmental enrichment can ameliorate ASD symptoms. Methyl-CpG Binding Protein 2 (MeCP2) is an epigenetic mechanism that, when mutated, underlies some forms of ASD (Gogate, et al., 2024). Mutations of the gene encoding for *Mecp2* in mice lead to cognitive and social interaction impairments, anxiety, and motor coordination abnormalities (Gemelli, et al., 2006). Early environmental enrichment (EE), in which mice are exposed to running wheels, tactile stimuli, and social interaction during preadolescent stages, provides sensory and cognitive stimulation that enhances neural plasticity (Fang et al., 2025). Wildtype (WT) and mice in which *Mecp2* is knocked out (KO) in the brain were randomly assigned to EE or social isolation conditions. Mice were then exposed to various behavioral tests to assess learning and memory, cognitive function, social interaction, as well as depression and anxiety. Using EE in our mouse model of ASD, we demonstrate improvements in social interaction as well increased levels of Brain Derived Neurotrophic Factor (BDNF) in the hippocampus, a protein implicated in synaptic plasticity and neurogenesis (Barco, et al., 2005). We also show changes in dendritic morphology as a function of exposure to EE. Taken together, these data show that early exposure to EE can improve symptoms associated with ASD, presumably through its effects on hippocampal synaptic plasticity.

Temmm Phan

Discipline: Biology

Authors:

Abstract Name: Nosocomial *Candida auris* Infections Compared to *Candida* spp.: Drug Resistance, Pathogenicity, & Environmental Survival

This review explores cellular mechanisms conferring antifungal resistance, environmental survival, and increased pathogenicity in *Candidozyma auris* (formerly *Candida auris*) compared to other *Candida* spp. in the context of nosocomial candidiasis, specifically candidemia. *C. auris* is a novel *Candida* yeast most commonly causing candidemia, which carries high mortality rates. High environmental survival and persistent skin colonization by *C. auris* presents a significant challenge for prevention of outbreaks, resulting in recurrent candidemia outbreaks. Furthermore, the limited availability of antifungals and *C. auris*'s frequent multi-drug or pan-drug resistance limits therapeutic options for the treatment of candidemia by *C. auris*. *C. auris* is also frequently misidentified by traditional methods. Comparison of *C. auris* and other clinically relevant *Candida* spp., such as *C. albicans*, *C. glabrata*, *C. haemulonii*, and *C. parapsilosis* was conducted by research on population-based surveillance and case studies. Epidemiological trends indicate a shift away from *C. albicans* towards *C. glabrata* and other *Candida* spp., due to prophylactic fluconazole use selecting for azole-resistant species. Comparison between the haploid structure of *C. auris* and *C. albicans* revealed more rapid evolution of resistance, lesser fitness trade-off for drug resistance, and longer-term acquisition of resistance in *C. auris* compared to *C. albicans*. Research on environmental adaptations indicated preferential colonization of skin, deeper tissue, and formation of aggressive skin biofilms by *C. auris* that prevent death in nosocomial environments or by disinfectant products. These factors suggest that *C. auris* carries a higher risk

compared to non-auris *Candida* spp. to hospitals, and that future therapeutic and preventative protocols must be re-evaluated in the context of highly-resistant *C. auris*.

Temmm Phan

Discipline: Biochemistry

Authors:

#1 Mohammad Siddiqi

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Chelsea Fariss

Abstract Name: Wildfire Smoke Exposure Altered Hippocampal Mitochondrial Dynamics and Corresponding Blood Biomarker Generation

Wildfire smoke (WFS) exposure has been associated with increased dementia in susceptible regions, raising concern that WFS is an environmental modifier of Alzheimer's disease and related dementia (ADRD) pathogenesis. However, the impact of WFS on neurological pathologies remains largely unknown. Thus, there is a need to assess neuropathogenic processes using modeled WFS exposure whilst developing translatable biomarkers to assess corresponding pathology in at-risk populations. In collaboration with the University of New Mexico, a mouse (C57BL/6) hippocampal neuroproteomic and serum peptidomic dataset was analyzed following 3 weeks of 4 hrs/day 100 µg/m³ California wildfire particulate. In the neuroproteome, 3715 proteins were identified, of which 1264 (34.02%) were significantly responsive to WFS relative to filtered air (FA). Responsive proteins displayed functional enrichment in loss of synaptic connectivity (312), abnormal mitochondrial dynamics (222), and cell junctions (344). Early-stage neurodegenerative conditions are associated with perturbed energetics and synaptic dysfunction. Proteomics identified loss of Cend1 & Drp1, key regulators of bioenergetic dynamics in neurons. Immunofluorescence microscopy confirmed acute loss of Drp1 post-WFS in input/output regions of the hippocampus, independent of mitochondrial density control. Drp1 loss was validated in vitro by exposing cerebrovascular endothelial cells to blood from WFS-exposed mice. WFS-exposed blood demonstrated circulating bioactivity modulating endothelial tight junctions, the blood-brain barrier, and Drp1. Biomarker probing of serum peptidomics identified 389 peptides, of which 160 (41.1%) were significantly responsive to WFS, 126 (78.8%) were brain-expressed, and 15 (3.86%) were brain-enriched. Brain-expressed peptides showed enrichment in endothelial vasculature regulation, while brain-enriched peptides were associated with synaptic regulation. Identification of Cend1 & Drp1 in serum portends relevance as biomarkers of altered mitochondrial bioenergetics. Overall, WFS exposure alters circulating factors that impact the blood-brain barrier, impair mitochondrial fission, and reveal that peptides shed into blood may provide putative biomarkers with translational potential for human assays.

Catlynh Phan

Discipline: Biology

Authors:

#1 Anna Salazar

#2 Hunter Moore

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#4 Emma Sebastian

Abstract Name: Restoring Intestinal Barrier Integrity Through Altering a Tight Junction Protein Leads to a Reversal of Aging Phenotypes in Drosophila

Intestinal barrier dysfunction, where the gut becomes leaky, is one of the hallmarks of aging observed across species from Drosophila to humans. Understanding how the loss of barrier function may impact aging phenotypes and whether these phenotypes can be reversed are questions that may lead to a better understanding of diseases of aging. This study utilizes Snakeskin (Ssk), a tight junction equivalent protein, which is important for preventing gut permeability between adjacent gut epithelial cells. The fruit fly, *Drosophila melanogaster*, is used in this research because of the short lifespan and easy genetic manipulation tools, where Ssk protein levels can be altered specifically in the gut by placing the flies on food that drives Ssk RNAi knockdown or overexpression and can be restored by placing flies on control food. The Smurf assay is used to monitor intestinal permeability through feeding flies a blue dye to check for a leaky gut. Ssk levels have previously been shown to naturally decline in the aging fly gut, which correlates directly with intestinal barrier failure. Furthermore, when Ssk is genetically lowered in young flies, they age prematurely, revealing numerous hallmarks of aging, including an increase in inflammation and metabolic dysfunction and a drastically reduced lifespan. This work investigates how changes in the gut impact mitochondria in the brain and thorax muscles of flies and whether strengthening the gut can delay these phenotypes. Mitochondria dysfunction is a known marker of aging and these studies are attempting to understand the impact of gut barrier dysfunction on brain and muscle aging phenotypes. These experiments are attempting to understand whether the breakdown of tight junctions are a primary cause of age-related systemic decline and may suggest that therapeutic strategies targeting these proteins may be a viable route to slow down the aging process.

Cong Huy Phan

Discipline: Computer Science

Authors:

Abstract Name: “From Reflexes to Reasoning”: Hierarchical Emergence of Cognition in Multi-level Agent-Based System

Understanding how consciousness emerges from neural organization remains one of science’s most profound challenges. While Chalmers’ hard problem suggests that subjective experience may resist full reduction, we can still investigate the organizational conditions that consciousness theories propose as prerequisites for experience. This project models a multi-level agent-based system inspired by biological organization, built as a four-step hierarchy — reflexive sensory-motor reactions, coordinated group behavior, perceptual awareness through information aggregation, and simple decision-making through evaluating alternatives — where each level is composed of entities from the level below. To mirror evolutionary pressures, the simulation is designed as a competitive “battlefield” environment in which agents must secure resources, avoid threats, and outcompete others to survive and reproduce. Swarm intelligence and genetic algorithms simulate the adaptive processes that shape populations under these constraints. The central hypothesis is that this hierarchical structure acts as a computational scaffold, enabling higher-level abilities to emerge only when lower-level organization is in place. Using simple metrics such as survival ratio across generations, the model evaluates whether agents with more complex hierarchical organization consistently outperform those with simpler architectures. This work shows how agent-based modeling can be used to explore organizational principles drawn from theories of consciousness within a biologically inspired, competition-driven setting.

Hannah Phanitchob

Discipline: Interdisciplinary

Authors:

Abstract Name: The Government is Doing WHAT?: "Websploring" Perspectives on Cloning, Conspiracy, and the More-Than-Human World

This project critically examines online narratives about human and more-than-human cloning, with a focus on the spread of misinformation, radicalization, conspiracies, and their dangerous impact. At first glance, discussions about human vs more-than-human cloning differ significantly. Human cloning is commonly considered morally objectionable, with supporters often forming part of controversial communities. In contrast, more-than-human cloning frequently sparks curiosity and, in some contexts, is encouraged. It is viewed not as an "act against God" but as a testament to human intelligence and dominance. This difference in responses raises many questions: Why are responses so dissimilar? How does online discourse drive these reactions? And can these distinctions--these different understandings of personhood and "life"--reinforce or perpetuate ideologies that cause harm? To answer these questions, I examine academic explorations of cloning and compare them with ones found all across the digital sphere--from social sites such as Reddit, X (formerly known as Twitter), and 4chan, to YouTube comment sections. Using a digital, "websplorer" approach, I analyze different perspectives on cloning, ranging from the "manosphere"-- interconnected misogynist online communities, scientism, and how they relate to the more-than-human. After a critical interrogation of these perspectives, I invite the user to consider an alternative, perhaps more ethical, approach to discussing cloning, one that does not reinforce heteronormativity, human exceptionalism, or pro-eugenic views. This alternative approach includes an exploration and critique of the Western concept of "personhood" and its limitations regarding cloned life, human and more-than-human.

Hannah Phegley

Discipline: History

Authors:

#1 Hannah Phegley

Abstract Name: Highways and Hardships: The Indianapolis Recorder's Role in Fighting Urban Segregation

During the mid-twentieth century, infrastructure projects across the United States disproportionately targeted Black neighborhoods for demolition under the guise of urban renewal. In Indianapolis, Indiana, the construction of Interstate 65 between the 1950s and early 1970s displaced hundreds of Black residents on the city's northside and permanently altered long-standing community networks. While scholars have examined discriminatory planning practices and the national dimensions of environmental racism, few have analyzed how Black newspapers documented and shaped resistance to these policies. My research offers a microhistory of the Indianapolis Recorder, one of the nation's oldest Black newspapers, and its coverage of the I-65 project from 1954 to 1973. Using articles, photographs, and editorials from the Indianapolis Recorder alongside secondary sources on urban planning and racial segregation, this project evaluates how the newspaper informed residents, exposed discriminatory practices, and mobilized local activism. The Indianapolis Recorder reported early warnings about displacement, highlighted the efforts of resistance and activist organizations such as the Hubbard Center Civic League and Homes Before Highways, and linked Indianapolis activists to broader civil rights networks and leaders, including Dr. Martin Luther King Jr. The Indianapolis Recorder played an essential role in resistance efforts to urban renewal in Indianapolis during the

late 1960s and early 1970s. The newspaper provided necessary coverage of the displacement caused by the construction of Interstate 65 and amplified the voices of organizations and activists fighting the project.

Samuel Phillips

Discipline: Environmental Science and Sustainability

Authors:

#1 Samuel Phillips

Abstract Name: Modeling the Transport of Forever Chemicals in the Arctic Ocean

Pollution affects every ecosystem on the planet, from the warmest tropical coastlines to the most remote polar seas, where contaminants can accumulate despite limited local human activity. With Arctic shipping routes expected to expand as sea ice declines due to climate change, the introduction and redistribution of pollutants in these fragile ecosystems is likely to accelerate. Yet little is currently known about the baseline contamination of the Arctic, making computational modeling a critical tool for exploring how pollutants may enter, move through, and accumulate within the region. This project, building on an earlier simulation of global ocean behavior, extends this framework to a dedicated Arctic domain to examine how the forever chemicals, Per- and polyfluoroalkyl substances (PFAS), may be transported into and across the region. Using the Massachusetts Institute of Technology's General Circulation Model (MITgcm) and Arctic PFAS samples collected by researchers at my university this September, I will build a baseline of observed PFAS concentrations and use the circulation model to help explain the ocean pathways that may contribute to their presence. By April, this project will provide predicted transport pathways, areas of potential pollutant buildup, and a reusable Arctic circulation simulation that can support future contaminant studies and field sampling efforts. These results will provide new context for understanding how contaminants might reach high-latitude environments and will support future efforts to expand Arctic pollution monitoring. At NCUR, I will present the modeling framework, the initial PFAS baseline, and insights from the Arctic circulation simulations.

Samantha Phillips

Discipline: Biology

Authors:

#1 Emily Martin

#2 Emmanuel Oladejo

Abstract Name: Winery Waste, Better Goats? Testing Fermented Grape Pomace

Grape pomace (GP), the primary byproduct of the winery industry, can be utilized as a sustainable feed resource to improve ruminant health and performance. GP is rich in nutrients like fiber, residual oil, and polyphenols, with the latter known for its antioxidative properties. Fermentation or ensiling of GP can reduce anti-nutritional factors, improve protein and carbohydrate availability, and enhance ruminal fermentability, suggesting potential benefits for growth performance when included at moderate dietary levels. The objective of this study is to determine the effect of dietary fermented GP on growth performance in healthy growing bucks. We hypothesize that 10% fermented GP will not impair feed intake and will maintain or improve average daily feed intake (ADFI), final body weight, and feed conversion ratio (FCR) relative to the control. A feeding trial will be conducted using a randomized block design with 10 growing bucks fed a control diet and 10 growing bucks fed a pelleted diet containing 10% fermented GP (dry matter basis) for 42 days. Bucks body weight will be measured on days 1, 15, 29, and 43 of the feeding trial periods, and ADFI, average daily

gain, and FCR will be calculated accordingly. Data will be analyzed using the generalized linear model procedure (PROC GLM) of SAS for analysis of variance (ANOVA) of the treatment effect. $P \leq 0.05$ will be considered significant. It is expected that fermented GP supplement will enhance the ADFI, final body weight, and feed efficiency of growing bucks. Also, this study will be the first to explore the potential sustainability of fermented GP in goat production. Findings will inform undergraduate research and practical recommendations for valorizing winery by-products in small-ruminant production while contributing to circular agricultural systems.

Caitlin Phillips

Discipline: Art History

Authors:

Abstract Name: The Apocalyptic Sublime and the Integration of Secular Anxieties into Biblical Apocalyptic Art

Throughout early Western Europe, apocalyptic art was strictly related to the Biblical Apocalypse and was used as a vessel to channel related fears of the end of the world through God's wrath. However, as the worldly elements of human culture have progressed, apocalyptic art has become integrated with secular iconography and associated anxieties as a motivation for its creation. This transition of depicting religious fears to the secular is first seen in 19th-century apocalyptic art of the British romantic sublime movement, with drastic political, economic, and cultural change throughout Europe influencing apprehensions. While apocalyptic scenes from the Bible still prevailed as the mode of how the apocalypse was perceived in art, there was an increasing inclusion of secular iconography that exemplified how people were no longer fearful of just God's fury; now, it was the consequences of human action that would bring upon the world's downfall. This beginning of this transitional period is first seen in J.M.W. Turner's *The Deluge*, with the deliberate inclusion of an African slave catching a fallen European woman during the storm, acting as commentary to the burgeoning calls for abolition in Britain and the great debate that surrounded it, in particular by the controlling white populous who feared the loss of power and control. This idea is further exemplified in the work of John Martin, who speaks to anxieties regarding the growing urban environment and industrialization, and Sir Francis Danby, who, in a similar manner to Turner, depicts a slave broken free of his chains and standing above a fallen white crowd. This intermediate mixing of religious and secular depictions in apocalyptic art were increasingly popularized and influential in the adaptation of how the masses perceived both cultural change and the felt associated anxieties of the unknown and, consequently, the end of the world.

Elizabeth Phillips-Breese

Discipline: Biochemistry

Authors:

#1 Alex Blom

Abstract Name: Dose Effects of Nitrogen Fertilizer on Amino Acid Composition in Basil

From the research that was done over the summer, the purpose of the investigation was to discover how does different doses of nitrogen fertilizers affect the amino acid composition in basil? To provide context for the research, amino acids need to have the element, nitrogen, present in order to be produced. In addition, plants are known to thrive best with the nutrients Nitrogen, Phosphate, and Phosphorous (NPK). Therefore, this experiment is to see if the amount of nitrogen, in the form of fertilizer, would influence the types and amounts

of amino acids present in the plants, specifically basil as well as, to find out if there are any physical effects on said plants. For the standard data, a balanced 10:10:10 NPK fertilizer was used and for all sets of samples the same amount of sun and water was distributed. That way, there can be a guarantee that any results were due to the amount of nitrogen provided. When carrying out this experiment, the LC method, or the High-Performance Liquid Chromatography (HPLC), and QuEChERS method were used. The HPLC method is where high pressure is applied to move the sample, allowing for a faster and more efficient separation of non-volatile (which is easily soluble in the liquid mobile phase, in the HPLC, due to low vapor pressure and a high boiling point) and polar compounds (molecules with an unequal distribution of electrons). The separated compounds are then detected, identified, and quantified. The QuEChERS method is a Quick, Easy, Cheap, Effective, Rugged, and Safe technique for preparing samples for analysis of pesticide residues and other contaminants in food and environmental samples. The final conclusions were that the plant sets with the most amount of nitrogen added had the most different types of amino acids discovered, as expected.

Anh Phung

Discipline: Engineering

Authors:

#1 Daren R Wilcox

#2 Forrest Austin

#3 Leanna Wildes

#4 Wilfred Djoko Talle

#5 Bota Yvan Brillant

Abstract Name: A Portable Handheld VOC Emissions Tracer

Additive manufacturing processes release volatile organic compounds (VOCs), aerosols, and ultrafine particles that can accumulate in poorly ventilated environments and contribute to long-term respiratory or cardiovascular diseases. Industrial systems often include filtration or monitoring equipment, but affordable, real-time solutions are rarely available for non-industrial users such as small labs, hobbyists, and students. In this paper, a portable handheld emissions tracer is presented. The tracer system integrates multiple sensors for ultrafine particulate matter (down to 1.0 μm), total VOCs, and formaldehyde into a compact, battery-powered platform that will enable accurate and efficient data collection. The system integrates Raspberry Pi Zero 2 with the Sensirion SEN55 and a MEMS formaldehyde sensor for targeted VOC monitoring. The electrical design emphasizes efficient power management; a rechargeable lithium-ion battery with a USB-C charging module which supports roughly four hours of operation. The contribution of this paper is a low-cost, adaptable solution for environmental monitoring in maker spaces and highlights the role of electrical design in developing practical, portable instrumentation.

Bakang Phutietsile

Discipline: Engineering

Authors:

#1 Bakang Phutietsile

#2 Chaitanya Borra

Abstract Name: The Dynamic Effects of Abrasive Water-Jet Machining (AWJM) on Material Integrity

Abrasive Water Jet Machining (AWJM) is a versatile non-conventional process that uses a high-velocity

water jet mixed with abrasive particles to cut almost any material without inducing thermal damage. Despite its advantages, achieving repeatable dimensional accuracy and low surface roughness is difficult because of the complex influence of process parameters such as water pressure, abrasive mass flow rate, traverse speed, standoff distance, nozzle angle, and especially machining-induced vibrations and workpiece chatter. This study focuses on the effect of operational vibrations on kerf quality, taper error, striation formation, and surface roughness in AWJM. Vibration is recognized as one of the primary causes of inconsistency in cut quality, yet its systematic measurement and correlation with surface integrity remain underexplored. A significant challenge in vibration monitoring during AWJM is the extremely short machining time and harsh wet environment, which demands robust, high-frequency data acquisition systems. In this research, only contact-type piezoelectric accelerometers with waterproof sealing mounting are employed to capture vibration signals directly from the workpiece and fixture. Sampling rates exceeding 50 kHz are used to ensure accurate representation of high-frequency transients generated by abrasive particle impacts and jet instability. The acquired time-domain signals are processed through Fast Fourier Transform (FFT) and power spectral density analysis to identify dominant frequency peaks and their amplitudes under varying cutting conditions. These experimental vibration characteristics are then correlated with measured surface roughness (Ra), kerf width variation, and taper angle. Finally, the results are validated against a theoretical vibration model that incorporates jet force fluctuations, abrasive particle momentum transfer, and dynamic response of the workpiece-fixture system. This work aims to establish clear quantitative relationships between vibration signatures and cut quality, providing practical guidelines for minimizing vibration-induced defects and improving precision in industrial AWJM operations.

Julian Piccone

Discipline: Criminology/Criminal Justice

Authors:

Abstract Name: The War on Drugs and the Controlled Substance Act: Racial Disparities and Drug Scheduling in the United States

The Controlled Substance Act (CSA)'s inconsistent guidelines lead to the disproportionate incarceration of Black Americans. The CSA and the U.S. War on Drugs of the late 20th century have contributed to racial disparities in incarceration, particularly against Black communities and while the system remains unchanged, it may continue to reinforce punitive drug policies leading to mass incarceration of Black Americans. This comprehensive literature review used peer-reviewed academic sources to examine racially disproportionate punishment during drug offenses, the drug scheduling process, and abuse potential of scheduled drugs, with a focus on marijuana's classification as a Schedule I drug in order to understand if the CSA is a significant contributor to the disproportionate incarceration of Black Americans. This research found that despite marijuana's relatively low potential for abuse and increasing medical acceptance, marijuana remains federally criminalized, a policy stance that may be rooted more in public perception of marijuana, rather than public health evidence. This classification, coupled with mandatory minimum sentencing laws, disproportionately affects Black Americans, who face higher incarceration rates for drug offenses despite comparable or lower usage rates than white counterparts. This research argued that drug scheduling functions may act as a structural mechanism of racial control to sustain mass incarceration and economic disenfranchisement in marginalized communities and explored how marijuana's legalization/reclassification may lead to a reduction in racially biased incarceration practices.

Rachel Pickert

Discipline: Architecture, Construction Management, and Interior Design

Authors:

Abstract Name: Crossing Heaven and Earth: Pilgrimage to Mountain Monasteries of Meteora as a Sacred Act

In northwestern Greece lies a sandstone formation of pillars climbing 1300 feet above the plain below. These massive stone columns were named Meteora, meaning lofty or elevated, signifying how their sheer cliffsides made access very difficult and dangerous. Despite this topographic challenge, the peaks of these pillars have been home for a community of Eastern Orthodox eremites since the 9th century. Beginning as a refuge to eremites, the political upheavals in the 13th century led them to construct monasteries for shelter from Turkish attacks upon Greece. As a defense strategy, the only access points were removable ladders, hoisting ropes, or nets. These political threats have since disappeared, and yet the monks have continued to keep the monasteries practically inaccessible. Why have they chosen such an isolated and perilous location to make their sacred dwelling? This paper explores the relationship between ascetic practices, extreme rituals, and spatial configurations to argue that architecture is not merely a background for religious practices, but what renders certain experiences possible. Monastic architecture does not provide solely a dwelling but can provide an environment for spiritual practices and define sacred space. This research draws on the distinctions between sacred and profane space as developed by Mircea Eliade and further explored by scholars such as Shelley Ashdown, who states that sacred space is not exclusive but a temporal paradox. To illustrate how the sacred is constructed, this research also engages themes of liminality and spirituality through the works of Victor Turner and Rudolf Otto. By examining the monasteries through the lens of these scholarly works, this paper shows how the journey to access the monasteries of the Meteora mountains can blur the boundaries between profane and sacred space and encourage a sense of humility for life threatened with extinction.

Oli Pierce

Discipline: History

Authors:

#1 Rachel Buff

Abstract Name: The Mystery of Leah Buff Frankel: Reclaiming the Voices of Queer Jewish Women in the Early 20th Century

Leah Buff was born into the Buff family at the turn of the 20th century. As the youngest daughter of six children, there was household pressure to fall into line and uphold the reputation the Buffs coveted in their small rural town of Charleston, West Virginia. Digging into her life and death, a myriad of questions arose as to whether or not she was expected to uphold an image that was not truly her. A general consensus was struck when presented to the team: there was more to Leah's story than at face value. Through genealogical and archival research, we stumbled upon a New York Times article detailing Leah's mysterious passing that made nationwide news. Just three days after her marriage to childhood sweetheart Charles Frankel, Leah plummeted from a hallway window of the prestigious Hotel Edison in New York City while on their honeymoon. At only 35, Leah's life ended at what should have been the start of her next chapter. However, the most striking detail of her demise came at the end of the article: the mention of a letter Leah received from her older sister, Emma, the matriarch of the family. Emma's final words to her sister read: "I have told the girls of your marriage, and they suspect nothing of your illness." These words raised a lot of questions. Why did Leah and Charles wait so long to get married? What illness was she stricken with, and why did the threat of public exposure push her to suicide? The swirl of family rumors that surrounded her also raised some lavender flags; a fear of sex, the importance of appearance to the family, and the social conservatism of the time led me to the notion that Leah did not have the words to describe her identity fully.

Discipline: Chemistry

Authors:

#1 Saima Akter

#2 Ana Corina Ruiz

#3 Melvin Garcia

#4 Jessica Pierre Toussaint

#5 Jason Mendoza

#6 Davia Hudson-Holness

Jason Mendoza

Abstract Name: Assessing the Impact of Nitrogen and Phosphate Fertilizers on the Growth of *Raphanus sativus* (Cherry Belle Radishes) in Simulated Martian Regolith

As science advances and humanity prepares for the possibility of sustaining life on Mars, developing reliable methods of food production becomes essential. However, cultivating crops in Martian soil remains challenging because Martian regolith lacks organic matter and many of the essential nutrients present in Earth's topsoil. This research, conducted as part of the Fall 2024 NASA Plant the Moon/Mars Challenge, evaluated how nitrogen- and phosphorus-based fertilizers influence the growth of *Raphanus sativus* (Cherry Belle radishes) in simulated Martian regolith. Control groups consisted of 100% Earth topsoil and 100% Martian regolith, while treatment groups used mixtures of simulated regolith, topsoil, and perlite. Treatments were amended with either nitrogen-rich fertilizers (worm castings, urea) or phosphorus-rich fertilizers (bone meal, superphosphate) to improve the nutrient profile of the regolith. Plants were grown indoors under controlled laboratory conditions, with pH, electrical conductivity, plant height, and leaf development measured weekly. Results showed successful radish growth in 100% topsoil and in the worm-casting-amended soils, but no growth occurred in the 100% regolith samples or in the phosphorus-amended treatments. Although worm castings promoted leafy growth, radish bulbs did not form, and the roots remained shallow and thin. These findings suggest that Martian regolith requires enrichment with organic material to support plant development, and that additional amendments such as microbial inoculants may be necessary to enhance nutrient uptake and encourage full root and bulb formation. Overall, this study provides useful insights into strategies for improving crop production in Martian regolith and contributes to ongoing efforts to develop sustainable food systems for long-duration Mars missions.

Ava Pimentel

Discipline: Physical/Occupational Therapy and Speech Language Pathology

Authors:

#1 Stuti Chakraborty

#2 Octavio Marin-Pardo

#3 Sook-Lei Liew

Abstract Name: The relationship between cardiovascular risk factors and cognitive and sensorimotor outcomes after stroke

Introduction: Cardiovascular risk factors like diabetes mellitus type II, hypertension, hyperlipidemia, and obesity are increasing in prevalence worldwide and have been shown to contribute to stroke risk and severity. While the relationship between these comorbidities and cognitive decline has been widely studied, their impact on cognitive and sensorimotor outcomes post-stroke remains less researched. Understanding how these comorbidities can affect stroke recovery is crucial to creating tailored post-stroke rehabilitation plans.

We hypothesized that stroke survivors with diabetes, hypertension, hyperlipidemia, or obesity at the time of their stroke would have worse cognitive and sensorimotor test scores than those without these comorbidities. Methods: Participant data (n = 44) was drawn from a multisite study. Stroke lesion volume was ascertained using 3D T1-weighted brain MRIs. Mild cognitive impairment was measured using the Montreal Cognitive Assessment (MoCA) and sensorimotor impairment was assessed using the Fugl-Meyer Upper Extremity Assessment (FMUE) and the Action Research Arm Test (ARAT). Data used was collected at baseline (within 22.11±8.5 days post-stroke). Mixed effects models were used to assess the association of diabetes, hypertension, obesity, and hyperlipidemia with cognitive and sensorimotor test outcomes and stroke lesion volume. The models were adjusted for age, sex, race, intracranial volume, and lesion volume, with site of data collection as a random effect. Results: Among the models tested, two demonstrated statistical significance. We found that diabetes at the time of stroke was associated with having greater stroke lesion volume ($\beta = 0.92$, $p = 0.01$) while hypertension was associated with lower FMUE scores ($\beta = -19.79$, $p = 0.03$). Conclusion: Cardiovascular risk factors such as diabetes and hypertension may contribute to worse post-stroke outcomes which demonstrates the need to consider comorbid conditions in treatment models and rehabilitation planning. This highlights the importance of continued research in how common comorbid conditions impact post-stroke recovery.

Alexis Pineda-Bautista

Discipline: Sociology

Authors:

#1 Leslie Martin

Abstract Name: Public Opinion, Immigration, and the News: The Weight People Put on the Media

My research question is: Does the media's depiction of immigrants/immigration impact the public's opinion on the topic? This research will examine how people react to the news they consume and what role the news media plays in their opinion on immigration. The presentation of a topic using curated language changes based on who is doing the reporting. Prior research shows that based on the media's word choice, use of images, and efforts to evoke emotion, public opinion can be swayed one way or another. People also form their opinion based on personal experiences. Taking into account how people make sense of political information, the public can also choose what information to take on as a part of their personal beliefs. I will conduct 15 semi-structured interviews from college students. Participants will be asked questions based on their reactions to the news on immigration, whether the news they engage with aligns with their opinion, and what they do when it doesn't. They will also be asked questions about alternative news sources and if their opinions have changed based on consumption of media. Participants will scan a QR code and fill in an interest form that contains some questions about their name, contact information, and availability. Based on the general decrease of young people consuming traditional media, I predict participants will place more weight on their personal experiences and alternative media sources to develop their opinion on immigration.

Michael Pink

Discipline: Computer Science

Authors:

Abstract Name: VariantBench: A Framework for Evaluating LLMs on Justifications for Genetic Variant Interpretation

Accurate classification in high-stakes domains requires not only correct predictions but also transparent and traceable reasoning. We illustrate this need in clinical genomics and present VariantBench, a reproducible benchmark and scoring harness that evaluates both final American College of Medical Genetics and Genomics and Association for Molecular Pathology (ACMG and AMP) labels and criterion-level reasoning fidelity for missense single-nucleotide variants (SNVs). Each case pairs a variant with deterministic, machine-readable evidence aligned to five commonly used criteria (PM2, PP3, PS1, BS1, BA1), enabling consistent evaluation of large language models (LLMs). Unlike prior work that reports only final labels, our framework scores the correctness and faithfulness of per-criterion justifications against numeric evidence. On a balanced 100-variant set, Gemini 2.5 Flash and GPT-4o outperform Claude 3 Opus in label accuracy and criterion detection, and both models improve substantially when the decisive PS1 cue is provided explicitly. Error analyses show that models reliably use population-frequency cues yet underuse high-impact rules unless the evidence is unambiguous. VariantBench provides a foundation for tracking such improvements and for comparing prompting, calibration, and aggregation strategies in genomics and other rule-governed, safety-critical settings.

Xypher Pino

Discipline: Biology

Authors:

#1 Xypher Pino

Abstract Name: Synthesizing a Central Resource for Congenital Nephrotic Syndrome

Congenital nephrotic syndrome (CNS) is a rare form of kidney disease occurring within three months of birth, affecting one to three in every 100,000 newborns in the US. The prognosis for CNS is very poor, quickly developing into end-stage renal disease by age three. Kidney transplants are the only curative treatment for CNS; it is important to find other ways to treat CNS and manage its symptoms, especially the heavy proteinuria present in all patients. Research indicates that the main cause of CNS are genetic mutations, specifically mutations causing malformations in the podocyte slit diaphragm. This thesis contributes to ongoing CNS research by synthesizing a comprehensive review of CNS, providing a clear understanding of the disease's pathophysiology, the role of genetic mutations, and currently available treatments. By combining these areas through analysis of various literature works, this thesis identifies research gaps and potential areas for further research, serving as a comprehensive resource for future CNS studies.

Robert Pitsko

Discipline: Computer Science

Authors:

#1 Mahfuza Farooque

Abstract Name: Improving Fine-Grained Emotion Recognition with Contrastive Learning

Understanding subtle emotional cues in text is important for designing AI systems that can support healthy communication and human well-being. While traditional classification approaches using models such as BERT and RoBERTa perform well on basic sentiment tasks, they struggle when emotions become more nuanced or when the number of emotion categories increases. Recent work has proposed ordinal label schemes for emotion classification, but performance remains inconsistent and these schemes are rigid and require manual construction. In this work, we compare a contrastive learning approach to both standard

classification and ordinal label encodings across emotion subsets spanning 2 to 27 classes. We find that contrastive learning produces the strongest performance and results in fewer severe misclassifications. Further, we find a large percentage of misclassified examples appeared close to semantically related emotions in the embedding space, indicating that the model still captured useful emotional information. These results show that contrastive learning can serve as a flexible and reliable framework for emotion recognition, especially when dealing with complex or overlapping emotional categories. This work lays the foundation for a follow-up study in which these emotion embedding models will be used to analyze the emotional tone of social media content. The goal of the larger project is to understand how emotional exposure affects mental well-being and to support future tools for mental-health monitoring.

Avery Pittman

Discipline: Architecture, Construction Management, and Interior Design

Authors:

Abstract Name: The Catamount Center for Entrepreneurship and Innovation

The project explores the development of the Catamount Center for Entrepreneurship and Innovation, a proposed interdisciplinary hub designed to strengthen creativity, collaboration, and well-being among students, faculty, and the local community. The work investigates how intentional environmental design can support innovation by drawing on two research frameworks: Biophilia, which examines the benefits of human connection to natural systems, and Person–Environment Fit Theory, which emphasizes the importance of aligning individual needs with the spaces they occupy. Using these foundations, the project evaluates how a well-designed environment can enhance idea generation, problem-solving, and team-based learning across all majors. This center aims to address a current gap at Western Carolina University. Existing innovation spaces on campus, such as the Rapid Center, the Technology Commons 3DU Makerspace, and the College of Business Innovation Center, offer valuable resources but remain limited by inconsistent accessibility, visibility, and inclusiveness. The Catamount Center proposes to unify these strengths into a single, widely accessible location where users can develop ideas, launch ventures, and engage in hands-on experimentation with tools like laser cutters, 3D printers, business equipment, and industry-standard software. The center would also serve as a bridge between the university and the local entrepreneurial community, creating opportunities for mentorship, skill development, and economic growth. Although still in the research phase, the project will advance into schematic and spatial design by early 2026, informed by case studies of existing university innovation centers and their regional impact. By examining how purposeful design can cultivate innovation in a rural context, this project provides insight into how universities can expand interdisciplinary learning, support new venture creation, and strengthen community engagement through a shared, well-designed innovation environment.

Jessica Plantamura

Discipline: Health and Human Development

Authors:

#1 Gilbert Munoz Cornejo

#2 Manan Roy

Abstract Name: Analyzing Cybersecurity Data Breaches Across North Carolina Healthcare Providers: 2016-2024

Healthcare remains one of the industries most affected by data breaches driven by evolving attack vectors, third-party vendor ecosystem, and uneven cybersecurity capacity. While national research has documented where breaches occur and which sectors are most affected, comparatively little work has examined breach patterns at the state level in a way that can inform local decision-making. This study addresses that gap by asking: what trends characterize reportable healthcare data breaches in North Carolina from 2016 to 2024, and how do breach type, breach location, and timing relate to breach magnitude (number of individuals affected)? Using the U.S. Department of Health and Human Services Office for Civil Rights (HHS OCR) Breach Portal, we will extract all incidents that meet the federal reporting threshold (breaches affecting 500+ individuals) and filter the records to North Carolina for 2016–2024. The analysis will include data cleaning and variable standardization, followed by descriptive statistics and visualizations to summarize annual frequency, affected individuals, and distributions across breach types and locations (e.g., hacking/IT incidents; network servers). To assess change over time and predictors of breach magnitude, we will conduct regression analyses using year and breach characteristics as independent variables and breach magnitude as the primary outcome. We expect to identify growth in breaches associated with hacking and networked systems and to detect time-based clustering that can guide healthcare management. Findings will be discussed in the context of practical cybersecurity planning and policy—highlighting priority control areas for North Carolina healthcare organizations to better protect patient and operational data.

Joshua Player

Discipline: Biology

Authors:

#1 Joshua Player

#2 Craig Myrum

Abstract Name: Comparative Effects of Estrone and 17 β -Estradiol on Arc Expression in SH-SY5Y Neuroblastoma: Implications for Postmenopausal Neuroprotection and Alzheimer's Risk

17 β -estradiol (E2) is the primary form of estrogen in the female body, both in its high concentrations and its strong binding affinity for estrogen receptors. While estrone (E1) exists alongside E2 premenopause, it exists in much lower concentrations, having weaker binding affinity to similar receptors. As women undergo menopause, E2 production drops by 98% while E1 only drops 70%, leaving E1 as the predominant estrogen postmenopause. Although estrogens broadly exhibit neuroprotective effects, most research has focused on E2, leaving E1's role in the brain comparatively understudied. This gap is notable, as postmenopausal women have approximately twice the risk of developing neurodegenerative diseases such as Alzheimer's disease (AD) compared with men, a disparity often attributed to declining estrogen levels. Yet despite E1 becoming the predominant estrogen during this period, its potential contribution to postmenopausal AD remains largely unexplored. Activity-regulated cytoskeleton-associated protein (Arc) is a protein localized within the hippocampus of the brain and is critical for learning and long-term memory, where its dysfunction has been associated with the development of neurodegenerative diseases such as AD. Research in this field is limited, with current studies validating only E2 of being capable of Arc protein expression. This study aims to apply current knowledge on E2-Arc relationships to comparatively explore E1's ability to induce Arc expression. To accomplish this, proteins were extracted from SH-SY5Y neuroblastoma cells treated with 10nM of E1 or E2 and normalized using bicinchoninic acid assays. SDS-PAGE was used to quantify Arc expression with respect to β -actin loading controls. The dose-dependent nature of Arc expression is currently being explored through similar experimentation at 10, 50, 100, 150, and 200nM E1 or E2. Current data suggests E1 is capable of inducing Arc expression similar to E2, providing a framework for subsequent investigations into the estrogen dynamics underlying postmenopausal neurodegeneration.

Luke Plesko

Discipline: Law and Legal Studies

Authors:

Abstract Name: LAWS against the Laws: Reassessing Proportionality in International Humanitarian Law

As artificial intelligence begins to embed itself in modern warfare, many nations are grappling with whether usage of Lethal Autonomous Weapon Systems (LAWS) can comply with current Laws of War. While LAWS are significantly improving their target distinction, they remain expressly not able to meet proportionality requirements under Article 51 of Additional Protocol 1, because proportionality demands meaningful, moral human input prior to the use of lethal weapons. In addressing this ambiguity, I argue that the international community must either clarify the principle of proportionality requiring adequate human input or generate a new set of principles in relation to Artificial Intelligence. Some disagree, instead proffering that International Humanitarian Law (IHL) already performs the key task of analyzing specific judgment and regulations to LAWS. However, these claims fundamentally fail to address that implicit reliance of proportionality has historically been performed with human quantitative judgement. My approach is that reframing the proportionality standard or generating new specific principles of IHL will ensure accountability and accommodate for future advancements in AI. This research will deeply analyze international perspectives on the degree of human judgement required to meet current legal thresholds. Humanitarian protections and technological process have to match each other to avoid miscalculation, civilian casualties, and losing meaning in the art of war. A survey of scholarly literature indicates that this subject has not been addressed. Ultimately, this paper argues that Artificial Intelligence fails to meet the analytical threshold of weighing the loss in civilian life to any discrete and concrete military advantage gained, therefore the international community must adopt new legal principles to account for this discrepancy.

Luke Plesko

Discipline: Law and Legal Studies

Authors:

Abstract Name: Guardians of Democracies: Prevention of African Violent Overthrows with the Judiciary

After the independence of Francophone African states, the French left the power of governance to the newly founded African states, yet the impact of French colonization led to fierce power struggles between tribes and communities among these states. According to Our World in Data, of the two million deaths caused by armed conflicts in Africa, 88% were the result of conflicts relating to coups d'états. This paper will argue that constitutional provisions that legitimize the Supreme Court of the land help prevent violent overthrows of preestablished governments in Francophone Africa. It will analyze recent coups in several Francophone African countries, specifically Mali, Burkina Faso, and Niger, and evaluate the extent to which these overthrows stem from systemic governance failures rather than personal disputes among political rivals. Finally, this research will compare these cases to a successful democratic state, Benin, to illustrate how strong institutions and courts can prevent violent seizures of power. The respect, legitimacy, and implementation of the courts in relation to the core beliefs of the state's Constitution strongly influence peace and internal policies. Judicial legitimacy is a significant factor in determining whether a nation can prevent coups because it provides a foundation of respect for constitutional principles. The implications of these findings will shift the focus in Africa from a disdain for democracy to a more legitimized democratic system with an enforceable and genuine judiciary that is not hesitant to check the powers of other branches. By foregrounding the role of constitutional courts in coup prevention, this research offers a novel analytical angle not previously developed in comparative studies of Francophone Africa. Ultimately, this research argues that the strength and legitimacy of a nation's constitutional court serve as the most decisive factor in preventing violent overthrows in Francophone Africa.

Olivia Pletter

Discipline: Education

Authors:

Abstract Name: Exploring Teacher Preferences and Student Engagement: In-Person vs. Screen-Based Read-Alouds in Literacy Education

This project examines how teachers prefer to share read-alouds with their students and what influences those choices. Specifically, it investigates whether teachers prefer reading aloud in person or using a screen-based format, and how each approach relates to student engagement. Understanding these preferences can inform how educators design meaningful literacy experiences that keep students focused, involved, and connected during instruction. Since the COVID-19 pandemic, technology has played a larger role in classrooms, and many teachers have incorporated digital tools into their instruction. However, there has been little research connecting teachers' personal preferences with what actually happens during these read-alouds in the classroom. This study seeks to address that gap by combining teacher perspectives with classroom observations. Two elementary teachers are participating in the study. Each completed a survey designed by the researcher to share their experiences with both in-person and screen-based read-alouds, how they felt students responded, and which method they preferred. The researcher then visited each classroom to observe both types of read-alouds, taking detailed notes about how students paid attention, participated, and interacted. These observation notes and survey responses are currently being analyzed to explore how teacher perceptions align with observed patterns of student engagement across both formats. Data analysis is ongoing, and results will be interpreted in relation to teachers' decision-making about read-aloud delivery methods and the broader goal of supporting student engagement in diverse instructional settings. This study aims to contribute to a better understanding of how multimodal literacy practices can be used intentionally to promote student engagement and participation in today's classrooms.

Jesus Poblano

Discipline: Physics and Astronomy

Authors:

#1 Nathalie Tuazon

#2 Anna Bezryadina

Abstract Name: Advancing Raman spectroscopy of micro- and nanoplastics through optical and acoustic trapping

Raman spectroscopy is a powerful technique for identifying the molecular composition of samples. However, analyzing nanometer- to millimeter-sized particles or individual living cells requires stable confinement during measurement. This study focuses on implementing optical trapping and combined optical–acoustic trapping for the contactless manipulation of micro- and nanoplastics for Raman characterization. Optical trapping employs a tightly focused laser beam under a microscope to hold microplastic particles during analysis. While effective for individual microscale objects, the Raman signal weakens significantly as particle size decreases. To address this limitation, we integrated optical–acoustic trapping with Raman spectroscopy to study nanoparticles in suspension. Acoustic standing waves generated by paired ultrasonic transducers provide stable confinement of particles, while the focused laser enables both optical trapping and Raman excitation. Over time, the Raman excitation laser partially evaporates residual liquid, producing a more

concentrated nanoplastics sample that enhances signal detection. These approaches have been applied to lab-generated microplastics, ocean-collected samples, and commercially purchased nanoparticles, demonstrating their versatility for environmental and biomedical studies.

Alen Poehlman

Discipline: Biology

Authors:

#1 Felicia Watson

#2 Sean Murphy

Abstract Name: An Integrative Antigen Discovery Pipeline to Accelerate Vaccine Development

The world's two currently approved malaria vaccines do not provide long-lasting sterile protection, leaving millions at risk of disease and death. Current vaccines rely on antibodies that target a parasite protein with high phenotypic diversity, contributing to limited durability. In contrast, the highly conserved ribosomal proteins (RPs) are a promising class of vaccine antigens that show little sequence diversity, are expressed at all stages of the parasite's life, and can induce sterile protection in small animal models. Despite these potential advantages, only a small subset of the 70-80 RPs encoded by *Plasmodium* have been experimentally evaluated in vaccine studies. The ability to evaluate proteins as vaccine candidates is impeded by a bottleneck caused by a lack of cost-efficient, high-throughput screening methods. Here, we demonstrate a novel pipeline that integrates computational predictions with *ex vivo* assays to accelerate antigen discovery in a cost-effective and biologically relevant manner. In Aim 1, we will use multiple *in silico* models to predict the immunogenicity of RP-derived peptides based on cellular processing and human genetic diversity in malaria-endemic regions. Top-scoring peptides will have their reactivity to *Plasmodium*-exposed T cells measured, allowing us to identify RPs containing the most immunoreactive peptides. In Aim 2, we will construct DNA vaccines encoding the downselected RPs from Aim 1 and evaluate their immunogenicity in mice. Finally, we will evaluate CD4⁺- and CD8⁺-mediated contributions to these RP-specific responses. We expect this study to lay the foundations for challenge experiments that reveal whether these previously uncharacterized RPs can provide sterile protection. More broadly, we anticipate that our pipeline could be scaled and applied to the full proteomes of *Plasmodium* and other infectious pathogens to streamline cost-effective identification of novel antigens and accelerate vaccine development.

Ayusha Pokharel

Discipline: Biology

Authors:

#1 Ayusha Pokharel

#2 Anya Melson

#3 Nipun Chopra

Ayusha Pokharel

Anya Melson

Abstract Name: Investigating the Effects of a Hexylamine-Derived Compound on Cell Death in A375 and N2a Cell Lines

According to the American Cancer Society, roughly 2 million new cancer cases are expected to be diagnosed in 2025, with 618,000 of those cases resulting in death. Currently, the Food and Drug Administration (FDA)

has approved more than 300 anticancer drugs, yet cancer prognosis remains inconsistent, tissue-specific, and inversely proportional to cancer staging. Additionally, due to their high mutation rate, cancer cell lines can develop resistance to anticancer drugs over time. For this reason, it is imperative to identify new potential anticancer drugs to treat cancers that are resistant to current treatments. Herein, we demonstrate the promise of a newly synthesized drug towards anti-proliferation capacity. Our work investigated the effects of this hexylamine derivative compound on various cell lines to determine its anticancer properties. Exposure to kidney cell type, HEK293 cells, showed a decrease in MTT cell viability at a drug concentration of 30 micromolar. Conversely, fibroblastic NIH/3T3 and melanoma SK-MEL-28 cell lines showed no change in response to drug exposure. The mechanisms by which the hexylamine derivative causes cell death are still unknown, but may include apoptosis, necrosis, or autophagy. Therefore, this study aims to examine the molecular mechanisms responsible for hexylamine-induced cell death. Using two western blots, we will measure the concentrations of caspase-3 and LC3-II, which are hallmark proteins in apoptosis and autophagy. We will also investigate whether drug exposure modulates actin polymerization in neuronal N2a and glial A375 cells. Collectively, our work will generate first-of-its-kind evidence for the use of this hexylamine derivative towards anti-tumorigenic activity, highlighting its translational potential.

Dipta Pokharel

Discipline: Health and Human Development

Authors:

#1 Amber Paulus

Abstract Name: Building a Living Biobank: Undergraduate Contributions to the VCU Kidney Transplant Prospective Registry

Kidney transplantation restores kidney function for patients with end-stage kidney disease, yet predicting long-term success remains challenging. This project utilizes the VCU Kidney Transplant Prospective Registry to identify demographic and molecular predictors of long-term allograft survival and complications. The Registry was developed to create a longitudinal, data-rich biobank that connects biospecimens with clinical outcomes. To date, 735 patients have consented to participate, with 632 having received a transplant and 103 remaining on the waitlist. Biospecimen data are available for 729 participants (99%), representing 6,552 unique samples that include 1,929 blood samples, 2,906 plasma or serum samples, and 1,717 urine samples. Among transplanted participants, most are between 50 and 69 years old, 57 percent identify as male, and 62 percent identify as Black or African American. The leading causes of kidney disease are systemic and secondary glomerular disorders, followed by inflammatory and primary glomerular diseases. Transplants have included 605 kidney and 27 kidney-pancreas recipients, with 538 organs from deceased donors and 94 from living donors. Most patients were transplanted within three months to two years after listing, although a subset waited more than five years. As undergraduate research assistants, we process and catalog biospecimens in LabNAV, link them with de-identified clinical data, and track measures such as transplant status, diagnosis, donor type, and wait time. Our work involves managing clinical research data, performing descriptive analyses, and contributing to translational science. Initial results confirm the Registry's utility in investigating ethnic and racial disparities, given its significant demographic representation. Ultimately, the biorepository provides the foundational data and specimens needed for precision medicine research to discover novel biomarkers and improve long-term patient outcomes in Virginia.

Rishima Pokharel

Discipline: Biology

Authors:

#1 Radmila Janjusevic
#2 Janina Li
#3 Robert Nicolas

Abstract Name: Assessing the role of surface protein from segmented filamentous bacteria in adhesion to gut epithelial cells through *Bacillus subtilis* model system

Segmented filamentous bacteria (SFB) are unculturable, host-specific commensal gut microbes. In the body, SFB function as potent inducers of host adaptive and innate immune system, facilitating the destruction of pathogens. SFB prime the immune system through vesicles transporting bacterial proteins to the intestinal epithelial cells (IEC). This is enabled by intimate binding of SFB to the hosts' IECs in the ileum (small intestine). SFB initially adhere to the ileum through flagellum-mediated binding to TLR 5 receptor, but multipoint, tight binding to epithelial cells is still intriguing. Ileal IECs are protected from lumen content by mucus, which is hydrogel rich in carbohydrates. Furthermore, some cell receptors of IECs are decorated with various carbohydrates. Fucosylation of IECs is closely related to the immune function of intestinal mucosa and could be triggered by cytokine IL-22. Protein P12260 was predicted to be an SFB-unique lipoprotein on the surface of bacteria and contains carbohydrate-binding domains. We hypothesized that SFB-host binding may be mediated by protein P12260-carbohydrate interactions. This project is part of a larger laboratory project which establishes *B. subtilis* as a model bacterium for surface display of SFB proteins for their functional studies. Specifically, this project investigates binding of P12260(SFB)-expressing *B. subtilis* to fucosylated mice epithelial cells by using an adhesion assay. To induce fucosylation of mice ileal IECs in vitro, mice IL-22 was purified and added to the cell growth media. If the results of the adhesion assays with 12260-expressing *B. subtilis* and IECs show increased ileal binding compared to *B. subtilis* alone, it would suggest their potential as an improved oral vaccine delivery system.

Natalia Poliakova

Discipline: Theatre/Drama

Authors:

Abstract Name: Get Your Words Off Me: Role of Aesthetic Distance in Staging Gender-Based Violence

"Her hair is all done well, and the professional make-up... I don't know, she just doesn't seem like a victim." In my conversation with the playwright Mara Nelson Greenberg, I asked what prompted her to write her extraordinary absurdist play *Do You Feel Anger?*, and she shared this story with me. As she was watching an HBO documentary "Allen v. Farrow", she caught herself subconsciously assessing Dylan Farrow and determining whether she was acting in a way that we typically expect a victim to; having realized that, Mara was able to distance herself from that process and evaluate it deeper for what it really was. From the meditation on this phenomenon *Do You Feel Anger?* came to be. It's a play that explores how we judge survivors of inter-personal violence and how their physical attributes and behaviors affect our judgement. In this paper I will explore possible approaches to the staging of the play and propose a directorial concept that can force audience members to encounter and address this phenomenon, and, hopefully, teach them more productive ways of communication with the survivors of (especially gender-based) violence.

Vanessa Polster

Discipline: Biology

Authors:

#1 Tracey Bonfield, PhD
#2 David Fletcher
#3 Evan Rudo
#4 Rodrigo Somoza, PhD

Abstract Name: Human Mesenchymal Stem Cells as Antimicrobial Therapeutics in *Mycobacterium abscessus* and *Pseudomonas aeruginosa* Infections

Introduction: Pulmonary infections pose a major cause of morbidity and mortality in immunocompromised individuals, including patients with immunodeficiency diseases, cystic fibrosis, cancer, and aging. Despite antibiotic advancements, bacteria such as *Mycobacterium abscessus* (*M. abscessus*) and *Pseudomonas aeruginosa* (*P. aeruginosa*) continue to evolve resistance. Mesenchymal stem/stromal cells (MSCs) have anti-inflammatory and antimicrobial properties, mystifying their clinical efficacy. We hypothesize that although MSCs are antimicrobial, a specific MSC phenotype provides the best secretome potency. **Methods:** Confluent MSCs from three donors (2320, 2326, 2337) were cultured for 72 hours to generate secretomes, which were tested in vitro on 104 colony-forming units (CFUs) of *M. abscessus* and *P. aeruginosa*. *M. abscessus* cultures were incubated for 24, 42, and 48 hours, while *P. aeruginosa* cultures were incubated for 4 and 24 hours. At each point, bacterial growth was quantified through optical density OD600nm and CFU post-treatment. **Results:** MSC secretomes inhibited *M. abscessus* in a donor-dependent manner. In *M. abscessus* donor 2326 achieved the strongest reduction at 42 hours (74.5%), while 2337 and 2320 performed similarly (68–70%). All three reached near-complete inhibition (>99.5%) by 48 hours. In *P. aeruginosa*, at 24 hours, 2320 was most potent (99.6%). Donor 2337 showed moderate inhibition (66.5%), while donor 2326 unexpectedly promoted growth (–11,642%) relative to the control medium. Despite these differences, all three secretomes significantly inhibited *P. aeruginosa* ($p < 0.05$) by the culture endpoint, though inhibition varied significantly among donors and between species. **Conclusion:** These results suggest MSC-derived secretomes can serve as complementary antimicrobial agents and emphasize the need for expanded research into donor-specific variability when developing MSC-based therapeutics. **Acknowledgments:** Research reported in this review was supported by The National Center for Regenerative Medicine ENGAGE Summer Program, The Cystic Fibrosis Foundation, The Marcus Foundation, and The Bonfield Laboratory at Case Western Reserve University School of Medicine.

Cameron Ponton

Discipline: Health and Human Development

Authors:

#1 Alexis Camacho
#2 Jeannie Bailey

Abstract Name: Sex-differences in Paraspinal Muscle Quality and Response to Pain Treatments for Chronic Low Back Pain

Chronic low back pain (cLBP) remains a leading cause of disability, yet diagnostic procedures such as the medial branch block (MBB) provide only short-term analgesia and offer limited insight into neuromuscular impairments that may influence long-term outcomes. Paraspinal muscle (PSM) quality degeneration, particularly increased fat infiltration (FI) of the multifidus (MF), has been consistently associated with diminished segmental stability, reduced force-generating capacity, and compensatory movement strategies that increase spinal loading. Because sex differences in muscle morphology are well established in clinical and nonclinical populations, determining whether these differences extend to PSM quality may refine interpretation of pain presentation and early treatment response. This study investigates sex-specific patterns of MF FI and evaluates how these structural characteristics relate to functional status and immediate analgesic response to MBB in adults with cLBP. Six participants completed validated patient-reported measures of pain intensity and physical function immediately before and 30-60 minutes after the procedure.

High-resolution lumbar MRI scans were acquired at the L4/L5 vertebrae using a standardized proton density fat fraction protocol. MF cross-sectional area and fat fraction (FF) were manually segmented by trained raters using reliability-checked workflow to quantify muscle quality and left-right asymmetry. Preliminary results show that although men and women reported similar baseline pain and functional limitations, women exhibited higher MF FF, while men demonstrated greater side-to-side asymmetry. Both groups experienced clinically meaningful short-term pain reductions post-MBB, suggesting that immediate analgesic response may reflect nociceptive blockade rather than underlying neuromuscular status. These findings underscore the value of incorporating PSM quality into clinical assessment frameworks as MF degeneration may influence longer-term biomechanical recovery despite comparable early symptom relief. Ongoing analyses will determine whether sex-specific muscle characteristics predict post-procedure movement patterns and rehabilitation trajectories. This work aims to advance precision rehabilitation by informing sex-informed assessment and intervention strategies for individuals with cLBP.

Daksh Popat

Discipline: Engineering

Authors:

#1 Mubarak Mujawar

Abstract Name: Machine Learning–Based Analysis of Optical Emission Spectroscopy of Cold Atmospheric Pressure Plasma Jet

Optical Emission Spectroscopy (OES) is a non-invasive diagnostic technique used to characterize plasmas by examining the light emitted from excited atomic and molecular species. In this study, spectral data were collected using an Ocean View spectrometer positioned 4–6 cm from a Cold atmospheric Pressure Plasma (CAPP) jet operating at room temperature. The OES system recorded intensity as a function of wavelength, producing detailed emission profiles of the plasma jet. Collecting high-quality OES data presents several challenges, including human and instrumental errors, fluctuations in detector response, and instability in the plasma source itself. Because the gas flow feeding the plasma jet is not perfectly constant, the emission signal exhibits time-dependent oscillations, which complicate the extraction of stable and reliable spectral features. Furthermore, CAPP jet inherently introduce temporal and spatial variations in discharge behavior, adding further uncertainty to the measured spectra. These fluctuations hinder consistent peak detection and wavelength calibration, particularly when performed manually. To address these challenges, machine learning techniques were used to enhance spectral processing and analysis. MATLAB-based algorithms enabled automated peak identification, noise reduction, and wavelength classification. Integrating AI/ML methods made the analysis more robust to variability in plasma conditions and measurement noise. Our model has significantly improved spectral line recognition, corrected oscillatory artifacts, and enabled the extraction of more reliable physical insights from complex OES datasets, demonstrating its value as an advanced tool for plasma diagnostics.

Elena Popovic

Discipline: Psychology

Authors:

#1 Elena Popovic

#2 Olivia Jeziorczak

#3 Kathryn Collins

Olivia Jeziorczak

Kathryn Collin's

Abstract Name: Mental Freedom: Discovering and Letting Go

The current study will examine the effectiveness of the Mental Freedom (MF) coaching framework, a six-session cognitive-behavioral program grounded in William Glasser's Choice Theory/Reality Therapy (Glasser, 1998). Mental Freedom is designed to strengthen emotional resilience, enhance coping skills, and cultivate personal autonomy through a structured set of cognitive heuristics (Olver, 2024). Each session introduces a core principle: (1) Responsibility vs. Response-ability; (2) the Unconditional Trust Challenge; (3) positive and intentional self-talk; (4) reframing the subjectivity of memory; (5) distinguishing Signal vs. Source when interpreting emotional pain; and (6) recognizing life's Gifts, Lessons, Opportunities, and Wisdom (G.L.O.W.). These components collectively aim to help individuals reinterpret stressful experiences and engage in more adaptive appraisals of daily challenges. In this study, Mental Freedom-certified counselors and life coaches will administer the MF program to clients in the experimental condition, while clients in the control condition will continue receiving their provider's usual coaching or counseling modality. Before beginning the six-week intervention, all participants will complete two measures: the 14-item Scales of Psychological Well-Being (Ryff, 1989) and the Ways of Coping Questionnaire (Folkman & Lazarus, 1988). These instruments assess emotional regulation, problem-focused coping, autonomy, personal growth, and self-acceptance. Participants will complete the same measures following the program, allowing for pre-post comparisons. We expect that clients in the Mental Freedom condition will report significant improvements in well-being and coping relative to the control condition, particularly in areas emphasized by the MF framework—such as autonomy, environmental mastery, and self-acceptance. These anticipated findings would support the potential utility of Mental Freedom as an accessible coaching approach that integrates cognitive reframing, constructive self-talk, and strengthened emotional insight. Future work may explore how MF performs across diverse populations and contexts, including individuals experiencing acute stress, trauma recovery, or major life transitions.

Elena Popovic

Discipline: Psychology

Authors:

#1 Elena Popovic

#2 Olivia Jeziorczak

#3 Samantha Desantis

Olivia Jeziorczak

Samantha Desantis

Abstract Name: Not All Regrets Are Created Equal: Attachment Style Explains Why

Regret research suggests that individuals experience different emotional responses depending on whether a negative outcome follows from an action they took or an action they failed to take. Early findings (Kahneman & Tversky, 1982) suggest that failed actions typically evoke more intense regret than inactions. However, later work highlights the prominence of inaction regrets, especially over time (Gilovich & Medvec, 1994; Beike et al., 2009). These mixed results raise the question that individual differences may play a role in shaping regret. One promising factor is attachment style, which influences how people make decisions, interpret responsibility, and respond to negative emotional outcomes. The current study investigates whether regret intensity for actions versus inactions differs as a function of one's attachment style. Approximately 60 undergraduate students will participate. After completing an existing attachment style measure (i.e., anxiety and avoidance), participants will read brief scenarios in which a negative outcome follows either from switching their initial choice (action) or staying with it (inaction). After each scenario, participants will rate the intensity of regret they expect to feel. This scenario-based paradigm allows us to examine how decision type and attachment style interact in shaping regret evaluations. We expect to replicate the well-documented main effect of decision type: actions will elicit stronger immediate regret than inactions.

More importantly, we predict an interaction between attachment style and decision type. Individuals higher in anxious attachment—who tend to ruminate, anticipate rejection, and feel heightened responsibility—are expected to report stronger regret following failed actions. In contrast, individuals higher in avoidant attachment—who typically suppress negative emotions and minimize dependence—are expected to show little difference in regret across decision types. This study aims to clarify why people differ in the intensity of regret they experience and how relational tendencies may shape emotional reactions to negative outcomes, contributing to a more nuanced understanding of decision-making processes.

Jocelyn Porchia

Discipline: Physical/Occupational Therapy and Speech Language Pathology

Authors:

#1 Felipe Gonzalez-Seguel

#2 Louisa Summers

#3 Lindsey Fresenko

#4 Stacey Slone

#5 Anna Kalema

#6 Douglas Long

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#8 Esther Dupont-Versteegden

#9 Kirby Mayer

Abstract Name: Seasonal Physical Activity in ICU Survivors

Introduction: Critical illness often leads to long-term physical and functional impairments that alter quality of life after intensive care unit (ICU). Physical activity (PA) patterns influence recovery trajectories for patients recovering from ICU stay. While seasonal PA fluctuations have been observed in community-dwelling adults, differences in PA by season in ICU survivors remain unknown. Therefore, the purpose of the study was to identify seasonal PA differences in ICU survivors. **Methods:** An interim analysis of PA data in ICU survivors from a prospective longitudinal study (NCT05537298) was examined for seasonal PA trends. PA was monitored via Garmin VivoFit-4 at hospital discharge (baseline), 3 months, and 6 months after discharge. A six-minute walk test (6MWT) was administered at each visit. Seasonal mean step counts were categorized by data collection dates. A two-way analysis of variance was used to examine the effects of season and time point on mean daily step count. Pearson correlations assessed associations between 6MWT and seasonal mean step count data. **Results:** Eighty ICU survivors were included (age 57 ± 13 years; BMI 28 ± 7 kg/m²; 54% male). No significant differences in mean daily step count were identified among the seasons (Autumn, Winter, Spring, Summer) for ICU survivors across the total recovery trajectory (all time points combined) or at individual time points (baseline, 3-month, 6-month). However, there was a significant difference in daily step count between baseline and 6-month ($p=0.0007$) and 3-month and 6-month ($p=0.045$) time points. Correlations between PA and 6MWT trended weakly positively at baseline ($r=0.4$, $p=0.072$) and were moderately and weakly correlated at 3-month ($r=0.5$, $p=0.003$), and 6-month ($r=0.4$, $p=0.037$), respectively. **Conclusions:** Independent of seasonal effects, patients increased physical activity after 3 months. These findings inform future research emphasizing existing interventions and the importance of continuous PA capture to improve post-ICU patient outcomes. **Funded By:** AR081002, K23 AR079583

Evelina Porta

NY - Guttman Community College

Discipline: Chemistry

Authors:
#1 Evelina Porta

Abstract Name: Evaluating Ethiopian Raw Coffee as a Sustainable Reducing Agent for Cr(VI)-Contaminated Wastewater

Hexavalent chromium [Cr(VI)] is a highly toxic pollutant commonly generated by industrial activities and linked to severe health risks, including carcinogenic effects. In contrast, trivalent chromium [Cr(III)] is significantly less toxic and functions as an essential micronutrient, making the reduction of Cr(VI) to Cr(III) a practical remediation strategy. This study investigates the potential of Ethiopian raw coffee as an environmentally friendly electron donor for the reduction of Cr(VI). Raw coffee beans were ground, air-dried for 2 weeks, sieved to obtain uniform particle sizes between 0.335 and 1 mm, and mixed at a mass-to-volume ratio of 0.5 g per 20 mL with simulated wastewater containing 25 mg/L Cr(VI). Reaction samples were collected over time using a syringe attached with a luer-lock PVDF 0.22 μ m filter, and all experiments were conducted at room temperature. Cr(VI) concentrations were measured using the diphenylcarbazide colorimetric method with an Aquamate 8000 UV-Vis spectrophotometer at 540 nm. Preliminary results showed that approximately 40 percent of the initial Cr(VI) disappeared within 80 minutes in the presence of raw coffee. Additional experiments will evaluate different mass-to-volume ratios and particle sizes, and further kinetic and thermodynamic results will be presented at the conference.

Selah Porter

Discipline: Biology

Authors:
#1 Selah Porter
#2 Kimberly Jefferson

Abstract Name: Impact of Calcium Channel Blockers on *Sneathia vaginalis*-Induced Ca²⁺ Influx

Sneathia vaginalis is an anaerobic gram negative streptobacillus and a component of the vaginal microbiome. It is consistently associated with negative pregnancy outcomes including amnionitis, preterm premature rupture of membranes, and preterm birth. *S. vaginalis* produces the cytopathogenic toxin A (CptA), which forms pores in the plasma membrane of human cells. The lab recently discovered that *S. vaginalis* causes rapid influx of Ca²⁺ into vaginal epithelial cells in a CptA-dependent manner. The hypothesis behind this study is that L-type and T-type calcium channel blockers prevent CptA-mediated Ca²⁺ influx. To test this hypothesis, VK2 E6/E7 vaginal keratinocytes were loaded with the calcium binding fluorophore CalbryteTM 520AM as an indicator of intracellular calcium levels. VK2 cells were pretreated with the pharmacologic calcium channel blockers nifedipine, cinnarizine, or verapamil prior to exposure to *S. vaginalis*. Fluorescence measurements were collected every minute for ten minutes to assess intracellular Ca²⁺ influx. Assays for cell viability were conducted to confirm that the concentrations of channel blockers used were not toxic to VK2 cells and to assess their effect of CptA-induced cytotoxicity. The results revealed that L/T-type calcium channel inhibitors reduce *S. vaginalis* induced Ca²⁺ influx. This suggests that Ca²⁺ influx depends upon a human calcium channel expressed on the VK2 cells rather than on the pores formed by CptA. In future work, the calcium channel/s responsible for CptA will be identified. This project contributes to our understanding of a key virulence factor of *S. vaginalis* which could ultimately promote improvements in intervention and treatment of the damage that this species can inflict upon the female reproductive tract.

Roberto Portillo Osorio

Discipline: Economics

Authors:

Abstract Name: An Economic Analysis of Immigration Policy, Logistics Costs, and Inflation on Lettuce Prices in the U.S.

This study seeks to examine the extent to which changes in immigration policies, transportation costs, and inflation influence the fluctuation of lettuce prices in the United States over the past two decades. Previous analyses by the United States Department of Agriculture (USDA) have examined the consequences of labor shortages and increasing fuel costs, yet few have integrated immigration policies, general transportation expenses, and rising prices all in a unified framework. This paper addresses this gap by studying these variables from the year 2007 to 2024. Using monthly national-level data, from the United States Bureau of Labor Statistics (BLS), as well as additional information from the United States Citizenship and Immigration Services (USCIS) and the Department of Labor (DOL), a multivariable linear regression equation was performed, with the aim to explain the impact of labor, transportation costs, and factors such as rising costs of fertilizers, pesticides, and raw materials on lettuce prices and the broad American farming industry. Regression results revealed positive correlations between the implementation of strict immigration policies, higher farm-to-market transportation expenditures, and inflation with fluctuating lettuce prices nationwide. Findings demonstrate that the biggest impact was caused by labor shortages resulting from stricter immigration legislation. Consequently, the reduction of migrant labor led to unstable lettuce prices. As a result, farm owners had to invest greater financial resources to maintain production, which in turn drove up costs for consumers. Based on these findings, future research could focus on how trade policies and tariffs affect the prices of vegetables, given that such staples are often imported from regions with fluctuating market conditions.

Gabriel Portugal

Discipline: Physical/Occupational Therapy and Speech Language Pathology

Authors:

#1 Mitzi Vernon

Abstract Name: Designing Transfers: Supporting the Transfer Learning Process for New Wheelchair Users

Background: Each year over 500,000 people sustain a spinal cord injury (SCI) and must learn to live a new life as wheelchair users. For wheelchair users, one of the most drastic changes to daily life is learning to transfer – moving from a wheelchair to a bed, toilet, car, and other surfaces. Yet, this can be very difficult to learn. Purpose: This research investigated wheelchair user's experiences learning to transfer and supporting assistive technology. Method: Wheelchair users with spinal cord injuries and rehabilitation experts were interviewed to understand the transfer learning process. A supporting literature review and product research further informed an analysis of currently available assistive devices supporting transfer learning. Findings: Wheelchair users shared personal recollections of motivation, frustration, and challenges learning to transfer. Further, interviews with rehabilitation experts provided insight into the role of assistive devices, such as the transfer board, in supporting transfer learning during rehabilitation. Notably, all wheelchair user participants reported receiving transfer board training during rehabilitation, and 80% of wheelchair users and rehabilitation experts felt that existing transfer devices could be improved. Discussion: These findings suggest an opportunity to develop improved assistive devices to support wheelchair users learning to transfer. Contributing to this need, the present study provides research-informed design criteria for future solutions to consider. The next phase of this research will involve exploring improved transfer devices meeting these criteria. Keywords: Wheelchair Users, Wheelchair Transfers, Assistive Technology

Silvia Postigo

DC - American University

Discipline: Economics

Authors:

Abstract Name: Modeling Economic Warfare: A Game Theory Analysis of the U.S.–China Trade War

The U.S.–China trade war was the most severe episode of economic confrontation in modern history, inflicting billions in losses and straining global trade. Why did the two largest economies fall into this cycle of mutual retaliation? This paper employs sequential Bayesian game theory to examine how the strategic decision-making of both actors triggered the escalating conflict. The model formalizes three variables: the tariff level (t), the probability that China responds aggressively or tactically (p), and the cost of retaliation (r). Unlike existing analyses, it operates these variables across a continuous action space, allowing precise identification of the critical escalation thresholds. Results show that China accepts low tariffs but retaliates once rates exceed 20% if politically aggressive, or 30% if economically tactical. The United States' optimal strategy depends on how it interprets China's type and how costly it expects retaliation to be. These thresholds accurately match real outcomes: China accepted the initial 10% tariff but immediately retaliated when the U.S. raised rates to 25%, revealing itself as the politically aggressive type - precisely the pattern the model predicts. The model's predictive success heightens its relevance today. The project extends the framework by recalibrating parameters using the current administration's "reciprocal tariff" schedule. The updated analysis shows what small misjudgments in beliefs or retaliation costs can again push the equilibrium from stability to open conflict, with trillion-dollar consequences for both nations. By quantifying these strategic interactions, the project links formal game theory with empirical behavior to inform more stability-oriented trade policy at a critical moment in global economic relations.

Wensel Poston

Discipline: Visual Arts

Authors:

#1 Wensel Poston

Abstract Name: Girls On Film

Girls On Film is a short video artwork depicting the slow, frantic drowning of a physically modified toy dog. The dog's discarded fur and elongated legs take it further from reality, while its squealing cries and thrashing movements force life back in; its simulated death creeps closer and closer as it lowers into its drowning pool. The work forces viewers into a position of uncomfortable voyeurism without relief, which is cut abruptly short once the dog's purpose ends and its struggle stops. In this robotic performance, Girls On Film mimics real life footage of violent and sexual exploitation from flourishing industries online. The circumstances under which these are filmed, when done as entertainment, are often in this same simplistic format featuring only a grey room and the subject of harm. To mirror this in toy form forces comparison between a human object bought for its own destruction and an inanimate children's doll, letting the audience stew in that ambiguity until the very end.

Teagan Potter

Discipline: Biology

Authors:

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#2 Madison Collins, PhD

Abstract Name: Regulation of Autophagy Protein Expression in Neutrophils during *S. aureus* interaction

Staphylococcus aureus (*S. aureus*) is a gram-positive bacterium that naturally colonizes the skin and nasal passages. While often harmless, it can become a serious pathogen, causing infections with high morbidity and mortality. The growing threat of antibiotic resistance has made treatment increasingly difficult, heightening concern. To establish infection, *S. aureus* has developed various strategies to evade the human immune system, particularly targeting neutrophils—the body’s first line of defense against bacterial infections. Previous work has shown that *S. aureus* without the SaeR/S gene regulatory complex is not as virulent both in vivo and in vitro. Recent research shows that the upstream accessory genes to saeR/S (saeP and saeQ) function to negatively regulate SaeR/S-mediated virulence gene expression. We have been utilizing western blots to identify and quantify autophagy proteins LC3 and p62 (the “gold standard” for autophagy detection) in neutrophils after interacting with wildtype and mutants deficient in SaeR/S, SaeP, and SaeQ, respectively (Δ saeR/S, Δ saeP, Δ saeQ). Early experiments suggest that neutrophils that phagocytose Δ saeR/S and Δ saeQ may have more expression of these autophagy proteins. These early data indicate that autophagy may function in neutrophils more efficiently during interaction with the mutants relative to wildtype. With this work and other work ongoing, the role and impact of SaeP and SaeQ may begin to be understood during the early stages of infection. Collectively, these studies will fill clinically relevant gaps in our understanding of how *S. aureus* escapes the host immune system to advance disease.

Prashreet Poudel

Discipline: Mathematics

Authors:

#1 Adam Gregory

Abstract Name: A Graph on Bumpless Pipe Dreams

Schubert polynomials were introduced in 1982 and have applications to theoretical physics and geometry. In 2018, bumpless pipe dreams (BPDs) were introduced to provide a combinatorial way of studying these polynomials. In our work, we used results from existing literature to define a graph structure on the set of BPDs for a fixed permutation. We initiate the study of this graph’s properties by investigating which graphs have cycles. We wrote code to implement these objects in SageMath, a Python-based application, and used this to generate all 409,113 graphs for small permutations. We analyzed this data to form a conjecture on which permutations have acyclic graphs, which we proved using mathematical induction.

Danielle Poulsen

Discipline: Chemistry

Authors:

#1 Maury Howard
Dhamissa Holsclaw

Abstract Name: Distributed Pharmaceutical Analysis Laboratory Project

Substandard and falsified pharmaceuticals pose a significant global health threat, particularly in low- and middle-income countries where regulatory oversight is limited. The Distributed Pharmaceutical Analysis Laboratory (DPAL) provides validated chemical analysis of suspect medications collected internationally, leveraging academic institutions and citizen scientists. Virginia Wesleyan University (VWU) participated in DPAL by analyzing ceftriaxone samples collected from Kenya, Uganda, Tanzania, India, Nepal, and Malawi using high-performance liquid chromatography (HPLC). Fourteen samples were evaluated, eleven of which met the $\pm 10\%$ active pharmaceutical ingredient (API) threshold. Three samples consistently failed, and repeat analysis confirmed these deviations, indicating genuine substandard quality. Initial retention time inconsistencies were traced to degraded mobile-phase buffers, which were replaced to ensure reliable results. These validated findings contribute to DPAL's mission of improving pharmaceutical surveillance, supporting public health initiatives, and enhancing trust in drug quality in low- and middle-income countries.

Sarah Powell

Discipline:

Authors:

Abstract Name: Designing a Community Scholars Model: Lessons from a Pilot Undergraduate Research–Community Partnership Program

Undergraduate research programs are increasingly exploring models that foreground reciprocal community engagement. This presentation shares the design and early outcomes of a pilot Community Scholars Program launched through UNC Charlotte's Office of Undergraduate Research. In this model, students are paired with community organizations that serve as mentors on research projects aligned with organizational needs. During the pilot year, two partner organizations worked with teams of two students each. Drawing on my role as OUR's associate director and as a co-mentor for the project with Love in Action Project, Inc., I will highlight key design decisions, including partner recruitment and embedded support for students and mentors. I will also describe the research guidance and professional development sessions provided to support student learning and community-engaged research skills. The presentation will focus on the decision-making processes that shaped the program's structure and mentoring approach, concluding with lessons learned and considerations for future iterations.

John Powell

Discipline: Geography/Geology

Authors:

Naomi Lopez

Abstract Name: Artificial Soil Nutrient Depletion Method for Establishing Fertilizer Application Rates

Accurate determination of fertilizer application rates requires a reliable method for generating low-nutrient or zero-nutrient soil. Over-fertilization is a significant contributor to nutrient runoff, environmental

contamination, and nutrient imbalances in plants. This study evaluates whether nutrient depletion can be achieved through water-based dilution as a practical approach for creating zero-nutrient soil suitable for controlled fertilizer experimentation. One cup of potting soil was mixed with increasing volumes of distilled water, alongside a distilled-water control. Nutrient concentrations of nitrogen (N), phosphorus (P), and potassium (K) were measured using Rapitest colorimetric analysis and digital coding devices. Soil slurries were tested before and after drying to determine whether nutrient depletion persisted beyond the aqueous phase. Results indicate that nutrient dilution is highly nutrient-specific. Approximately four gallons of water were required to lower N and P to “Deficient” levels, while K consistently remained “Adequate.” Upon drying the soil, previously diluted samples returned to “Adequate” nutrient levels for all components except nitrogen, which approached zero after extensive dilution. Phosphorus and potassium did not reach near-zero levels at any dilution, demonstrating resistance to depletion through water mixing alone. These findings suggest that while nitrogen can be substantially reduced through high-volume water mixing, water dilution is not sufficient for producing zero-nutrient soil for phosphorus or potassium. Future work will focus on controlled nitrogen fertilizer application and exploring more effective depletion techniques for P and K to support development of precise fertilizer-rate guidelines.

Anya Powell

Discipline: Biology

Authors:

#1 Jeremiah Henning

#2 Jonathan Perez

Abstract Name: Ghost Crabs Take the Spotlight: Ambient Artificial Light Pollutions’ effect on Atlantic Ghost Crabs (*Ocypode quadrata*)

Artificial Light pollution, the effects of artificial ambient light in natural spaces, is an emerging problem in rapidly urbanizing coastal ecosystems. Light pollution has well-documented impacts on the navigation, feeding behavior, and nesting activity of coastal organisms, like sea turtles and birds, however, has received less attention in non-vertebrates. For instance, Atlantic Ghost Crabs (*Ocypode quadrata*) are nocturnal mesopredators that visually seek prey items, evade predators, and are a common bioindicator species of human activity in beach ecosystems. Escape response behaviors are essential for ghost crab survival, and light pollution may impact their ability to visually detect predators and disrupt the production of Crustacean Hyperglycemic Hormone (CHH), a stress hormone synthesized in their eye stalks. To determine the impact of ambient light pollution on ghost crab escape response behavior, we collected and lab reared 15 crabs from a high-light urbanized beach and 15 crabs from a low-light undeveloped area of the beach on the West End of Dauphin Island, Alabama. We exposed crabs to a common light environment and measured escape responses following a stimulus of being pursued by a flashlight. Additionally, at experiment conclusion we collected hemolymph samples and eye stalks to measure CHH expression. Overall, we found that crabs from low-light beaches fought more, froze less, and burrowed less than crabs from high-light beaches. Additionally, we found males had more defensive behaviors (run, freezing) relative to females that were more likely to fight and burrow. Additionally, we found some evidence of plasticity in escape responses, crabs ran more and burrowed less when ambient night light was added in the lab. Our results provide one of the first assessments of escape response being sensitive to artificial light pollution and shows crabs from highly urbanized beaches may be less equipped to escape predators or children chasing them with flashlights.

Johanna Powers

Discipline: Biology

Authors:
#1 Sierra Beecher

Abstract Name: Seed Banking and Student Engagement Initiatives for the Conservation of Virginia's Native Plants

Seed banking is an important practice which maintains genetic diversity and provides “insurance” for plant species in case of disaster. Although this is most often done for crop species, the seed banking of native plant species cannot be overlooked as native plants are often the foundation of their respective ecosystem. Therefore the curation and amplification of Virginia’s native plant species is vital to the conservation and restoration of our local environment. The goal of this project was to contribute to building an ongoing, student-centered seed banking and plant restoration initiative. Additionally, this project aimed to lay a foundation for future student research opportunities and contribute to current ones. This was done by compiling information about the identification, storage, and germination of multiple species in the lab database into one comprehensible document. Seeds of multiple native species were also collected and curated, contributing to the actual supply of the seedbank. A Canvas course was built, including Seed Collection & Ethics and Plant Identification quizzes, which streamlines the participation of future VCU students. These efforts not only grew the seedbank, but also contributed to the successful amplification of multiple species (Blue mistflower, ironweed, joe pye weed, brown-eyed susan, and common evening primrose). Additionally, the collected seeds have provided support for ongoing research projects measuring rates of germination, response to hormones, growth rates, and microscopy.

Robert Prada

Discipline: Business

Authors:

Abstract Name: AI, Task Delegation, and the Future of Work in Emerging Markets: Evidence from the Turkish Retail Sector

This project will explore how retail firms in emerging markets are adapting to the rapid rise of artificial intelligence (AI), with a specific focus on task delegation. While AI is often discussed from a purely technical point of view, this research focuses on the human and organisational side, how people think, react, and make decisions when AI becomes part of their daily work. Using a Delphi-based approach supported by a Fuzzy Extended Analytic Hierarchy Process (FEAHP), we engaged senior leadership in the Turkish retail sector to identify six key dimensions that shape the adoption of AI: Adoption and Readiness, Human-AI Augmentation and Efficiency, Automation and Operational Shifts, Innovation and Strategic Value Creation, Ethical and Risk Management, and Organisational Learning and Coordination. AI, like other transformative technologies, introduces a democratizing force into workplace relations; studying this shift within an emerging market defined by high power-distance and hierarchical control, allows us to observe how ceding decision-making to AI reshapes task-worker outcomes [and the tensions that surface when authority becomes less concentrated at the top]. This ongoing research aims to forecast changes in task-worker outcomes which can help organisations in emerging markets implement the use of AI in ways that enhance human performance rather than widening gaps between technology and the workforce.

Jose Pradas

Discipline: Psychology

Authors:

#1 Jose Pradas

#2 Nicholas Beskow

#3 Jocelyn Jarvis

#4 Heewon Gray

#5 Marilyn Stern

Nicholas Beskow

Abstract Name: Concern About Child Weight as a Predictor of Home Fruit and Vegetable Availability in a Healthy Lifestyle Intervention for Pediatric Cancer Survivors

Background: Caregivers play a central role in shaping children's nutrition through the foods they provide and encourage within the home. For pediatric cancer survivors, maintaining healthy dietary patterns is especially important due to elevated treatment-related metabolic risks and vulnerability to obesity. The aim of this study was to examine whether caregiver concern about child weight was associated with differences in the availability of fruits and vegetables in the home. **Methods:** The current study analyzed data collected from 253 caregivers of pediatric cancer survivors with overweight/obesity enrolled in a randomized control trial of a behavioral intervention focused on nutrition and physical activity. Caregivers reported their level of concern about their child's current weight on a 5-point scale and completed items assessing how often fresh or frozen fruits and vegetables were available in the home. A multivariate analysis of variance (MANOVA) was conducted to examine the effect of caregiver concern on child weight on reported fruit and vegetable availability. **Results:** Participants primarily identified as female (91%), White (69%), with an average age of 39.62 years (SD = 8.25). The overall MANOVA model was significant, $F(8,496) = 2.23$, $p = .024$, indicating that caregiver concern about child weight was associated with differences in home food availability. Follow-up analyses revealed significant effects for vegetable availability, $F(4,248) = 3.55$, $p = .008$, and fruit availability, $F(4,248) = 2.75$, $p = .029$. Caregivers expressing greater concern about their child's weight reported higher availability of fruits and vegetables within the home. **Conclusion:** Caregivers who are more concerned about their child's weight may increase the availability of healthier food in the household. This pattern suggests that caregivers may be motivated to encourage healthier eating by providing more fruits and vegetables at home. Future behavioral interventions may incorporate strategies to increase the availability of healthier options within the home.

Melina Prado

Discipline: Biology

Authors:

#1 Siddhartha Das

#2 Julio Rangel

Abstract Name: Characterization of a Fatty Acyl Elongase (gFAELO) in *Giardia lamblia*

Giardia lamblia is the causative agent of giardiasis; a globally prevalent intestinal disease transmitted through ingestion of contaminated food or water. The parasite alternates between two major life cycle stages: the trophozoite, an adherent and metabolically active form that proliferates in the host intestine, and the cyst, a dormant and environmentally resilient form responsible for ensuring transmission. The transition from trophozoite to cyst requires extensive cellular and metabolic reprogramming, including coordinated remodeling of membrane lipids and the biosynthesis of a robust cyst wall composed of proteins and carbohydrates. Although lipids are known to influence encystation, the specific contributions of many lipid-modifying enzymes remain poorly understood, limiting insight into how metabolic shifts regulate this developmental process. This study aims to characterize the role of the giardial fatty acyl elongase (gFAELO) in trophozoite-to-cyst differentiation, with a particular focus on how modulation of its activity—especially overexpression—affects cyst formation. The spatial and temporal behavior of gFAELO during encystation will also be assessed to better understand its potential regulatory function. To investigate gFAELO function, molecular approaches were used to modulate its expression, including the generation of gFAELO-overexpressing *Giardia* lines. A Halo-tagged gFAELO was also integrated into the genome to enable visualization of its localization during differentiation, providing a basis for future studies on its spatial and temporal dynamics. Overexpression of gFAELO resulted in a marked impairment of cyst formation, demonstrating that increased levels of long-chain fatty acid synthesis disrupt essential lipid-regulated steps of encystation. These findings suggest that precise control of gFAELO activity is necessary for successful differentiation. Understanding gFAELO's role in encystation provides valuable insight into the lipid-mediated regulation of *Giardia*'s life cycle and may aid in identifying metabolic vulnerabilities that could be targeted to reduce parasite persistence and transmission.

Sid Prakash

Discipline: Nursing and Public Health

Authors:

#1 Jesper Mølgaard

#2 Øivind Jans

#3 Eske Aasvang

Abstract Name: Preoperative Anemia and Length of Admission in a Surgical Cohort: Simulation of Therapeutic Potential

Preoperative anemia, often prevalent in surgical patients, is associated with increased morbidity, costs, and prolonged hospitalization. This study utilizes a de-identified dataset of surgical admissions from the University of Copenhagen, Rigshospitalet, Copenhagen, Denmark, to retrospectively analyze the relationship between preoperative hemoglobin (Hgb) levels and length of admission (LoA), serving as a foundation for assessing the value of prophylactic iron transfusion as a preoperative anemia treatment. From surgical and blood-test datasets, we linked the lowest preoperative Hgb value per patient admission to LoA. LoA data were log-transformed to manage right-skew, and statistical outliers were removed using studentized residuals.

We used robust linear regression with heteroscedasticity-consistent standard errors to model the correlation between Hgb and Log-LoA across the full cohort of 41,003 patients and an anemic subset (Hgb < 8.0 mmol/L) of 22,279 patients. To estimate the potential benefit of iron transfusion, we conducted Monte Carlo simulations (n = 1,000) modeling Hgb increases while accounting for treatment non-responders and applying the model adjustments to patients' LoA to calculate "bed-days saved" (the aggregate of reduction in full admitted days per patient). The analysis confirmed a significant negative correlation between preoperative Hgb and LoA, with the anemic-specific model demonstrating an increased association. Applying the regression estimates to the anemic subset suggested that increasing Hgb by 0.5, 0.75, and 1.0 mmol/L could potentially save 6,755 (-3.12%), 9824 (-4.54%), and 13,037 (-6.03%) bed-days respectively, or per 1000 admissions 303, 440, and 585 bed-days respectively. These findings indicate that theoretical treatment of preoperative iron-deficient anemia could yield significant savings in hospital resource utilization. This analysis serves as the preliminary phase of a larger investigation, for which propensity score matching can be implemented to evaluate the causal efficacy of preoperative intravenous iron infusion in reducing LoA and blood transfusion risk

Sahana Prasad

Discipline: Biology

Authors:

#1 Sahana Prasad

Abstract Name: Investigating the Effects of Exposure Time and Plasma Temperatures on Argon and Helium Plasma-Activated Water for Wound Healing

Dielectric Barrier Discharge (DBD) plasma is an emerging therapeutic option for wound healing. This is due to the generation of reactive oxygen and nitrogen species (RONS) through interactions between the plasma jet and liquid film of the wound surface. As the plasma jet dissociates and recombines surrounding air molecules, RONS are formed and solvated in the wound, bringing unique healing characteristics such as cell-signaling, immune defense, cell proliferation, and angiogenesis. This study investigated how variable plasma setup conditions like exposure time and plasma temperatures can manipulate the concentration of RONS (H₂O₂/NO₃/NO₂) and thus impact the therapeutic potential of DBD plasma for wound healing. RONS concentrations were quantified through absorption spectroscopy: Distilled water, modeling the wound surface, was exposed to a helium plasma jet for 5-15 minutes to create helium plasma-activated water (hPAW). Curve-fitting routines involved comparing hPAW samples within each time condition to calibration curves of varied concentrations of H₂O₂, NO₃, and NO₂ within its designated wavelength ranges through the Shimadzu 1900i spectrophotometer in order to quantify the RONS concentration in each hPAW time condition. However, samples within each condition exhibited a high coefficient of variance, ranging from 18%-62.28%, indicating that external factors besides plasma setup conditions like plasma temperature influence RONS concentration in hPAW. Additional current work includes the change of helium plasma with argon DBD plasma. Argon results are being compared to the helium case in terms of RONS concentration, though generated RONS are slightly different in this argon plasma case. This project will present calibration curves for RONS, helium-PAW, and argon-PAW. Curve-fitting routines and insights into factors impacting the DBD plasma will be presented. Its implications on the therapeutic treatments will be evaluated. The final presentation will include full experimental results for both argon and helium plasma.

Rohan Prasad

Discipline: Computer Science

Authors:

#1 Rohan Prasad
#2 Arnav Biruduraju
#3 Manas Jha
Arnav Biruduraju
Manas Jha

Abstract Name: Addressing Heterogeneity in Meta-Analysis of Medical Data using MATLAB

This open-source MATLAB program provides student researchers with an accessible way to learn and apply meta-analysis techniques commonly used in the medical field. Meta-analysis is a trusted approach for combining results from multiple studies to evaluate overall effects and guide evidence-based decisions. Medical data are typically categorized as continuous, binary, or correlational, and the appropriate meta-analytic model depends on the dataset type. Accordingly, the program includes fixed-effects and random-effects models. For continuous data, the fixed-effect model uses mean, standard deviation, and sample size to calculate the bias-corrected standardized mean difference (Hedges' g). For binary outcomes, events and non-events across two groups are used to compute the Odds Ratio as the effect size. For correlational data, the correlation coefficient (r) serves as the effect size measure. Confidence intervals, z -values, p -values, and the variance of the true standardized mean difference are also computed. All MATLAB routines were validated using real medical datasets, including examples from Lin et al. (2013) on the impact of smoke-free legislation on acute myocardial infarction, and examples from Borenstein et al.'s Introduction to Meta-Analysis. A key component of the code addresses heterogeneity in effect sizes. Understanding heterogeneity requires separating true variation from random error, allowing researchers to evaluate dispersion in study outcomes. The MATLAB model calculates Q statistics (weighted squared deviations), corresponding p -values, between-studies variance (T^2), between-studies standard deviation (T), and the proportion of true heterogeneity relative to total observed variation (I^2). These statistics help determine whether variation across studies reflects meaningful differences or sampling noise. The open-source MATLAB package presented at this conference is freely available for use and adaptation. Each model includes validation results from multiple published studies, demonstrating the robustness of the algorithms and supporting their broader application in medical data analysis.

Anshika Prasad

Discipline: Philosophy, Ethics, and Religious Studies

Authors:

Abstract Name: Artificial Intelligence's Role in Clinical Decision-Making

Artificial intelligence (AI) systems are increasingly used to support diagnosis, risk prediction, and treatment planning, raising questions about how they influence physicians' clinical decision-making and ethical responsibilities. Studies suggest that while many doctors view AI as a promising decision-support tool, they also worry about transparency, bias, accountability for errors, and potential erosion of physician and patient autonomy. This literature review synthesizes current evidence on physicians' attitudes toward AI in clinical decision support, with a focus on how AI affects decision-making processes and key ethical principles. A narrative review was conducted by searching databases including PubMed and MEDLINE for peer-reviewed articles published between 2015 and 2025 that examined physicians' use or perceptions of AI-based tools in clinical care. Studies were included if they reported on decision-making, ethical concerns, or professional responsibilities related to AI, and were excluded if they focused solely on technical performance without clinician perspectives. The analysis also considered selected work on other health professionals to contextualize physicians' views within the broader healthcare team. Across studies, physicians generally endorsed AI as a way to enhance diagnostic accuracy and efficiency, especially for data-intensive or repetitive tasks, but emphasized that final clinical decisions should remain under human control. Common ethical concerns included algorithmic opacity, data bias and fairness, unclear legal liability, and risks to patient trust

if AI is used without adequate explanation or consent. Many authors argued that preserving physician decision-making autonomy requires sufficient information about AI tools, competencies to critically appraise AI outputs, and institutional policies that allow clinicians to deviate from AI recommendations when warranted. The review concludes that ethically robust integration of AI into medical decision-making will depend on targeted education for physicians, accountable AI design, and stronger guidance from professional bodies on responsibility, disclosure, and patient-centered use.

Sherina Premanandh

Discipline: Biochemistry

Authors:

Abstract Name: Role of Ceramide Synthase 6-Generated Ceramide in Organelle-Specific Metabolism

Sphingolipids are essential lipids involved in membrane structure, signaling, and cell communication, with ceramides serving as central metabolites synthesized *de novo* in the ER by ceramide synthases (CerS1-6). Ceramide synthase 6 (CerS6) produces C16-ceramide, which can regulate apoptosis and tumor progression. Importantly, elevated CerS6 expression in high-grade cancers has been linked to poor prognosis. However, the precise role of CerS6-generated ceramide in organellar metabolism is not known. We aimed to investigate the role of CerS6-generated C16-ceramide in mitochondrial and lysosomal proteome and metabolism. We used parental (WT) and CerS6 knock-out (KO) HCT116 colon cancer cell lines which also express Mito-tag and Lyso-tag proteins with HA-tags to purify these organelles using rapid immunoprecipitation protocols. Following isolation, purity of the organellar fractions were validated using immunoblotting with several organelle antibodies. Targeted and untargeted proteomic and metabolomic analyses were carried out in the Massey Comprehensive Cancer Center shared resource facilities. Comparative analyses identified significant differences in organelle-specific metabolomes between WT and CerS6 KO cells. Targeted lipidomics data comparing the mitochondria from WT and KO cells showed notable alterations in mitochondrial sphingolipid composition. Ceramide levels were reduced in the CerS6 KO mitochondria compared to WT, accompanied by other significant changes in complex sphingolipids. These were downstream sphingolipid species, including hexosylceramides (HexCer) and sphingomyelins (SM), suggesting broader disruptions in mitochondrial lipid homeostasis. Moreover, in addition to significant changes in the sphingolipid content, untargeted metabolomics identified several pathways to be potentially regulated by ceramide in the lysosomes. These results suggest that CerS6 loss disrupts organellar sphingolipid metabolism and potentially affect organelle specific metabolic pathways and cellular signaling. Currently, we are defining the changes in the proteomes of these organelles that can mediate the changes in the metabolites.

Leigha Premo

Discipline: Biology

Authors:

#1 Leigha Premo

#2 Sidney China

#3 Rosemary Stoffel

#4 Matthew McCall

#5 Kathryn Jacobsen

#6 Khayriyyah Mohd Hanafiah

Sidney China

Abstract Name: Nasal Carriage of Multidrug-Resistant *Staphylococcus aureus* Among University Students

Nasal carriage of *Staphylococcus aureus* (SA) is common in healthy individuals but remains a significant risk factor for future infection. This project examines SA carriage in college students—an understudied community population that experiences high interpersonal contact and widespread employment in frontline service jobs—and evaluates predictors of carriage. Nasal swabs and survey responses on demographics, workplace exposure, antibiotic use and knowledge, student-athlete status, and hygiene behaviors were collected from 81 consenting participants (IRB approval: 4419-081524-01). Swabs were stored at -80°C , enriched overnight in tryptic soy broth, plated onto mannitol salt agar, blood agar and CHROMagar *S. aureus*. Presumptive colonies were confirmed using catalase testing and latex agglutination. Confirmed SA isolates ($n=23/81$, 28%) were screened for antimicrobial resistance using CHROMagar MRSA and Kirby–Bauer disk diffusion for ciprofloxacin, tetracycline, cefoxitin, erythromycin, and clindamycin, including D-testing to detect inducible clindamycin resistance. Isolates positive on CHROMagar MRSA were additionally tested against rifampin and linezolid. Isolates exhibiting resistance to any antimicrobial ($n=8/23$, 35%) underwent broth microdilution to determine MICs for ciprofloxacin, erythromycin, and vancomycin. A total of 58 (71.6%) of isolates were coagulase negative staphylococcus species (CoNS), ~24.7% were SA and ~3.7% were MRSA. All MRSA isolates were resistant to at least one other antibiotic and three non-MRSA isolates had inducible clindamycin and erythromycin resistance. Preliminary analysis suggest that carriage in this cohort aligns more closely with community-acquired exposure than with healthcare-associated risk, with higher proportion of isolates recovered from students in food service and retail roles, while student athletes show no higher carriage than non-athletes. The inclusion of antibiotic knowledge as a behavioral predictor is another novel component that may clarify links between awareness, use, and resistance. Future analyses will incorporate 16S rRNA gene sequencing to increase detection sensitivity and expand characterization of the nasal microbiota.

Ruthie Presswood

Discipline: Psychology

Authors:

#1 LaRicka Wingate

Abstract Name: The Creation and Evaluation of an Ethnically Informed INQ-15 in BIPOC College Students

The Interpersonal Psychological Theory of Suicide (IPTS) proposes that the desire for suicide stems from perceived burdensomeness, thwarted belongingness, and acquired capability. This research study will focus on the two interpersonal aspects of the theory: perceived burdensomeness and thwarted belongingness. While the Interpersonal Needs Questionnaire (INQ-15) is widely used to assess these constructs, growing evidence suggests its items may not accurately capture the lived experiences of ethnically diverse individuals. This study addresses the limitations of the INQ-15 by creating and evaluating an ethnically informed version tailored to college students who identify as Black, Indigenous, or People of Color (BIPOC). We hypothesize that ethnicity-specific expressions of belongingness and burdensomeness will differ significantly from those captured by the standard INQ-15. Participants ($N = 165$) at a Midwestern public university will complete a self-report survey including the original INQ-15, our newly developed Ethnically Informed INQ-15, and the Multigroup Ethnic Identity Measure (MEIM-8). Using Qualtrics, SPSS, and a Multigroup Confirmatory Factor Analysis (MG-CFA), we will assess measurement invariance across versions of the scale. Preliminary findings from the literature suggest that factors like racial composition in social environments and systemic oppression can distort responses on standard IPTS measures. We hypothesize that the Ethnically Informed INQ-15 will demonstrate improved construct validity in the context of ethnic identity. Conclusions will inform the refinement of suicide risk assessments for BIPOC individuals and contribute to ethnically responsive mental health practices. Future directions include validating the revised scale in other minoritized populations and expanding its use in clinical settings to reduce cultural bias in psychological assessment tools.

Stephen Price

Discipline: Philosophy, Ethics, and Religious Studies

Authors:

Abstract Name: Spiritual Fatherhood in the Rule of St. Benedict

Benedict of Nursia renounced worldly goods and lived a life of Christian asceticism through prayer, work, and sacrifice. In the Rule of St. Benedict, instructions are given for those who wish to join this way of life in monasteries under the leadership of an abbot. For Benedict, the abbot holds “Christ’s place” (RB 2.2) and is the “father of the household” (RB 2.7) in the monastery. At the same time, monks are instructed in the Rule to “prefer nothing to... Christ” (RB 4.21). This presentation will show how, rather than detracting from the monks' obedience to Christ, the abbot governs in God’s name and acts as an instrumental cause of grace, through his office, to those in his care. Drawing on both medieval and contemporary scholarship on the Rule, I show that Benedict’s vision is that God shares his power of spiritual formation with the abbot. This understanding harmonizes God’s role as the ultimate object of obedience and source of all grace with the abbot's role as the immediate representative of the will of God to the monks. As the privileged mediator of Christ's will in the monastery, the abbot receives a temporal role of spiritual fatherhood from God, the eternal father of the monks, as he shepherds the souls of the monastic flock. I will draw on these insights from the Rule to demonstrate more broadly how God uses people as instrumental causes to dispense his grace and to nurture the faithful.

Amber Price

Discipline: Dance

Authors:

Abstract Name: Dance: Rehabilitative Resource to Lower Recidivism Rates

Dance is a rehabilitative method that can provide incarcerated individuals with the mental resources needed to be more equipped to reintegrate into society, which in turn will lower recidivism rates in the United States (U.S.). The U.S. has a high recidivism rate compared to other developed countries. This is due to a lack of providing incarcerated individuals with the mental and physical resources needed to successfully reintegrate into society once they are released. The U.S. focuses on a retribution approach to the prison system whereas most other developed countries focus on a rehabilitation approach. The prison system in the U.S. does not help mentally and emotionally prepare incarcerated populations for society like rehabilitation facilities do. Dance Movement Therapy (DMT) has been a therapeutic tool in the U.S. since the 1940s, but very little research has been done on its effectiveness on incarcerated populations. The mixed-method research methodology used combines numerical data on global recidivism rates and analyzes individual’s experiences with DMT to provide a complete overview of the results DMT can provide to incarcerated populations. Through DMT, incarcerated individuals can improve their social skills, personal identity, and mental health. These areas of growth can better prepare incarcerated populations to re-enter society. While research that directly connects dance to recidivism rates is still emerging, the evidence that suggests that DMT could lower recidivism rates is compelling. Dance may not be the sole solution, but it is an essential step towards utilizing rehabilitative methods that can be beneficial to incarcerated individuals and the U.S.’s prison system.

Nathan Prince

Discipline: Psychology

Authors:

#1 Taryn Myers, Ph.D.

#2 Kadie Kennedy, B.A.

#3 Gianna Delevan

Abstract Name: You can't win, so win: How athletes and non-athletes respond to images of professional athletes

Previous research by Daniels and associates (2021) has found that athletes' presentation in the media impacts how the public views them. The current study examined how female, male, and gender expansive athletes and non-athletes responded to images of professional athletes. It was hypothesized that those who identified as athletes would experience more body dissatisfaction and disordered eating behaviors than those who did not identify as athletes, as well as athletes would experience more body dissatisfaction following viewing photos than non-athletes, and that women and gender expansive individuals would exhibit greater increases in body dissatisfaction than would men. A sample of 222 participants ($mAge = 33.38$, $SD = 11.70$) recruited from a mid-Atlantic University ($n = 39$) or Connect by CloudResearch ($n = 183$) completed the study via SurveyMonkey. Participants were exposed to four images of professional athletes of their identified gender, with 95 women (42.8%), 61 men (27.5%), and 66 gender expansive individuals (29.7%). 66.2% were Caucasian, and 91.9% were not of Latinx origin. Participants completed demographic information, the Body Appreciation Scale-2 (Tylka & Wood-Barcalow, 2015), and the Teruel Orthorexia Scale (Teruel et al., Barrada & Roncero, 2018). Before exposure began, after viewing each of the pictures of professional athletes, and at the end of the study, participants completed Visual Analogue Scales for weight, shape, and muscularity satisfaction (Slater et al., 2017). Athletes scored higher on body appreciation and a focus on healthy eating. However, athletes also showed higher levels of orthorexia nervosa, which should be closely monitored. Athletes were similarly less affected by viewing images of professional athletes. As hypothesized, women were more affected by viewing these images; however, surprisingly, they scored higher than gender expansive individuals and not men, indicating that images of athletes may affect those outside of the gender binary in ways yet to be explored.

Daron Prioleau

Discipline: Visual Arts

Authors:

#1 Christy Frederick

Abstract Name: Compare and contrast of the design Aesthetics of African, African American, and Japanese designers: Historic to Modern day views

For this research, I will compare and contrast African, African American, and Japanese fashion designers and design aesthetics ; historic to modern day views. Exploring how culture and design aesthetics have evolved across time, utilizing visual and textual methods, I will engage with scholarly articles, past fashion shows, educational videos, and credible online sources to understand the intersections between heritage, innovation, and global influence. Historically, these cultures have drawn deeply from their traditions with African fashion from vibrant textiles and symbolism for storytelling, African American fashion from trendsetting, resilience and cultural expression, and Japanese fashion from precision, simplicity, and quality. Yet, each has also absorbed contrasting influences shaped by colonization, globalization, and modern identity. This study will undertake an in-depth examination of each culture and its representative designers, analyzing how shifts in

political, cultural, and technological contexts have specifically influenced the evolution of fashion within these societies. The knowledge gained will be applied to the creation of two garments titled “Shini” and “Venus.” Shini symbolizes moments of cultural fracture and destruction by reflecting pain, loss, and rebirth through the use of soft, deconstructed, and burnt fabric that still retain a sense of beauty. In contrast, Venus embodies love, unity, and hope, representing how each culture found strength and connection amid adversity. This garment will use structured, proportional forms and refined materials to showcase elegance and harmony. Together, these works will serve as a visual dialogue of contrast and connection, highlighting how fashion continues to be a reflection of identity, struggle, and cultural evolution.

Markham Publick

Discipline: Psychology

Authors:

#1 Kailynne Landry

#2 Micaela Flores-Vaccari

#3 Andrew Velkey

Abstract Name: When Fish Flounder: Zebrafish (*Danio rerio*) as a Behavioral Model for Choice Paralysis under Reward Option Similarities

Choice paralysis is defined as a delay or failure to demonstrate a stable reward preference, arising from either choice overload (an excess of options) or the similarity effect (indiscriminable differences between two options). Although well characterized in humans and attributed to higher-order cognition, establishing an animal model could elucidate fundamental neurobehavioral mechanisms underlying this phenomenon. In the present study, adult zebrafish (*Danio rerio*) were used to quantify how reward similarity impacts choice latency in a discrete-choice instrumental T-maze task. Subjects chose between high- and low-fidelity social rewards presented across four similarity conditions (mirror images and same- or opposite-sex conspecifics) and a single dissimilarity condition (a food reward). Fish chose between two reward options across similarity conditions (mirror images and same- or opposite-sex conspecifics) or a single dissimilarity condition (a food reward), and preference stabilized when one option was selected in 8 of the last 10 trials after at least 15, or at 30 trials. Response latencies, blocked into deciles, were analyzed with mixed-factorial ANOVAs, revealing significant main effects of Block and Demonstrated Preference, plus Block $\times$ Sex and Block $\times$ Preference interactions, but no effects of similarity condition. Trials-to-criterion showed the same pattern: no sex or condition effects, but a robust influence of preference. Effect-size estimates for preference and trials-to-criterion fell in the medium-to-large range, supporting zebrafish choice paralysis as a tractable model of the neurobehavioral consequences of option similarity.

Abraham Puig

Discipline: Mathematics

Authors:

#1 Christopher Trombley

Abstract Name: Exact & Closed Form Solutions For The Kolmogorov-Petrovsky-Piskunov-Fisher Equation in Cartesian and Polar Coordinates

The Kolmogorov–Petrovsky–Piskunov–Fisher (KPP–Fisher) equation is a fundamental nonlinear reaction–diffusion partial differential equation (PDE) that plays a central role in population genetics, ecological

modeling, and combustion theory. It contains two distinct parts, which is a linear diffusion term and a nonlinear reaction term. The linear diffusion term governs the spatial spreading of the distribution through a classical second-order derivative. The nonlinear reaction term represents local growth or decay and depends solely on the value of the distribution itself, independent of any of its spatial derivatives. The standard analytical technique for solving the KPP-Fisher equation involves transforming the equation into a nonlinear ordinary differential equation (ODE) by a change of variables and analyzing the resulting wave form. The resulting ODE is then studied to determine admissible wave profiles and wave speeds that satisfy the required boundary conditions. While effective, this method relies heavily on classical similarity reductions and often requires nontrivial analysis to obtain explicit solutions. We will demonstrate that an alternative approach inspired by non-classical symmetries but only using elementary methods leads to exact and closed form solutions for certain choices of boundary conditions. We present examples involving quadratic and cubic source terms, also showing how the structure of the nonlinearity influences solvability. We also extend the analysis to both Cartesian and polar coordinate systems, demonstrating that the technique applies naturally to radially symmetric versions of the KPP–Fisher equation as well. This approach offers a easier to use and more accessible pathway for solving for exact solutions to a classical nonlinear PDE.

Seban Pulickan

Discipline: Nursing and Public Health

Authors:

#1 Youngdeok Kim

#2 Eunsoo Park

#3 Jessica Geller

#4 Jisu Kim

Abstract Name: Examining the Associations of Physical Activity and Genetics with Longevity: A Narrative Review of the Literature

Physical activity (PA) is widely associated with improved health outcomes and longer life expectancy, as numerous observational studies have reported robust inverse associations between PA and all-cause mortality. However, most of this evidence originates from general population-level observational research, where causal inference is inherently challenging. In particular, genetics may represent a critical source of residual confounding that complicates the efforts to separate the independent associations of PA from underlying biological predispositions. This criticism has been most prominently raised by Kujala and colleagues, who highlighted the limitations of standard confounder adjustment and introduced the concept of the healthy exerciser bias, which reflects that physically active individuals may live longer not because of their activity itself, but because they carry favorable longevity genes, such as predisposition towards better cardiovascular fitness (CRF). Additionally, findings from monozygotic twin studies, where genetic factors are inherently controlled, have reported minimal or no independent association with PA and mortality, further challenging conventional interpretations of observational data. Given these complexities, alternative research designs may provide stronger evidence regarding the causal role of PA in longevity, accounting for genetic confoundings. The purpose of this study is to conduct a narrative review of the literature, synthesizing the evidence, and examining whether the association between physical activity and all-cause mortality persists even after accounting for genetic predisposition. Particularly, we will focus on studies that employ the three most widely used methodologies for addressing genetic confounding: 1) Mendelian randomization (MR); 2) monozygotic twin studies; and 3) polygenic risk score (PRS)-involved observational studies. We will follow the process of systematic review to develop search strategies, establish inclusion/exclusion criteria, and organize the evidence for synthesis throughout an extensive literature review. We expect that the observed association between PA and mortality will vary across study designs depending on how genetic influences are addressed.

Meghan Puppala

Discipline: Biology

Authors:

#1 Caroline Mooney

#2 Agata Kublicka

#3 Sarah Dremel

Abstract Name: Manipulation of RNA Polymerase III by Herpes Simplex Virus-1

RNA polymerase III (Pol III) transcribes noncoding RNA, including transfer RNA (tRNA), and is commonly targeted during cancer and viral infection. We applied a multi-omics approach to query the Pol III landscape in the context of Herpes Simplex Virus-1 (HSV-1) infection. HSV-1 infection upregulated Pol III type 2 genes, including 7SL, tRNA, and Alu elements. Notably, tRNA synthesis rates increased 10-fold. tRNAs are noncoding RNAs which decode mRNA codons to supply the appropriate amino acids during translation. tRNAs are essential for protein translation, a process taxed heavily during productive viral infection. The consequences of Pol III upregulation during HSV-1 infection are currently unknown. We hypothesize that HSV-1 upregulates the tRNA pool to promote viral translation. To test our hypothesis, we used RNA interference (RNAi) to deplete components of the Pol III transcription initiation complex (TBP, POLR3F, BDP1, BRF1). Orthogonally, we inhibited Pol III using the small molecule inhibitor, ML-60218. RNAi and inhibitor treatment had no significant impact on cell viability. Pol III inhibition was validated by RT-qPCR assessment of premature-tRNAs. Following RNAi in an infected keratinocyte model, we observed decreased viral progeny. In parallel, drug inhibition of infected fibroblast models (HdFn, MRC5) resulted in decreased viral genome replication, late genes, and progeny. Our findings support a model in which increased Pol III activity favors viral replication. These findings provide insight into mechanisms by which HSV-1 alters the Pol III landscape, shifting key ncRNAs to favor the pathogen.

Sonya Purcell

Discipline: Political Science

Authors:

Abstract Name: Federal Intervention and Local Crime: A Difference-in-Discontinuity Study of the 2025 Troop Deployments

Federal intervention in local policing intensified in 2025 when the Trump administration began deploying federal troops to Democratic-led cities. Prior federal mechanisms, such as pattern-and-practice investigations, have produced inconsistent effects on crime, raising questions about whether federal action meaningfully improves public safety. This study evaluates whether federal troop deployment reduces crime by analyzing Washington, D.C., the first city to receive troops, and Chicago, a comparable city publicly targeted but not yet deployed upon. Using daily crime incident data and a Difference-in-Discontinuity design, I estimate the causal impact of deployment by comparing changes in crime rates in D.C. before and after troop arrival with contemporaneous trends in Chicago. The results show extremely small estimated reductions in crime, typically less than one incident per day, and none are statistically significant. Additional analysis of violent crimes specifically, the policy's stated target, likewise reveals no measurable effect. These findings suggest that federal troop deployment is an ineffective and high-cost strategy for reducing crime. The results contribute to ongoing debates over federal involvement in local policing and the efficacy of aggressive public-safety interventions.

Anna Puryear

Discipline: Interdisciplinary

Authors:

#1 Liesl Allingham

Abstract Name: Let's Get Blitzed? Performance Enhancing Drugs in National Socialism and their Pop Culture Afterlife

Why is pop culture so obsessed with Nazis on drugs? This research analyzes how, and why, contemporary pop culture and Nazisploitation films draw on the documented use of performance-enhancing drugs during the National Socialist era in Germany. Media tropes such as the Nazi mad scientist, zombie soldiers, and hyped super-soldiers borrow selectively from historical accounts of methamphetamine distribution within the Wehrmacht. Working within the conventions of Exploitation Cinema, Nazisploitation films use controversial and transgressive subjects such as military drug use to create spectacle in order to draw in viewers. These spectacles succeed because they simultaneously amplify Nazis into nearly invincible threats to democracy, and collapse them into ruined and addicted bodies. This contradiction produces a satisfying narrative cycle for audiences who get to repeatedly defeat an enemy portrayed as both unnaturally powerful and profoundly debased. These depictions are not historically accurate. Instead they offer audiences a way to relive the story of the victor. Viewers return to these films because of the reward of defeating a villain engineered to be undefeatable, but only because of their unfair reliance on performance-enhancing drugs, a signal of their moral inferiority. Thus, the genre reinforces an American postwar identity built on triumph and a clear moral line between “us” and “the epitome of evil.”

Natalie Putz

Discipline: Political Science

Authors:

Abstract Name: The State Beneath the Skin: Tattoos as Uncensored Testimony in Russian Prisons

What explains the emergence of Russian prison tattoos as a discourse of resistance in post-Soviet Russia? Once targeted for erasure by the Soviet Union, these symbols have gained prominence since its collapse, evolving from stigmatized criminal markers into a complex communicative system that shapes identity, authority, and belonging both within and beyond penal institutions. Rooted in codified prison hierarchies, these tattoos originally served as visual records; over time, they became a legible language conveying moral codes, survival strategies, and subtle forms of resistance in environments of strict oversight. While research on Soviet-era tattoos emphasizes codified systems of carceral resistance, studies of contemporary authoritarianism highlight increasingly individualized, aestheticized dissent. These literatures imply different expectations about how symbolic resistance operates today. This study analyzes prison tattoos as a form of carceral communication: encoding identity, norms, and resistance for incarcerated individuals, while transmitting collective memory, counter-narratives, and moral codes to the broader public. Employing a comparative multimodal discourse analysis, a corpus of 84 post-1991 tattoo images was examined alongside testimonial and institutional texts. Tattoos were systematically coded by motif (e.g., stars on the shoulders, barbed wire on the forehead, American iconography), anatomical placement, inferred meaning, and official classification. The images were then interpreted through critical, subcultural, and identity theory to trace how visual symbols articulate both legitimacy and dissent. The findings reveal a paradox: within a society marked by increasing surveillance and declining trust, the semiotic order of the criminal subculture has become a more stable and intelligible medium of communication than the language of the state. Russian prison tattoos operate as enduring systems of moral and political knowledge, offering a critical case for understanding how

subcultural discourses acquire cultural authority when official narratives lose credibility in transitional authoritarian states.

Yifei Qi

Discipline: Biology

Authors:

#1 Joshua Schraiber

#2 Eberardo Raymundo

#3 Bryan Nam

Abstract Name: Tracing Genetic Continuity Between Ancient and Present-day Humans in Southern East Asia Using a Diffusion-Based Model

Understanding whether present-day populations descend directly from ancient groups remains a central challenge in human population genetics, especially in regions with complex population histories. Southern East Asia (SEA), in particular, presents a complex demographic landscape shaped by migration, admixture, and genetic turnover. Yet despite the substantial growth in ancient DNA (aDNA) sampled from East and Southeast Asia in the last 5 years, the population histories of these regions are still not well-characterized, and researchers still lack streamlined tools to determine whether specific ancient groups contributed ancestry to present-day SEA populations. Our project addresses this challenge by developing a computational pipeline that assesses the genetic continuity between ancient and modern human groups. It applies a previously published test of direct ancestry that uses a diffusion-based statistical tool that evaluates whether allele frequency patterns in present-day populations are consistent with direct genetic descent from ancient groups. By implementing automated file processing, robust quality control, flexible sample groupings, and customizable inclusion/exclusion criteria, this pipeline allows us to run continuity tests reproducibly on thousands of ancient individuals. After validating the pipeline using well-studied European ancient genomes we applied it to aDNA uncovered from SEA, including recently published genomes from Yunnan and earlier datasets from surrounding regions. Preliminary results reveal which ancient populations may have contributed ancestry to present-day SEA groups and provide new insight into long-term population stability, regional migration patterns, and shifts in population structure.

Helen Qin

Discipline: Chemistry

Authors:

#1 Dmitri Talapin

#2 Marley Downes

Abstract Name: Synthesis of High-Entropy MXene via Lewis Acidic Molten Salt Etching

Since the discovery of graphene in 2004, two-dimensional (2D) materials - ultrathin sheets just a few atoms thick - have attracted enormous scientific interest for their unique properties. Among them, a family known as MXenes, discovered in 2011, stands out for its compositional tunability, exceptional electrical conductivity, and tunable surfaces. These qualities have made MXenes promising candidates for next-generation applications in energy storage, water purification, and biosensing technologies. Recent developments have focused on synthesizing high-entropy MXenes, derived from high-entropy MAX phases containing four or more transition metal species in the M-layer. Traditionally, these materials are prepared via selective etching

of the A-layer using hydrofluoric acid (HF), a hazardous and environmentally unfriendly reagent known for its extreme toxicity and corrosivity. This project aims to circumvent the use of HF by employing Lewis acidic molten salts (LAMS) as an alternative etchant. The approach utilizes the reactivity and thermal stability of molten halides to selectively remove the A-site element (typically Al) while preserving the multi-metal M-layer. By optimizing key reaction parameters - temperature, reaction time, and salt-to-MAX ratio - we demonstrate the feasibility of this etching strategy for producing high-entropy MXenes under safer and potentially scalable conditions. These findings lay the groundwork for future studies aimed at expanding the synthetic means for MXene production and tailoring their surface chemistry for catalytic applications.

Myra Qin

Discipline: Biochemistry

Authors:

#1 Myra Qin

#2 Nasir Imam

#3 Eric Gibbs

#4 Sudha Chakrapani

Abstract Name: Deciphering Postsynaptic Architecture by Structural Characterization of the Gephyrin Ortholog Cinnamon

Glycine (Gly) and γ -aminobutyric acid (GABA) are predominant inhibitory neurotransmitters in the mammalian brain, recognized by GABA type-A (GABAA) and Gly receptors (GABAARs and GlyRs, respectively). A significant portion of GABAARs and GlyRs are recruited and anchored to the postsynaptic membrane by the central scaffolding protein gephyrin, with other moonlighting functions, such as serving an essential role in molybdenum cofactor (MoCo) biosynthesis. Gephyrin is structurally organized into an N-terminal G-domain (GephG) connected to a C-terminal E-domain (GephE) via a large highly unstructured linker C domain. At postsynaptic sites, gephyrin has been proposed to form a hexagonal lattice through G-domain trimers and E-domain dimers. As a highly conserved protein, several gephyrin orthologs have been identified across species. In mammals, the homologs are involved in both moonlighting functions, while other organisms, such as prokaryotes and plants, are limited to MoCo biosynthesis. Previous studies demonstrated that the gephyrin ortholog in *Drosophila melanogaster*, cinnamon, exhibits identical functions as that of gephyrin. While structural studies have been conducted with isolated GephG and GephE, full-length gephyrin has been difficult to study presumably due to the highly unstructured and proteolytically-sensitive linker C region. Among the known gephyrin homologs, cinnamon features a significantly shorter linker that makes it an attractive candidate to explore inhibitory postsynaptic architecture. We therefore recombinantly purified the full-length cinnamon and subsequently conducted structural studies employing Cryo-electron microscopy (Cryo-EM). Our preliminary studies demonstrate a concentration dependent conformational heterogeneity in cinnamon, with the majority of molecules exhibiting a potential trimeric state.

Zhi Qu

Discipline: Biology

Authors:

#1 Chi Zhang

#2 Dandan Zheng

Abstract Name: Integrative Transcriptomic and Radiomic Profiling of Pancreatic Cancer

With 97% of patients diagnosed with pancreatic cancer, only 3% survive for longer than 5 years post-diagnosis, presenting a global healthcare crisis. To help identify biomarkers and improve early-stage detection, this project integrates transcriptomic and radiomic data to characterize tumor heterogeneity and discover molecular signatures associated with patient outcomes. We analyzed a rare multi-omics dataset from 15 patients in the University of Nebraska Medical Center's Pancreatic Rapid Autopsy Program (RAPID), which includes gene expression data and CT scans for both primary and metastatic tumors. This dataset provides an opportunity to study molecular and imaging features across spatially distinct tumor sites. To identify potential biomarkers, we first used a large public dataset (TCGA) of primary pancreatic tumors to find groups of tumors with similar gene-expression profiles. We trained a machine-learning model to recognize these groups and then applied it to the primary tumors in the RAPID cohort to test whether the same biological patterns appear in an independent dataset. In the TCGA cohort, additional clustering of gene-expression data revealed three tumor subtypes. We identified some survival-linked molecular markers whose expression patterns distinguish patients with different clinical outcomes, such as SLC2A1. When applied to the RAPID cohort, the predicted subtypes showed a trend toward differing survival times. To expand multi-omics integration, the next step of the study links radiomics features from CT scans with the transcriptomic data to identify cross-modal signatures of tumor heterogeneity. Together, this project establishes a multi-omics framework for biomarker discovery and provides insights into tumor progression that may support more individualized treatment strategies for pancreatic cancer. These findings will be discussed in the context of improving early detection and defining biologically meaningful patient subgroups.

Kali Quade

Discipline: Nursing and Public Health

Authors:

#1 Paul Auer

Abstract Name: Characterizing mCAs by Age, Sex, Ancestry, and Genomic Location to Predict Hematologic Malignancy in the All of Us Research Program

Hematopoietic stem cells are precursors for all blood cell types, which, during the maturation process, may accumulate genomic mutations. While many of these mutations have minimal impact, some confer a competitive advantage, leading to the formation of large colonies of clones—a phenomenon known as clonal hematopoiesis. This process has been linked to several diseases, including heart disease, arteriosclerosis, and hematologic malignancies. Notably, by the age of seventy, approximately 10% of the healthy U.S. population exhibits clonal hematopoiesis, with prevalence increasing exponentially with age. One significant mutation type contributing to clonal hematopoiesis are mosaic chromosomal alterations (mCAs), whereby substantial portions of somatic DNA undergo alterations. Importantly, certain mCAs have an increased association with the development of hematologic malignancies, and their prevalence varies across demographic groups. To explore these relationships, we utilized the All of Us Research Program, which offers comprehensive health records from a diverse set of individuals which previous studies have often lacked. We found that frequencies and chromosomal locations of autosomal mCAs differ based on age, sex, and ancestry, with implications for predicting both hematologic malignancy and other diseases. This was concluded following mCA frequency analysis across individuals of varying demographics, identification of chromosomal aberration loci hubs within these groups, and finally, assessment of whether the identified mCAs predict the onset of blood cancers. Recent findings across four large-scale biobanks include identification of novel risk loci that modulate mCA risk and associations with other diseases with emphasis on blood cell count abnormalities. Future analysis involves finding and characterizing associations between blood pressure irregularities and mCAs across various biobanks. By uncovering demographic-specific patterns of mCAs, we aim to tailor personalized cancer prevention and treatment strategies, recognizing the diverse genetic variability underlying hematologic malignancies.

Discipline: Biology

Authors:

#1 Gabrielle Quaresma

#2 Amanda Starr

Abstract Name: Microbial Resistance in Livestock Communities

Livestock are given preventative medications to aid in keeping them healthy, and the excretion of this medication through waste is a large contributor to the spread of antibiotic resistance in the environment. Farmville, Virginia has a large farming community, so it is expected to have more antibiotic resistant bacteria, especially near livestock locations. Through this project, a methodology was developed to collect air samples using a 3D printed device and fan. Three air samples were collected both from a horse pasture and Longwood University's campus. These air microbes were caught on HVAC filters, were grown on LB plates for one week, and then the DNA was extracted. The DNA was quantified using nanodrop and qubit. Samples were barcoded using the 16S library kit from Nanopore, sequenced using a Nanopore Flongle device, and analyzed using EPI2ME software to determine the genera present in each sample. The air microbiome between the horse pasture and Longwood's campus were different from one another, with some genera unique to each location. Antibiotic specific primers will be utilized to determine the presence of antibiotic resistance. Aminoglycosides, macrolides, tetracyclines, quinolones, fosfomycin, trimethoprim, and beta lactam resistance genes were selected for their significance in livestock and human health. Primers were designed to target the ermB gene, which causes erythromycin resistance in bacteria. The primers were verified using PCR, and through qPCR a standard curve was developed and presence of the gene was quantified in each sample. Higher presence of the ermB gene was found in the horse location, meaning there was more erythromycin resistant bacteria in that community. Future directions include qPCR with remaining primers and sampling cow, chicken, and pig locations. This research is important in establishing a baseline of antibiotic resistance in the Farmville community to better aid in animal and human healthcare.

Mia Querciagrossa

Discipline: Biology

Authors:

#1 Clayton Carlson

Abstract Name: The Effect of Short-Chain Fatty Acids on Neurogenesis: Uncovering a Mechanistic Link in the Gut-Brain Axis

The gut-brain axis is a bidirectional communication system between the central nervous system and the digestive tract, involving the brain, gut, and the gut microbiota. The gut-brain axis is important because it is the means of communication between the gut and brain, and it influences mood, cognitive ability, and overall health. The study of the gut-brain axis is important because it can develop new treatments for things like anxiety, depression, and irritable bowel syndrome, which are debilitating diseases that are seen frequently in the world today. Short-chain fatty acids (SCFAs) are produced by the microbiota of the gut and occur naturally from the fermentation of dietary fiber. SCFAs have far-reaching effects, influencing the immune system, metabolism, and even brain function by affecting cells in various parts of the body. SCFAs are thought to play a large role in the communication of the gut-brain axis. Neurogenesis is the process of generating new neurons and is responsible for creating the brain's network of neurons. Human mesenchymal stem cells (hMSCs) were grown and differentiated using differentiation media, and fluorescent microscopy was used to confirm the identity of the neurons and several of their structures, like the nucleus. The goal of

this project is to differentiate hMSCs into neurons in the presence of different concentrations of SCFAs to observe how differentiation is altered. Gene expression of the neurons would then be observed to see how SCFAs impact neurogenesis. This will make clearer the form of communication that is used by the gut-brain axis.

Hannah Quick

Discipline: Health and Human Development

Authors:

#1 Robert Barnes

#2 America Alanis

#3 Josée Guindon

Abstract Name: Investigating Impact of Estrous Cycle, Gonadectomy, and Selective G-Protein Estrogen Receptor Agonism on Inflammatory Pain Using Formalin Testing Model

Inflammatory pain is a key component of acute traumatic pain and chronic rheumatic disease, which significantly reduces the quality of life of those who suffer from it and is often resistant to available treatments. Despite changing policies, there are still a disproportionately high number of pain studies conducted on males compared to females, despite the majority of pain patients being women. Baseline sex differences in inflammatory pain must first be understood in order to guide the development of more effective treatments. Therefore, this study evaluated baseline sex differences in C57BL/6J male and female mice using a formalin model of inflammatory pain. Upon observation of significant sex differences, further investigation was conducted by assessing female mice at each phase of the estrous cycle and through examining the effects of gonadectomy (ovariectomy or castration). Female mice in the metestrus or diestrus phase had decreased inflammatory pain relative to both male mice and female mice in the proestrus or estrus phase. Ovariectomy resulted in decreased pain, which was restored through treatment with estradiol (E2). Castration similarly reduced pain in male mice. Injection of the G-protein coupled estrogen receptor (GPER) agonist G1 resulted in significant antinociception in both female and male mice, regardless of whether they had received sham surgery or gonadectomy. These results establish baseline sex differences in the formalin model of inflammatory pain and support the need for further investigation into the relationships between sex hormones and the regulation of nociception.

Isabella Quilon

Discipline: Psychology

Authors:

#1 Abigail Adade

Faith Maeba

Abstract Name: Therapy in the Age of AI: How Young Adults Seek Help, Support, and Solutions

Therapy has long been a foundational approach for addressing mental health, but advances in digital technology have led many young adults, especially Generation Z, to increasingly turn to AI tools for support. Rising costs, limited access to providers, and long wait times have further boosted the appeal of AI-based mental-health solutions. Despite this growing interest, the use of AI for emotional and psychological support raises important questions about trust, empathy, safety, and the ethical responsibilities of mental-health providers and developers. We conducted a brief scoping review of research on AI-based mental-health tools

and student help-seeking behaviors. Searches were performed on Google Scholar and publicly accessible academic sources from 2020 to 2025 using keywords related to “AI mental health,” “chatbot therapy,” “student help-seeking,” “Gen Z mental health attitudes,” and “digital counseling tools.” Eight articles met inclusion criteria. A standardized five-sentence template was used to summarize each study, covering the citation, purpose, participants, key findings, and relevance to AI and help-seeking, and themes were identified through qualitative synthesis. The findings highlight four key themes: (1) students value the accessibility and professionalism of AI but ultimately trust human therapists for deeper emotional issues; (2) AI chatbots often lack empathy and may give inappropriate or emotionally unsafe responses; (3) young adults are willing to seek help but prefer human connection for emotional support; and (4) AI could be a helpful addition if improved for emotional safety and regulation. Although AI has the potential to improve accessibility and reduce wait times, students do not view it as a replacement for human therapists, especially when addressing deeper emotional needs. Further research is needed to examine ethical safeguards and the long-term effects of AI-supported mental-health services for Generation Z.

Tori Quinn

Discipline: Nursing and Public Health

Authors:

#1 Reagan Fanning

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#3 Alessandra Bavilla

Shandelariah Footracer

Abstract Name: Promoting Healthy Living: A Targeted Intervention for Teen Parents

Purpose: For this project, we implemented a health intervention targeting teen parents, focused on reducing stress and practicing healthy habits. We partnered with a teenage parenting program at an alternative high school in Northern Arizona. We designed, implemented, and evaluated three evidence-based health activities for seven current or expecting teen moms. This intervention aimed to increase teen moms' knowledge and self-efficacy in managing their stress levels through adjusting physical activity, nutrition, and mindfulness. **Research Context:** Teen parents are more likely to experience poor mental health outcomes compared to other parents or teens. Teen parents deal with stress from school, parenting, and finances. Poor mental health outcomes can negatively affect a teen parent's success in school, bonding with the baby, and personal health. **Intervention methodology:** Social Cognitive Theory (SCT) guided our intervention. SCT helps explain why people adopt certain behaviors by showing how personal, behavioral, and environmental factors interact to influence behavior. For our first activity, students participated in a walk using baby carriers and engaged in conversations about the importance of physical activity and mental health. For our second activity, we facilitated a meal preparation lesson with students and prepared two meals together. Meal prepping helps people plan healthy meals and removes the stress of preparing meals throughout the week. In our last activity, we taught and practiced mindfulness yoga. **Conclusion:** To evaluate the effectiveness of our intervention, students took a pre- and post-test for each activity. We evaluated the students' self-efficacy in performing the activities on their own time and their stress levels before and after each activity. We found that overall, the students demonstrated an increase in self-efficacy and lower stress, indicating that engaging in health activities can support the well-being of teen parents. This intervention can be used in other alternative high school settings for teen parents.

Arzoo Qureishy

Discipline: Exercise Science and Nutrition

Authors:

#1 Arzoo Qureishy

#2 Seban Pulickan

#3 Marianna Mangolini

#4 Edmund Acevedo

Seban Pulickan

Abstract Name: Utilizing Exercise to Prime the Anxiolytic Effects of High-Definition Transcranial Direct Current Stimulation

Anxiety disorders are the most common mental health condition in the United States, affecting 40 million individuals, roughly 19.1% of the population. Although anxiolytic medications such as SSRIs and benzodiazepines are widely used, their side effects are substantial. Thus, the challenge of addressing the high prevalence of anxiety has not been adequately met, and interest has grown in non-invasive, safer alternatives. High-definition transcranial direct stimulation (HD-tDCS) is a viable option for precise stimulation of specific regions of the brain, including the dorsolateral prefrontal cortex (DLPFC), a region known to be hypoactive in individuals with anxiety. Interestingly, moderate physical activity has been shown to produce acute anxiolytic effects by improving brain oxygenation and promoting parasympathetic activity. However, no studies have examined whether exercise can help as a physiological primer to increase the effects of HD-tDCS. It is accepted that tDCS increases the neuronal resting membrane potential, promotes synaptic plasticity, and enhances neural network functional connectivity. However, studies utilizing HD-tDCS have revealed inconsistent results, likely due to varying protocols and subject heterogeneity. Thus, the effects of exercise may serve to prime the neuronal pathways and enhance the effectiveness of HD-tDCS. To investigate the possible priming effects of exercise, each participant will complete three experimental sessions: moderate-intensity exercise followed by HD-tDCS; exercise followed by sham; and HD-tDCS alone, therefore serving as their own control. The exercise intensity will be set at 65% of each participant's heart rate reserve (determined via submaximal test), a level consistently shown to reduce anxiety in prior research. To explore the plausible underlying mechanism, near-infrared spectroscopy (NIRS) will assess oxygenation changes in the prefrontal cortex, and heart rate variability (HRV) will serve as a proxy of parasympathetic activity. We hypothesize that combining HD-tDCS with physical activity will yield a superior anxiolytic response compared to either intervention alone.

Abdel Rahman Rabata

Discipline: History

Authors:

Abstract Name: Constructing Texas Identity Through Modern Entertainment in 1936: A Comparative Analysis of the Dallas Fair Park and Casa Manana

This research is a comparative study and analysis of The Texas Centennial of 1936, where organizers and key leaders in Dallas and Fort Worth used rival entertainment complexes to define "Texas" for visitors and residents. This project compares the official Texas Centennial Exposition at Dallas Fair Park with Fort Worth's privately run Frontier Centennial and Casa Manana cafe theater. Using The Centennial newsletters, postcards, photographs, local newspaper coverage, and later scholarship, the project traces how architecture, lighting, performances, and advertising built competing stories about Texas identity. At Fair Park, New Deal style buildings, the Hall of State, patriotic parades, rodeos, Shakespeare plays, and the Bluebonnet Girl hostess presented Texas as a unified commonwealth with a heroic past, modern industry, and respectable family culture. In Fort Worth, Billy Rose's revolving stage, water ballets, showgirls, imported Broadway acts, and the slogan "Forty-five minutes west to Whoopee" promoted an entertainment frontier centered on glamour, mechanical spectacle, and cowboy myth. The study also follows these sites beyond 1936, noting

how permanent buildings at Fair Park and the reborn Casa Manana theater continued to stage musical productions for North Texas audiences, so generations learned regional pride through leisure. Additionally, I have conducted close reading of visitor quotations, postcards, and staging details highlights emotional responses such as pride, wonder, and amusement among fair visitors. Further, by reading these popular entertainment sites as historical sources, the project shows how fairs, theaters, and mass amusements shaped ideas about belonging, gender, and modernity, and invites audiences to think about how present-day entertainment venues still teach shared identities and regional stories across social class and regional lines.

Abdel Rahman Rabata

Discipline: English and Literature

Authors:

Abstract Name: Compassion or Exploitation? The Complexity of the Medical Gaze in The Elephant Man

"I am not an animal! I am a human being!" cries John Merrick in David Lynch's 1980 film *The Elephant Man*. This powerful statement has become a symbol of human dignity against cruelty, but beneath its compassion lies a more unsettling truth that even the most empathetic portrayals of Merrick remain structured by the same gaze that first dehumanized him. Based on a real man exhibited in Victorian freak shows and later "rescued" by Dr. Frederick Treves, Merrick's story is often told as one of kindness and friendship. However, each retelling, the memoir by Treves, the play by Bernard Pomerance, and Lynch's film, reproduces the Western gaze's project that defines humanity through spectacle, difference, and control. This project interrogates how language and representation across these three works perpetuate the medical gaze. The gaze, initially born within medicine, expands into cultural and artistic forms, transforming the concept into something both empathic and exploitative. Drawing on Michel Foucault's theory of the clinical gaze, Rosemarie Garland Thomson's account of freakery as a cultural construct, and Linda Tuhiwai Smith's work on the "cultural archive," the paper examines how Merrick is viewed as spectacle due to the construction of difference and how Western knowledge systems reduce the "Other" to an object of observation. By tracing how *The Elephant Man* has been rewritten from the clinical memoir to the stage play to the film, I argue that the narratives' supposed compassion masks a deeper continuity of power and manipulation. Although these works are typically viewed as narratives of compassion, they collectively serve the same function of exploitation from a neo-colonial perspective, situating Merrick as both spectacle and specimen and uncovering the broader project of the West.

Ryan Rackley

Discipline: Law and Legal Studies

Authors:

Abstract Name: Rebuilding Merit: A Constitutional and Operational Framework for Race-Neutral Admissions at the United States Service Academies

This research study explores a new methodology for how service academies in the United States should structure admissions after Students for Fair Admissions (SFFA) and the 2025 Department of War mandate establishing a merit-only selection process. This study combines constitutional doctrine with empirical measures of officership, presenting an original, post-SFFA model designed to the academies' specific missions, structures, and legal postures. Even assuming national security and unit cohesion constitute compelling interests, race-conscious admissions are both constitutionally vulnerable and operationally

unwarranted, while race-neutral, character-based merit presents a more defensible alternative. Regarding the methodology, this study combines doctrinal analysis of equal protection, case law, explanation of recent litigation against USMA and USNA, and engagement with empirical work. Specifically, the works from RAND, the Government Accountability Office, and Department of War demographic reports were used to examine whether military-specific interests can satisfy strict scrutiny and what narrow tailoring requirements would follow. Furthermore, this study examines race-neutral resources, congressional-district outreach, expanded preparatory and bridge programs, and candidate scoring that weighs academics, fitness, leadership, and demonstrated resilience. While some of these factors are already available at the academies, these methodologies may be able to sustain a credible officer pipeline without racial classifications. The project also incorporates a discussion of the researcher's personal path through the Air Force Academy's Falcon Foundation preparatory program to explore how neutral pipelines can help candidates overlooked by test-centric definitions of merit. It concludes that current Supreme Court doctrine leaves minimal room for race-conscious policies and strongly supports a transparent merit framework through previously established predictors of officership, neutral pipelines, and recurring audits. This project places this methodology within broader debates over affirmative action, military relations, and constitutional deference to the armed forces, arguing that equal protection and mission effectiveness are mutual obligations for the service academies.

Sarah Rafie

Discipline: Biology

Authors:

#1 Meriem Bendaoud

Abstract Name: Evaluating the Impact of Soft Drinks on Bacterial Growth and Biofilm Development

Soft drinks are consumed globally in both regular and diet forms, and many are marketed with added vitamins or plant extracts. While their metabolic and health impacts are well studied, little is known about their antimicrobial properties and potential influence on microbial growth. This study investigates the antimicrobial activity of Monster, Red Bull, and Ginger Ale, along with their diet counterparts and vitamins B2 and B3, at varying concentrations. A broth assay using 96-well plates was performed against 20 microorganisms, including both Gram-negative and Gram-positive bacteria and fungi. Growth inhibition and biofilm formation were assessed. Monster and Diet Monster showed strong inhibitory effects against several bacterial strains, including *Pseudomonas aeruginosa*, *Bacillus cereus*, *Escherichia coli*, and *Staphylococcus aureus*. Ginger Ale and Diet Ginger Ale produced variable results, sometimes increasing and other times reducing microbial growth. Red Bull and Diet Red Bull displayed moderate inhibition, primarily against Gram-positive species such as *Staphylococcus epidermidis*, *Streptococcus oralis*, and *S. aureus*. At higher concentrations, several beverages promoted biofilm formation. Vitamins B2 and B3 showed no significant activity, except for slight inhibition with vitamin B3 against *P. aeruginosa*. These findings indicate that certain energy drinks, particularly Monster and Diet Monster, contain compounds with notable antimicrobial properties. The observed biofilm formation at higher concentrations raises concerns about unexpected microbial responses. Future work will focus on isolating and characterizing the active compounds responsible for these effects to better understand their biological significance.

Jazmyn Rafique

Discipline: Biology

Authors:

#1 Lina Yoo

Abstract Name: Identification of Novel mRNA Targets of miR-379-5p in Breast Epithelial Cells

microRNA-379-5p (miR-379-5p) is downregulated in breast cancer and may exert its effects through the suppression of key mRNA targets. Building on prior bioinformatic work that identified several negatively correlated and tumor-upregulated candidate genes using miRDB, TargetScan, and Firebrowse, this study aimed to experimentally determine which mRNAs are directly downregulated by miR-379-5p in normal mammary epithelial cells (AG11132). Using established transfection protocols, cells were treated with a miR-379-5p mimic or negative control, followed by RNA extraction and qRT-PCR analysis of ten prioritized genes. Across multiple replicates, HLCS and SLC20A1 consistently exhibited higher Cq values and reduced expression in mimic-treated cells, indicating that they may be direct targets of miR-379-5p. These findings highlight promising regulatory mRNA candidates in breast tissue whose elevated expression and strong negative correlation with miR-379-5p suggest biologically relevant roles in breast cancer and warrant further investigation.

Clara Ragan

Discipline: Nursing and Public Health

Authors:

#1 Regan Moss

Abstract Name: Navigating the Accommodation Process for Reproductive Events in Higher Education Settings: Multi-stakeholder Perspectives

Research Questions: 1) “How do accommodations facilitators and seekers describe the pathways to seek and receive accommodations for a pregnancy or parenting event?” 2) “What are the barriers and facilitators in this process?” Background: Within the university setting, student parents face many barriers to occupational and academic success including inflexible attendance policies, unempathetic professors and lack of institutional knowledge on how to seek support effectively. While accommodations can help address some of these barriers, individuals experiencing a reproductive event in university settings report not seeking accommodations due to factors such as negative and stigmatizing interactions with faculty and staff, time poverty, and perceived or actual lack of university support. The decision-making perspectives of people seeking formal accommodations is not well discussed in present scholarship and there is a dearth of information on the perspective of accommodations facilitators. Methods: Through semi-structured individual in-depth interviews with accommodations seekers and facilitators, this study highlights the lived experiences of students who sought an accommodation for a reproductive or parenting events in the university setting and explores the perspectives of those facilitating accommodations. Participants were recruited from a convenience sample utilizing snowball sampling and social media outreach through large 4-year universities in the southeast. Data were analyzed through a mixed inductive-deductive integrated reflexive thematic analysis, utilizing the socioecological model explicate the multi-level determinants impacting decision-making. Results: Preliminary results reveal barriers in the accommodations process including gaps in facilitators’ understanding of their roles and responsibilities as they pertain to accommodations required by Title IX, inadequate education for accommodations seekers, and stigma surrounding Title IX and student pregnancy. Implications: Findings highlight opportunities for universities to better support students experiencing reproductive and parenting events through the accommodations process and gaps to address in the accommodations pathways.

Miriam Raggs

Discipline: Chemistry

Authors:

#1 Miriam Raggs

Abstract Name: Chemical Pressure Effect in the Magnetocaloric Candidate CrNiP

The magnetocaloric effect, a thermodynamic phenomenon, can provide a more efficient and environmentally friendly route for cooling technology compared to traditional compressor-based systems. The rare-earth free MM'X alloys where M and M' = transition metal and X = main group element, have received much attention as promising magnetocaloric candidates. These materials have shown to exhibit a strong magnetostructural coupling resulting in a large entropy change typically over a wide temperature region, optimal for magnetic refrigeration technology. In this talk I will present the results of the chemical pressure effects on the MM'X alloy magnetocaloric candidate, CrNiP. With Sb or S substitution on the P atomic site in CrNiP, a spectrum of positive and negative chemical pressure is created where the material undergoes a structural transition from the hexagonal Ni₂In-type to the orthorhombic TiNiSi-type and finally to the hexagonal FeP₂-type structure. Subsequently, this significantly alters the magnetic behavior, resulting in either or coexisting antiferromagnetic and ferromagnetic order. Our results reveal chemical pressure as an advantageous tool to tune the structural and magnetic behavior in the MM'X alloy CrNiP and ultimately provide a source of control over the magnetocaloric properties.

Komal Rahi

Discipline: Engineering

Authors:

#1 Michael McClure

Abstract Name: Evaluating Decellularized Human Muscle Matrix as a Translational Scaffold for Volumetric Muscle Loss Repair

Volumetric muscle loss occurs following high-velocity trauma such as gunshot wounds, blast injuries, or car accidents. These types of injuries result in the loss of a large volume of muscle, reducing motor function and limiting mobility. To address these injuries, one approach involves preparing a biologic scaffold by isolating the decellularized muscle matrix (DMM), which contains regenerative factors that stimulate de novo muscle growth. While our group has demonstrated success in preclinical models, our goal is to begin testing these grafts in clinical trials. As a first step in this process, we need to evaluate the effectiveness of the decellularization process in human muscle. We quantified remaining cellular and extracellular matrix components within aged human latissimus dorsi. DNA quantification assays were performed to measure remaining nuclear material by comparing tissue samples before and after decellularization, confirming that DNA levels were reduced to nearly undetectable levels. Protein quantification assays were performed to evaluate the overall protein content remaining after decellularization, helping confirm that key extracellular matrix proteins were preserved while cellular proteins were removed. Ongoing work will characterize the extracellular matrix proteins within the decellularized matrix using proteomics to evaluate the potential for these grafts to elicit regeneration. These results highlight the translational aspects of these skeletal muscle grafts and demonstrate their potential to be used in volumetric muscle loss repair.

Sahar Rahman

Discipline: Criminology/Criminal Justice

Authors:

Abstract Name: Investigating the Postmortem Degradation of Identifiable Fingerprint Minutiae Over Time

Fingerprints are considered one of the most dependable methods of biometric identification due to their distinct ridge patterns and consistency throughout an individual's lifetime. However, following death, factors like humidity, temperature, and skin slippage can obscure fingerprint clarity, complicating forensic identification. This research investigates how recognizable fingerprint minutiae evolve under postmortem conditions in the Northern Virginia region. Fingerprints were taken daily from cadaver models utilizing ink and fingerprint paper, with minutiae assessed through automated software analysis. A total of ten fingerprints were recorded and analyzed over a span of five consecutive days to evaluate degradation patterns. The count of identifiable minutiae dropped by roughly 33 percent from Day 0 to Day 5, with a noticeable decline in ridge detail beginning around Day 4. Increased environmental humidity seemed to hasten this deterioration by impairing ridge adhesion and clarity. These findings align with anticipated postmortem physiological changes and highlight the impact of both climate and time on fingerprint quality. The study indicates that identifiable minutiae remain relatively stable during the initial three days following death, after which the reliability of identification significantly diminishes. Future research will aim to increase the sample size and investigate additional environmental factors to enhance the accuracy and forensic implications of these findings.

Shahrin Rahman

Discipline: Biology

Authors:

#1 Shahrin Rahman

#2 Donna Kashian

Abstract Name: Conserving Mudpuppies: Mapping and Monitoring an Indicator Species in the Detroit River

Mudpuppies are a salamander species native to the Great Lakes region, and can be found in the Detroit River. They have really porous skin, allowing them to absorb lots of water. Their sensitive skin marks them as bio-indicators, meaning their population size can tell us about the quality of a water body. Higher populations of mudpuppies can indicate a healthy river. After experiencing a decline in mudpuppy populations due to lampricide applications and habitat degradation, The Department of Natural Resources marked this amphibian as a species of special concern. As a result, the Detroit Zoological Society initiated a study in 2009 to monitor mudpuppies. This work is done in Detroit, where youth may be unaware of the mudpuppies' existence and its importance to conservation. The aim of this project is to highlight local conservation work and educate guests of the Detroit Zoo. In this project, we will collect and compile the data and use Esri ArcGIS Pro to analyze and map the data collected by the Detroit Zoo, as well as create educational material. This material will be presented as a poster in the National Amphibian Conservation Center in order to highlight local conservation work.

Christian Raimondo

Discipline: Engineering

Authors:

Abstract Name: Assessment Of Bridge Strikes and Predictive Factors Across Five States Using Regression Analysis to Highlight Bridge Vulnerability

A bridge strike occurs when an over-height vehicle collides with the underside or superstructure of a bridge as it attempts to pass underneath it. These incidents can cause damage to the bridge, disrupt traffic, and pose safety risks to drivers. Between 2012 and 2021, there were about 11,000 to 18,000 crashes each year nationally, leading to nearly 2,200 deaths and 47,000 injuries. This study investigates the critical factors influencing bridge strike incidents across five states: New York, Washington, Illinois, Florida, and North Carolina, with a focus on New York due to its unique infrastructure characteristics, as well as data availability. Lower clearance heights and older age had the most correlation with an increase in bridge strikes in New York City. Using these variables, five bridges in New York City were identified as “high risk”. We aim to understand if this is applicable for bridges in other states and how variability of clearance of height and age across these cities affects strike count. New York State bridge strike data from NYC Open Data is analyzed in conjunction with the University of Wisconsin’s National Data Clearinghouse for Bridge and Tunnel Strikes to quantify strike rates and average clearance heights and ages of bridges in each state. This research employs statistical methodologies, including regression analysis, to determine if low clearance height and bridge age are significant predictors of strike frequency and whether these effects differ across states. By identifying the key predictors and their state-specific impact, this study can be used to find bridges at a higher risk of bridge strikes. Locating these bridges can lead to necessary inspections and renovations, thus lowering their risk of damage and saving millions of dollars.

Muhammad Uzair Rais

Discipline: Nursing and Public Health

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#15 Caroline Donohoe
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Viet Nguyen

Abstract Name: The Missing Pieces: An Umbrella Review of Risk and Resistance Factors in Substance Use

Background: The existing literature on risk, protective, and resistance factors is fragmented across separate reviews. It is therefore currently difficult to connect these intersecting ideas with one another and build comprehensive substance use prevention strategies. This review aims to bring these areas together by

systematically organizing what is already known about risk, protective, and resistance factors related to substance use. **Methods:** We conducted an umbrella review of approximately 13,000 articles. Reviews were included if they were published in 2000 or later; reported on a U.S. population, and examined risk, protective, or resistance factors; studied substance use in non-clinical settings. Further, we excluded studies that only focused on alcohol or nicotine, studies that were centered on pharmaceutical or clinical treatment interventions, only focused on a youth-only population, were non-English publications, or studies where the outcome was not substance use. After this screening, approximately 700 articles were moved forward for full-text review. **Results:** We expect a wide set of major themes to be identified. Risk-related themes are expected to include: trauma and adversity, mental health challenges, social marginalization and stigma, family and peer influences, community disadvantage, genetic and biological vulnerabilities, health and medically related exposure risks. Protective/resistance themes are likely to include: school-based prevention programs, family-based interventions, digital and mobile health strategies, community-based programs, psychosocial and behavioral approaches, culturally informed and identity-specific interventions, exercise and wellness programs, policy and system-level prevention strategies. **Discussion:** The next step in this project will focus on extracting and summarizing data from the full-text articles to better understand the current landscape of risk and protective factors and how resistance factors may intersect with these concepts towards reducing the likelihood of substance use.

Aditya Raj

Discipline: Computer Science

Authors:

#1 Achintya Lakshmanan

#2 Aneesh Shamraj

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Raj Mamidala

Abstract Name: A Self-Improving Feedback System for Safer and More Reliable AI-Generated Code

Large Language Models (LLMs) can generate code rapidly from natural-language prompts, but their outputs often suffer from compilation errors, logical mistakes, and security vulnerabilities. Current tools provide static checks or manual prompt-engineering strategies, yet no automated system offers continuous, data-driven corrective feedback. In this project, we analyzed more than 2,000 programming tasks across multiple LLMs and observed compilation success rates ranging from 58%–85%, alongside 39%–60% security-related issues, highlighting the urgent need for more reliable AI-assisted code generation. To address this gap, we developed a neural network that predicts whether a user's prompt is likely to produce code with compilation, semantic, or security errors before the LLM generates the output. When the model flags a high-risk prompt, another LLM tries to understand the risks that can occur and then refines the prompt accordingly. Next, the refined prompt is fed back into the model, which produces new code that is analyzed using CodeQL and KLEE symbolic execution to verify whether the issues are resolved. These results are then added to the training dataset, creating a self-improving feedback loop to improve the Neural Network. Our results show that this automated correction pipeline significantly increases prompt quality and reduces downstream errors. This work demonstrates a scalable and proactive approach to improving the safety, reliability, and usability of AI-generated software.

Siddharth Rajakumar

Discipline: Biology

Authors:

Abstract Name: CRISPR-Phagemid Systems as an Antibiotic Alternative: Targeting *mecA* to Combat Methicillin-Resistant *Staphylococcus aureus* (MRSA)

Antibiotics have revolutionized healthcare; however, the advent of antibiotic resistance, or microorganisms evolving to resist antibacterial drugs, poses a significant global health threat. If not addressed, this could lead to a “post-antibiotic era” in which ten million people die each year from once treatable infections by 2050. Methicillin-resistant *Staphylococcus aureus* (MRSA) is one such bacterium that has evolved to resist standard antibiotics, including vancomycin, making MRSA infections particularly difficult to treat in hospital settings. MRSA’s drug-resistant genes, such as *mecA*, and its ability to form biofilms create additional challenges for conventional antibiotic therapies. Recent research has explored CRISPR-Cas systems as a potential alternative therapy, using nucleases designed to target essential bacterial genes. These systems are delivered via phagemids, plasmid-bacteriophage hybrids that can be injected into target bacteria in phage particles and replicate within the host bacteria like a plasmid. This review examines current *in vivo* and *in vitro* studies to evaluate whether CRISPR-phagemid systems are a viable alternative to vancomycin and other antibiotics for MRSA treatment. The CRISPR-phagemid systems can overcome MRSA biofilms and specifically target the *mecA* genes, rendering the cells sensitive to standard antibiotics. These CRISPR-phagemid systems also exhibit high specificity, targeting only MRSA bacteria while leaving the rest of the microbiome unaffected. Although further research is required to ensure its safe use in clinical settings, current findings suggest that CRISPR-phagemid systems may offer a promising alternative strategy for the treatment of MRSA infections and other antibiotic-resistant bacteria.

Arya Rajesh

Discipline: Biology

Authors:

#1 Anna Grace Carns

#2 Elzbieta Dulko

Abstract Name: Determining the Role of Midline Thalamus in Childhood Absence Epilepsy

Childhood Absence Epilepsy (CAE) is one of the most common forms of pediatric epilepsy. Absence seizures often occur many times each day (~200 per day) and are associated with attention problems, depression, anxiety, and memory impairments. Currently, no cure for CAE exists and treatment strategies are limited, and there is little research on the mechanism of seizure generation. Seizures are associated with highly synchronized firing across the brain. Understanding how this synchrony is generated will inform new therapeutic strategies. Our preliminary data demonstrates that the midline thalamus is highly synchronized with multiple surrounding brain structures during seizures. Furthermore, stimulation of midline thalamus evokes seizures in the mouse cortex. These findings motivate us to test the hypothesis that midline thalamus facilitates synchrony generation during absence seizures. We seek to explore the role of midline thalamus in seizure generation by temporarily suppressing neuronal firing in the midline thalamus using chemogenetics. Seizure activity was monitored by implanting EEG headsets on male C3H/HeJ mice and recording brain electrical activity. Baseline EEG recordings were collected before administering clozapine-N-oxide (CNO) and deschloroclozapine (DCZ) to activate Designer Receptor Exclusively Activated by Designer Drugs (DREADDs) to temporarily inhibit neuronal firing and transiently suppress neuronal firing. We then quantified changes in seizure frequency and duration. Brains were then collected for histological verification of DREADD expression fluorescence microscopy. By defining the role of the midline thalamus in seizure synchrony, these experiments may reveal new mechanistic insights and support the development of improved treatments for Childhood Absence Epilepsy.

Discipline: Health and Human Development

Authors:

#1 Tyler Miller

Abstract Name: Investigating the Immunomodulatory and Tumor-Targeting Effects of Ashwagandha-Derived Therapeutic RH324 in the Glioblastoma (GBM) Microenvironment

Withania somnifera (Ashwagandha) has long been used in Ayurvedic medicine for its adaptogenic and anti-inflammatory effects. Its therapeutic potential arises from its broad natural composition of proteins, amino acids, fatty acids, carbohydrates, vitamins, minerals, and phytochemicals. RH324, an investigational therapeutic developed by ReHeva Biosciences, is a full-spectrum Ashwagandha extract formulated to retain this multifactorial biochemical profile. Unlike single-compound agents, RH324 is designed to act on multiple biological pathways simultaneously and has been evaluated currently for safety and biological activity in patients with advanced non-small cell lung cancer (NSCLC). Building on this foundation, our study examines whether RH324 modulates the tumor-immune microenvironment in GBM and displays tumor-killing capacities. The NF- κ B pathway regulates chemokine expression that shapes myeloid cell recruitment and polarization within the tumor microenvironment. Prior studies show that deleting the p65 (RelA) subunit in myeloid cells can reduce pro-tumor chemokine secretion and alter immune infiltration, suggesting that targeting NF- κ B-related mechanisms may influence tumor-associated immunity. Building on this rationale, our project explores whether RH324, a multifactorial Ashwagandha-derived extract, can modulate immune activity in GBM tissue. At this stage, it remains unknown whether RH324 is cytotoxic to malignant cells, whether it alters immune cell behavior, or which signaling pathways it affects. We expect that RH324 may suppress or activate specific immune populations, with NF- κ B signaling being one potential pathway to be assessed. To address these questions, GBM tissue samples are being collected from operating rooms at University Hospitals in Cleveland, OH and treated with defined RH324 doses. Immunohistochemistry (IHC) will assess changes in cell viability and immune activation, while future single-cell RNA sequencing (scRNA-seq) will help identify transcriptional pathways affected by treatment. In sum, this study aims to define how RH324 may engage NF- κ B-related pathways and contribute to the development of new botanical approaches for shaping tumor immunity.

Naemi Rajkumar

Discipline: Biology

Authors:

#1 Naemi Rajkumar

Abstract Name: BRAFV600E Mutations in Recurrent Papillary Thyroid Carcinoma

Papillary thyroid carcinoma (PTC) is the most common type of thyroid cancer, and although many patients have favorable outcomes, a significant number still experience aggressive tumor behavior or cancer recurrence after treatment. Current diagnostic tools, such as ultrasound imaging and fine-needle aspiration biopsy (FNA), play an important role in identifying thyroid nodules, but these methods often produce indeterminate or uncertain results. When this happens, it becomes harder for clinicians to decide the best treatment approach, which may lead to either unnecessary surgery or delayed care. Incorporating routine BRAF V600E mutation testing into standard clinical evaluation may help improve accuracy in diagnosing and managing PTC. The BRAF V600E mutation is one of the most common genetic changes found in PTC, and research shows it may be closely linked with tumor behavior and treatment outcomes. Using BRAF testing alongside imaging and cytology may give physicians more confidence in identifying high-risk tumors

earlier and determining which patients might benefit from more complete surgical removal, lymph-node evaluation, or closer follow-up after treatment. This approach may help avoid overly aggressive treatment in patients with lower-risk disease. BRAF testing could strengthen long-term care planning by signaling which patients may face a greater likelihood of recurrence or persistent cancer. This supports more personalized care, where treatment decisions are guided not only by tumor size and appearance but also by the underlying biology of the tumor.

Karthikeyan Rajkumar Jayapriya

Discipline: Computer Science

Authors:

Abstract Name: When Lives Are Data: A Java-Based Tool For Detecting Medical Device Software-Driven Vulnerabilities

Remote hackers have discovered healthcare to be vulnerable, seeing medical information as more than ten times more valuable than black market credit card numbers, as they gain access to drugs, conduct fraud with patient insurance, and infiltrate medical devices, harming or even killing thousands of patients. Software attacks, a type of cyberattack, consists of phishing, worms, SPAM, and XSS, which were analyzed to determine that software attacks misguide patients and doctors to reveal private medical information. To address the danger posed by software attacks and foster favorable patient outcomes, the study investigates the following question: how do software attacks intercept private health information, and is there an innovative solution to strengthen cybersecurity, prevent cyberattacks, and minimize data infringement? The study primarily encapsulates a unique tool, designed using Java, that will receive information about a medical device and analyze the cybersecurity strength of the device using specific Food and Drug Administration (FDA) guidelines. Some of these guidelines include checking for the presence of a secure product development framework (SPDF), which indicates that the device can resist major cyber vulnerabilities and threats, has proper design controls, and contains appropriate risk management. The primary methodology for this study was to use the FDA guidelines to thoroughly test a medical device's security, minimize chances of cyberattacks and data infringement, and highlight improvement areas for the manufacturer through the tool's output, raising awareness on the role of robust cybersecurity in preventing patient harm. This study can also serve as a precedent study for points of intervention for researchers in future studies, collectively shedding light on the importance of implementing the novel Java tool in enhancing cybersecurity to progress healthcare.

Seema Rajper

Discipline: Nursing and Public Health

Authors:

#1 Seema Rajper

#2 Jean Zhang

Abstract Name: The Association between Ultra Processed Foods and Inadequate Sleep in US adults from NHANES, 2005-2018

Background Ultra-processed food (UPF), rich in sugar and fat, could affect sleep quality due to inflammation and hormonal imbalance. However, the population level data is scarce, and the findings are mixed, especially in adult population. Objective We examined associations between UPF consumption and odds of inadequate

sleep (characterized by sleep difficulty and/or inadequate sleep duration: short sleep (<7 h) or long sleep (≥ 9 hours)) among US non-pregnant, non-lactating adults using National Health and Nutrition Examination Survey (NHANES) with a 14-year span. **Methods** We assessed 33,156 adults (aged ≥ 20 y) using up to two 24-hour diet recalls from the NHANES (2005 to 2018). UPF intake was calculated using the NOVA classification system, and inadequate sleep (specifically sleep difficulty, short sleep, long sleep) was ascertained from the self-reported sleep disorder survey. Odds of inadequate sleep (aORs) were compared across the quartile intakes of UPF using population weights-adjusted multivariable general logistic regression. **Results** Of the 33,156 adult participants, 34.9% had short sleep (n=11,576), 11.9% had long sleep (n=3,937), and 24.7% had sleep difficulty (n=8,199). We also found that the highest quartile of UPF, relative to the lowest quartile, is significantly associated with 23% increased odds of short sleep (aOR =1.23, 95% CI: 1.07-1.41; p=0.023), after adjusting for all covariates. The dose-response relationships between higher UPF intake and higher risk of short or long sleep were determined, respectively (both p <0.05). However, no association was found with sleep difficulty (aOR = 1.09, 95% CI: 0.95-1.26; p =0.6185). **Conclusion** We found the dose-response relationship between higher UPF intakes and higher risk for inadequate sleep duration (short or long sleep), indicating that reducing UPF consumption is critical in improving sleep quality via decreased inflammation and enhanced hormonal balance.

Connor Rakes

Discipline: History

Authors:

#1 Christopher Bean

#2 Scott Barton

Abstract Name: Ford Vs. Labor: Examining the Relationship of Henry Ford and Unions during the Rise of the Ford Motor Company

One of the most influential Americans in the first half the twentieth century is undoubtedly Henry Ford. A man who left a lasting impact not only on the motor vehicle industry but also on the functioning of factory work as a whole. Ford's life has been written about extensively, but a key area is missing. The goal of this project, to analyze the efforts of the burgeoning Ford and his company to combat labor; by using biographies on Henry Ford, Union meeting notes, writings of Ford himself, economic profiles and other pertinent primary material. This project will attempt to express the effort of both labor unions and Ford from the founding of the company in 1903 through the 1910s and resolve by the onset of the Great Depression. By analyzing the relationship of the soon to be great industrialist and the labor movement, this project hopes to shed light on an interesting timeframe of American history. One in which labor had power on the rise and the industrialist was beginning to establish himself. By exploring the dichotomy of industry and man over a century ago, in a time in which the established roles of power were reversed we may gain insight into future and current issues with labor. With Henry Ford being such an influential individual in today's age, examining how he had handle labor relations may better inform the present industrialist and entrepreneur.

Anna Rakes

Discipline: Education

Authors:

#1 Heather Barker

Abstract Name: Assessing the Effectiveness of Magnet Schools in Promoting Desegregation: A Systematic Review and Replication Study.

Following the inception of magnet schools in 1968, these programs experienced initial success at meeting their goal: desegregating public schools. However, an abandonment of court ordered desegregation initiatives suggests a shift in the goals of magnet schools. Almost 60 years later, the literature around magnet schools' effectiveness is conflicting and a generalized conclusion is difficult due to each school's unique context. How can we synthesize findings across studies of magnet schools to identify broader trends of integration in school districts? Additionally, how have levels of desegregation in magnet schools changed over time when applying established desegregation measures to current district data? Phase one of this study consists of a qualitative systematic review. A comprehensive literature search was conducted to collect a sample of 51 studies on magnet schools, followed by a qualitative analysis of desegregation in magnet schools over time and the consensus of the literature on desegregation in magnet schools. Phase two is a replication study of three studies selected from the larger qualitative review, utilizing established desegregation measures to analyze current data from three large school districts and evaluate the change in desegregation levels across US magnet schools. Initial results from phase one reveal that literature from the 1980s suggests early success of magnet schools in promoting desegregation. By the 1990s, the literature suggests this success has become selective, concentrated within specific schools, and short-lived. The various desegregation measures from phase two revealed varying magnet school success, but that racial exposure in magnet schools has gradually grown closer to that of non-magnet schools over time. These results suggest that magnet schools may no longer stand out as stronger tools for racial integration than traditional public schools. A reevaluation of how desegregation in public schools is measured and achieved is needed to improve equity in public schools.

Kayla Ralston

Discipline: Social Work and Human Services

Authors:

#1 Gary Cuddeback

#2 Amy Adkins

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#4 Emma Adcock

Abstract Name: Exploring the Knowledge Gap: Mental Health Crisis Identification Training for 911 Call Takers

Individuals with serious mental illness (SMI) are more likely to come into contact with law enforcement and the justice system. Livingston (2016) found that 25% of people with mental illness have been arrested at least once in their lives. Law enforcement officers often become the primary intervention in handling a mental health crisis, and most mental health-related training curricula (e.g., Crisis Intervention Team (CIT)) have focused on this group. However, the burden to initially ascertain whether an emergency is mental health-related has fallen to 911 call takers and dispatchers, the first first responders. The performance outcomes outlined by the Virginia Department of Criminal Justice Services for compulsory minimum training of 911 dispatchers include managing calls and sustaining composure during situations that may involve mental

health crises. The guidelines emphasize crisis negotiation, instinct, and accumulated experience. This study aims to understand what SMI training options are available and utilized for 911 call takers. An extensive literature search within EBSCOhost, ProQuest, Google Scholar, HeinOnline, and PsycInfo databases was completed using search terms such as "911", "training", "mental health", and "mental illness". Search results yielded 10 studies that directly related to 911 call takers and mental health-related calls. Of the 10 studies, three mentioned trainings that comprised of identifying their own mental health, crisis negotiation, and identifying potential SMI-related calls to transfer to crisis and suicide hotlines. SMI training for 911 call takers is crucial to ensure better outcomes; more research is essential to gain insight into effective training that can help ease the strain on emergency services and inform policymakers and reformers on effective strategies.

Sakethram Ramakrishnan

Discipline: Computer Science

Authors:

Abstract Name: Beyond Evolution: Machine Learning as the New Architect of Protein Engineering

Machine learning has changed how scientists perform protein engineering. Historically speaking, designing or modifying proteins is dependent on directed evolution and high-throughput screening. In these methods, function improvements are mutated iteratively and selectively. These methods, although powerful, are limited by experimental labor, material cost, time, and the constrained ability of human intuition to navigate this high-dimensional sequence space. Recent advancements in deep learning, especially protein language models, generative architectures, and structure prediction networks, emphasize the importance of upstream protein design in computation. This paper examines the shift across three interrelated dimensions. First, machine learning systems are able to identify function sequences that are divergent compared to known evolutionary trajectories, which shows that computational methods can uncover viable designs outside human-derived heuristics. Second, these models compress the wet lab by pre-filtering mutational landscapes, which reduces the number of unique variants that must be physically synthesized and subsequently tested. Third, protein language models demonstrate that amino acid sequences have a kind of statistical “grammar”; that is, context-dependent rules control residue compatibility, folding constraints, and functional motifs. Case studies that looked at antibody affinity maturation, enzyme stability optimization, solvent tolerance engineering, and de novo enzyme generation show that model-guided protein design consistently reduces uncertainty before experimentation and broadens the practical search space beyond what natural sampling alone could do. However, there are still challenges, especially in interpretability, generalization to low-data and low-apriori knowledge biochemical families, and the reliable translation of computational predictions into in vitro and in vivo protocols and performance metrics. In sum, machine learning not only accelerates protein engineering but also bolsters its understanding, which posits computation—not archaic trial-and-error experimentation—as the future of biological design.

Harshini Ramasubramanian

Discipline: Biology

Authors:

#1 Harshini Ramasubramanian

#2 Zoe Paxhia-Poppaw

#3 Brook Hemmelgarn

#4 Karthickeyan Chella Krishnan

Abstract Name: How female sex affects mitochondria in Alzheimer's disease?

Alzheimer's disease (AD) is a neurodegenerative disease that affects more than 6.5 million Americans annually, with approximately 4.2 million of them being female, highlighting the increased risk of AD in women. Mitochondrial maladaptation is a hallmark of AD pathology, characterized by decreased respiration, reduced levels of mitochondrial proteins and altered mitochondrial dynamics. Our goal in this project is to investigate how female sex affects mitochondria in a mouse model of Alzheimer's disease. To answer this question, we used the 5xFAD (on a C57BL/6J background) mouse model, which carries two transgenes (APP and PSEN1) with five AD-causing mutations. Brains were harvested at 2, 4 and 6 months of age, and hippocampi were isolated for further analysis. Mitochondrial function was assessed using frozen mitochondrial respirometry, protein levels were evaluated through immunoblotting, and AD progression was examined through staining. Our preliminary results indicate that 2-month-old females exhibit reduced levels of mitochondrial proteins compared to their male counterparts. The findings from this project will guide future research on mitochondrial involvement in AD.

DARLINA RAMDHANIE

Discipline: Biology

Authors:

#1 Dr. Virginia GarciaMarin

Abstract Name: Ultrastructural Neurodegeneration in the LGN After Optic Nerve Crush and the Benefits of HDAP.

Traumatic injury to the optic nerve initiates a degenerative cascade extending beyond the retina, producing structural and functional changes throughout the central visual pathway. The lateral geniculate nucleus (LGN), the thalamic relay between retinal ganglion cells (RGCs) and primary visual cortex, is especially vulnerable because its large, vGlut2-positive retinogeniculate terminals rely on mitochondrial stability to sustain high-frequency synaptic transmission. Despite this, the central consequences of optic nerve crush (ONC) at the ultrastructural level remain poorly understood. This project investigates how ONC alters mitochondrial integrity and synaptic architecture within the LGN, and whether a high-density aromatic peptide (HDAP), a cardiolipin-binding mitochondrial stabilizer, can prevent these degenerative changes. Ten adult C57BL/6 mice will undergo unilateral ONC followed by either HDAP (3 mg/kg) or vehicle treatment for 14 days. LGN tissue will be processed for transmission electron microscopy (TEM), and systematic sampling will obtain unbiased, representative neuropil. Quantitative ultrastructural measurements will include mitochondrial density, size, and cristae integrity; bouton area and synaptic density; postsynaptic target distribution; and the frequency of degenerating axonal and dendritic profiles. Preliminary findings indicate that ONC induces features of Wallerian degeneration within the LGN, including shrinking axoplasm separating from the myelin sheath to form submyelin spaces, the appearance of myelin ovoids, and degradation of compact myelin layers. We hypothesize that untreated ONC mice exhibit swollen mitochondria, disrupted cristae, reduced synaptic density, and increased degenerating profiles within the LGN. In contrast, we predict that HDAP will preserve mitochondrial structure, maintain bouton and active zone integrity, and reduce neuropil degeneration. This project will define ultrastructural changes in the LGN after ONC and test a therapeutic strategy that may prevent central trans-synaptic degeneration. These findings will deepen understanding of how optic nerve injury affects thalamic circuitry and may inform future treatments for traumatic optic neuropathy, glaucoma, and related visual disorders.

Anushri Ramesh

Discipline: Interdisciplinary

Authors:

#1 Anushri Ramesh

#2 Nakeina Douglas-Glenn

Abstract Name: Reimagining High School Sports as an Engine of Social Mobility: Structural Barriers and Policy Solutions

Social mobility is understood as movement within a system of stratification (Heath & Li, 2003). Promoting it requires creating opportunities for upward mobility. Current social mobility rates in the U.S. are lower than those in most of Europe (Reeves, 2014). Social origins, higher education, and labor-market advancement have traditionally been seen as the main paths to social mobility. In more recent times, non-traditional pathways, such as sports, have gained interest, although their impact on mobility remains limited for the general population (Eitzen, 2009; Mackin & Alwther, 2011). This poster explores whether high school sports can serve as a more equitable form of mobility by expanding access to opportunities and social capital. Guided by the stages of the policy process, the poster identifies potential changes to high school sports leagues that could increase student participation and promote the development of nationally competitive athletes. It presents policy alternatives to address structural barriers, such as resource disparities, eligibility restrictions, and pay-to-play models that limit access to competitive training. The poster will assess their likely effectiveness, feasibility, and equity of these policy alternatives in reducing structural barriers. Finally, it will propose strategies to increase student participation and create pathways for student athletes from diverse socio-economic backgrounds, aiming to maximize social mobility. Current studies focus on male athletes without acknowledging differing circumstances for female athletes. This comprehensive study is designed to investigate and compare data on accounts of gender and other key identifiers.

Soorya Ramesh

Discipline: Sociology

Authors:

#1 Sloane Donovan

#2 Jessica Jaiswal

#3 Yahya Abdullah Alnashri

Abstract Name: Stigma as a barrier to Opioid Use Disorder (OUD) treatment in Alabama

Introduction: Opioid Use Disorder (OUD) remains a critical public health challenge, and treatment retention is an important predictor of positive health outcomes. Yet, stigma around OUD and medications for opioid use disorder (MOUD) create challenges to treatment continuation. This study aims to assess perceived stigma and its associated factors among individuals receiving MOUD in Alabama. Methods: A quantitative cross-sectional survey was administered to respondents (n=251) from substance use treatment clinics in Alabama. The survey collected demographic information and MOUD history. Using the Substance Use Stigma Mechanism Scale (SU-SMS) and Methadone Maintenance Treatment Stigma Mechanisms Scale (MMT-SMS), patients reported on stigma related to their drug use experiences, including internalized stigma. was collected. Using STATA, descriptive statistics were generated, and linear regression analyses were conducted to examine relationships between predictor variables and healthcare stigma outcomes, with statistical significance set at $p \leq 0.05$. Results: The sample was predominantly White (81.3%) and female (54.2%), with 87% receiving MOUD. Participants reported high rates of experiencing stigma in healthcare settings, including receiving poor care due to drug use history (30.3%) and being denied needed prescriptions because of MOUD usage (29.0%). Regression analysis revealed that women and individuals with higher education levels reported significantly greater perceived stigma. Conversely, Black/Other participants and older adults

(51+) reported significantly lower stigma compared to their White and younger adult (≤ 30) counterparts, respectively. Conclusion: MOUD is an effective treatment that improves the quality of life for many patients, yet stigma remains a significant barrier to accessing this care. To better support patients, healthcare organizations should implement evidence based anti stigma training for staff. Future research should focus on evaluating targeted interventions to reduce healthcare related stigma to ensure equitable access to continuous care.

Akshita Ramesh

Discipline: Engineering

Authors:

#1 Ravi Hadimani

#2 Irfan Ahmed

#3 Asif Jamil

Abstract Name: Reduced-Channel EEG Biometrics Using Hybrid Machine Learning on P300 Neural Signatures for Secure Authentication

The increasing prevalence of cyber-based attacks and spoofing has exposed an increased need for stronger and more resilient authentication measures across industries. Traditional biometric systems, such as fingerprint detection and facial recognition have become widely adopted. However, these systems remain vulnerable to various forms of physical or digital spoofing. Neural signatures, by contrast, are directly tied to internal cognitive processes and are extremely difficult for an outside actor to imitate, which makes them a promising direction for the next generation of cybersecurity solutions. This research focuses on the integration of Electroencephalography into the field of cybersecurity through the combined implementation of noninvasive neuroimaging techniques and Machine Learning. Electroencephalography (EEG) is a non-invasive neuroimaging technique capable of capturing neural activity through the usage of external electrodes applied to the scalp. EEG has the capability to provide real-time neural data for a variety of diverse applications, such as Brain-Computer Interface (BCI) technology. The safest and most cost-effective implementation of Brain-Computer Interfaces are Scalp-EEG based, which use EEG data to facilitate communication with the Brain-Computer Interface to translate brain activity into commands used for various tasks. This work aims to use EEG data as a form of biometric, and proposes a P300-based Authentication system reliant on Event-Related Potentials to elicit responses in brain activity for authentication, while identifying the prominence of each EEG node in contribution to overall authentication accuracy. The primary research question examines whether the P300 response can function as a reliable biometric identifier and identifies which EEG channels provide the strongest contributions to authentication accuracy. By integrating Event-Related Potential derived features within the authentication pipeline, the proposed system aims to enhance security robustness against conventional spoofing and cyberattacks. Results show strong classification performance and indicate that EEG-based biometrics have significant potential as a secure and robust authentication approach.

Vani Ramesh

Discipline: Environmental Science and Sustainability

Authors:

#1 Vani Ramesh

#2 Brian Toibin

Abstract Name: Agrivoltaics: SWOT analysis of current status and future implementation in the United States

Agrivoltaics is the process of co-locating agricultural and solar photovoltaic installations, usually on farmland, with the goal of improving the outputs of both processes. Research in European and Asian countries concerning agrivoltaic operations has reported positive outcomes, raising the potential for implementation in the United States. The US has the highest per capita energy use in the world, and Virginia's electricity demand is increasing 5% annually, largely due to the advent of data centers. In conjunction, many family-farm operations face difficult economic conditions given the precarious nature of the agriculture industry. Implementation of agrivoltaic systems across the US has unearthed political and policy conflicts in many communities concerning the "best" use of agricultural land. This qualitative SWOT analysis examines the strengths, weaknesses, opportunities, and threats present in the current US agrivoltaic practices. Methods being employed include a literature/media review of advocates and opponents of agrivoltaics; a literature review of best practices currently implemented in the United States and other countries; and interviews with current advocates and practitioners of agrivoltaics. Preliminary findings suggest that agrivoltaics improves soil quality, enhances native biodiversity, and improves economic conditions for small farmers. However, adoption faces barriers including high upfront costs, developer practices that conflict with agricultural priorities, and community opposition that usually centers on disputed claims. Future opportunities for agrivoltaics' use within farming communities requires research that produces actionable facts. This study will identify conditions and best practices needed for establishing small-scale agrivoltaic systems in the United States. Towards that end, continued qualitative and quantitative research must be conducted to establish a better understanding of the social, economic, and environmental conditions surrounding these debates. Understanding and implementing these lessons can set a path for the successful deployment of agrivoltaic systems across the United States, particularly Virginia.

Pranav Ramesh

Discipline: Health and Human Development

Authors:

#1 Justin Thomas

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Abstract Name: Racial Differences in Actigraphically-Measured Sleep

Background Racial disparities are present in sleep. However, there is a lack of research on racial disparities that include Middle Eastern and North African (MENA) individuals as a racial category. Methods Actigraphy data was collected for a racially diverse sample of 40 participants over two weeks. We ran a multivariate analysis of covariance using age as a covariate, race as the independent variable with four levels of race (Black(n=18), White(n=11), MENA(n=7), and Asian(n=4)), and the best linear fit of total sleep time (TST), wakefulness after sleep onset, and sleep efficiency as the dependent variables. Post hoc analysis using Fisher's least significant difference (LSD) correction for multiple comparisons was performed to determine pairwise associations. Results The results of the main analysis revealed sleep parameters differed by race, Wilks' $\Lambda = .53$, $F(9, 80.46) = 2.64$, $p = .01$. Post-hoc pairwise analysis revealed TST was the only variable that differed by race, $F(3,35)=4.40$, $p=.01$. There was a statistically significant difference between white ($M=385.75$ minutes, $SE=18.22$) and Black ($M=301.65$ minutes, $SE=14.76$) groups ($p<.001$). Differences between White and Asian ($M = 329.53$, $SE = 31.49$) and white and MENA participants ($M = 345.00$, $SE = 23.60$) were not statistically significantly different but may be clinically relevant. Conclusion Racial disparities in TST were evident, with Black participants having the shortest sleep duration followed by Asian, MENA, and then White individuals. While there were no statistically significant racial differences in other sleep characteristics, we may be underpowered to detect group differences with small effect sizes.

Joaquin Ramirez

Discipline: Environmental Science and Sustainability

Authors:

#1 Joaquin Ramirez
#2 Mina Pham
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Abstract Name: Quantifying the Relationship Between Traffic Activity and NO₂ Levels Using EPA and FHWA Measurements

Nitrogen dioxide (NO₂) is a trace gaseous pollutant formed when nitrogen and oxygen react under high-temperature conditions. This reaction occurs primarily during high-temperature combustion in vehicle engines and naturally during lightning strikes. Because urban areas experience heavy traffic, vehicles have become a major source of NO₂ emissions. NO₂ also contributes to the formation of harmful secondary pollutants. NO₂ reduces air quality, irritates the respiratory system, and is recognized as a key criteria pollutant. Monitoring NO₂ concentrations is essential for understanding environmental impacts and raising awareness of this public health concern. This study analyzes NO₂ levels in major East Coast cities, including New York City, Philadelphia, Baltimore, Washington, D.C., and Richmond. We used hourly Environmental Protection Agency (EPA) ground-based NO₂ measurements combined with hourly Federal Highway Administration (FHWA) traffic counts from 2019 to 2021 to examine how NO₂ surface concentrations vary with traffic volume (vehicles per hour). Although higher correlation coefficients may be observed in more controlled environments, our results demonstrate a clear linear relationship during morning peak hours, followed by a noticeable decrease in the correlation as the day progresses. This pattern highlights the influence of atmospheric chemistry and photochemical processes on NO₂ behavior throughout the day.

David Ramirez

Discipline: Mathematics

Authors:

#1 Jyrko Correa

Abstract Name: Strongly Independent Set (SIS) Homology for Geometric Lattices

We introduce a new homological theory for geometric lattices that captures structural information beyond the reach of classical constructions. Our approach replaces the traditional chain-based simplicial complex with one generated by strongly independent sets (SIS) of atoms, where each permutation of a set defines a distinct oriented simplex. This construction incorporates the combinatorial geometry of atomic independence into the homological setting, yielding a refined algebraic-topological invariant of lattice structure. We prove that all intermediate homology groups vanish and derive an explicit closed formula for the dimension of the top homology in terms of the dimensions of the SIS chain spaces. We further compare the resulting SIS homology with classical homological frameworks. The SIS invariant not only extends the traditional chain-based approach but also distinguishes geometric lattices that remain indistinguishable under conventional invariants. These findings suggest a broader paradigm in which algebraic topology interacts with lattice theory through atomic independence, providing a finer topological invariant for discrete geometric structures.

Celia Rammel

Discipline: Interdisciplinary

Authors:

Abstract Name: Reviving Space, Reviving Art: Transforming a Historic Inn into a Hub for Dance, Art, and Creative Industry Collaboration

This presentation explores the strategies and mechanisms for transforming an historic building into a year-round, multidisciplinary center for dance, performance, and creative industry collaboration. Inspired by models like Jacob's Pillow and Kaatsbaan Cultural Park, the project aims to build a sustainable arts ecosystem in a rural setting—merging dance education, cultural tourism, hospitality, and community engagement. The project employs a wide range of research techniques, including vital conversations with executives at similar institutions, arts consultants, architectural experts, state representatives, and those most intimately involved with an historic renovation process. The project investigates the architectural, financial, and programming strategies needed to revitalize an existing space and redefine its role in a cultural and economic landscape. The research focuses on a hypothetical project with real-world planning and application. The project commences with a geographical space that reveals some key aspects in key Creative and Cultural Industries and performing arts research on non-urban environments. Maine has been selected as an exemplar, with findings relevant to regions both nationally and internationally. Maine's regional rural landscape presents a surprisingly nurturing context for the proposed interdisciplinary arts venue, demonstrated in recently reported arts and cultural participation data by the National Endowment for the Arts, US Census Bureau, and Cultural Alliance of Maine. More vitally, as explored in the research, Maine's environment serves as a bridge between artists, residents, tourists, and all citizens alike in grounding Maine's rural uniqueness in the creative ways it knows best, spurring creative and cultural industry growth—a cornerstone to a community's vibrancy and overall health. In exposing this narrative and the need for an interdisciplinary venue in a small rural town, the purpose of the research in examining the method for remodeling and redefining a landmark building into an interdisciplinary arts center comes to fruition

Joshua Ramos

Discipline: Nursing and Public Health

Authors:

#1 Joshua Ramos

#2 Jacqueline Gannon

Abstract Name: Bridging the Gap Between Perception and Practice: Analyzing Nurses' Roles in Evidence-Based Chronic Pain Management

Chronic pain is a complex medical condition and remains one of the most intricate and costly health conditions to manage. The management of chronic pain is further complicated by its longstanding relationship with opioid therapy. Chronic pain and the opioid epidemic together pose a public health crisis that reinforces the need for evidence-based, non-opioid interventions in the management of chronic pain. Nurses play a central role in chronic pain management. However, each nurse's perceptions, beliefs, and knowledge vary widely, resulting in less optimal outcomes. The focus of this study is to investigate how nurses perceive chronic pain, and how these perceptions shape evidence-based interventions in clinical practice. This project will utilize a mixed-methods descriptive design surveying registered nurses using a

validated survey tool consisting of twenty-eight items. This survey will also examine nurses' understanding of chronic pain physiology, their attitudes toward opioid and non-opioid treatments, as well as the barriers that affect their ability to implement holistic strategies. Demographic and experiential factors will also be used to identify patterns related to education, experience, and nursing specialty. The anticipated findings are expected to identify key contributing factors that influence how nurses assess and manage chronic pain, including their beliefs about opioid use, chronic pain, non-pharmacologic treatments, and the barriers encountered.

Understanding the influences that nurses experience is essential to aligning clinical practice and current recommendations for safe, multimodal pain management. Through the analysis of the gaps, this study has the end goal of highlighting educational initiatives, promoting more effective and holistic approaches to chronic pain care, and the reduction of reliance on opioids. The findings of this study have the potential to strengthen nursing practice by identifying actionable gaps in knowledge and promoting evidence-based, multimodal pain management strategies that support safer, more effective care for individuals living with chronic pain.

Jose Ramos

Discipline: Psychology

Authors:

#1 Jose Ramos

Abstract Name: Gender and Belonging: An Exploration of Male Nursing Students' Experiences

Despite gradual increases in male nursing school enrollment, men remain significantly underrepresented in nursing, a field historically shaped by gendered stereotypes and expectations. Such underrepresentation often contributes to isolation, stereotype strain, and identity conflict. This study explores the psychosocial experiences of male nursing students at Southern Nazarene University, focusing on how perceived gender-related challenges influence their sense of belonging, professional identity, and persistence in nursing education. Guided by Bronfenbrenner's Ecological Systems Theory (1979) and the Sense of Belonging Theory (Hagerty et al., 1992) as frameworks, this qualitative research used open-ended surveys completed by seven male students in the SNU nursing program. Thematic analysis revealed six central themes: subtle gender bias, fluctuating sense of belonging, support gaps, stereotype pressure, strong retention commitment, and a pressing need for mentorship. Findings suggest that male nursing students often experience marginalization in clinical settings, lack access to tailored support systems, and face internal and external pressures related to societal perceptions of masculinity. Despite these challenges, participants expressed resilience and dedication to the profession, often motivated by personal and familial goals. This research underscores the need for nursing programs to develop inclusive practices, provide gender-sensitive mentorship, and address structural inequities to support the retention and success of male nursing students.

Alaina Ramundo

Discipline: Exercise Science and Nutrition

Authors:

#1 Lara Amaral

#2 Kevin Pearson

Abstract Name: Early-Phase Exercise Offsets High Diet Impacts Better Than Late-Phase Exercise in Female Mice

Exercise is crucial for managing body composition, metabolism, and overall health. Several studies show

significant benefits of either early morning or evening exercise. Individuals in the middle-aged and obese demographic are less likely to die if they exercise in the evening rather than in the morning. Other studies show that early morning exercise correlates with weight and fat loss. Compared to evening exercise, early morning exercise also indicates positive trends in sleep quality and heart health. We used the TSE PhenoMaster System to explore how exercise timing influenced metabolic results in C57BL/6 mice. This study assessed the impacts of early versus late active phase running in female mice fed a high-fat diet. Mice were fed a high-fat diet for eight weeks and divided into three groups: control (no exercise), early active phase running (8 PM–12 AM), and late active phase running (2 AM–6 AM). Female mice that exercised during the initial active period showed significantly reduced body weight and fat mass compared to those that exercised later or did not exercise. Gene expression analysis showed reduced leptin levels in early-phase runners, indicating better metabolic control. These studies suggest that the timing of the exercise significantly impacts metabolic health results. Future studies will examine the long-term effects of early versus late phase exercise, evaluate potential sex-specific differences by including male mice, and incorporate progressive resistance protocols further to explore adaptations in fat loss and lean mass growth. These results offer essential information for enhancing rodent exercise models to investigate interventions aimed at obesity and metabolic conditions.

Alyssa Ramundo

Discipline: Business

Authors:

#1 Shahryar Gheibi

#2 John O'Neill

Ava Geer

Abstract Name: Predictive Analysis of Insurance Costs and Cost Drivers for A Nonprofit Organization

Nonprofit self-insured organizations often face financial uncertainties due to fluctuations in costs and unpredictable claims. In support of cost saving initiatives for a self-insured not-for-profit, our consulting team developed a predictive analysis model to estimate the company's insurance expenses for 2025. Using three full years of historical claims data, we applied actuarial forecasting models, specifically development triangles, to track cumulative quarterly claims and project for future costs. Inside of R studio using the ChainLadder package, we constructed the triangles using the weighted averages between the quarterly development periods and extending them to predict expenses in future quarters. After receiving a second dataset with updated claims extending through April of 2025, the accuracy of our model was tested by comparing the actual cumulative expenses and the projected expenses inside of the first quarter of 2025. The projections were 96% accurate, displaying strong predictive validity. After validating the models accuracy, we expanded into the two components that became parts of our predictive estimate for expenses inside of the year of 2025; expenses from claims that had been incurred but not yet reported (IBNR) and projected expenses that the company would incur adjusted for a 3% nationwide inflation rate, based on our quarterly development triangles. Our predictive analysis provided insights into cost saving opportunities and cost drivers that ultimately allowed the company to adequately maintain their reserves and plan more effectively for future claims expenditures.

Atharva Ranbhare

Discipline: Biology

Authors:

#1 Atharva Ranbhare

Abstract Name: Integrating Mechanistic Modeling and Machine-Learned Dynamics to Characterize the p53–MDM2 Tumor Suppressor Feedback Loop in Colon Cancer

The p53 protein is a tumor suppressor that activates DNA repair pathways or triggers cell death, preventing cancer formation in human cells. The p53 protein is controlled by MDM2, a regulatory protein that maintains p53 levels when conditions are normal. In various cancers, including colon cancer, this feedback loop is disrupted, allowing damaged cells to continue dividing, as p53 is unable to regulate. Current mathematical and computational models fail to capture the variability observed in cancer systems and capture the behavior of the p53-MDM2 system. This research project focuses on developing a computational model that allows for accurate showings of the dynamic behavior of the p53-MDM2 feedback loop in colon cancer. The model focuses on two approaches: traditional mechanistic equations that represent biochemical interactions, and machine-learned components that account for additional regulatory influences. This model is trained on publicly available time-series gene expression and protein-level data, with the goal of identifying where mechanistic assumptions break down and which regulatory effects may be present in cancer cells. The model will allow for improved predictions on how p53 levels rise and fall under stress, identification of unexplained nonlinear behaviors, and simulations showing how potential therapies may influence the system. This project allows for a flexible and interpretable framework for identifying a key cancer signaling system. By integrating biological knowledge with modern computational methods, this model aims to offer insight into why the p53-MDM2 loop behaves differently in cancer and how those differences may inform therapeutic strategies.

Norlito Sanchez Jr.

Discipline: Chemistry

Authors:

#1 Norlito Sanchez Jr.

#2 Demetrios Pagonis

Abstract Name: Comparative Assessment of Wasatch Front Pollutants: Mortality Risk and Toxicity

Exposure to air pollutants, fine (PM_{2.5}) and coarse (PM₁₀) Particulate Matter, and Ozone (O₃) is associated with an increased risk of all-cause mortality, deaths from any natural cause. Utah expresses concern as its arid climate worsens air quality from natural and anthropogenic sources including vehicle emission, mining and processing, and home heating. The dry lakebed of Great Salt Lake (GSL) especially serves as a major emitter of windblown dust across the Wasatch Front. GSL remains the primary source of PM₁₀ emissions with now, increasing O₃ and PM_{2.5} concerns and levels. In this work, we compare air quality trends to their health outcomes; our analysis focuses on quantifying the pollutants and identifying potential dust sources. Meta-analyses show that for every 10 µg/m³ increase in daily PM₁₀, mortality rises about 0.41%, while a 1-hour spike of 100 µg/m³ increases by 0.17%. During 2023-2024, air monitoring data from Environmental Protection Agency (EPA) recorded mean concentrations of 0.074 ppm Ozone (O₃), 19.8 µg/m³ PM₁₀ and 7.46 µg/m³ PM_{2.5} across Utah counties, resulting an approximate 21 ± 7 attributable deaths annually. We calculated that roughly 166 GSL dust events per year would be needed to produce a similar health impact for all pollutant exposure. Dust deposited in communities also contain metal of concern for human health. Due to its high oxidative potential and elevated arsenic and lithium levels, GSL dust is more chemically reactive and toxic than other regional playas in The Great Basin. Preventing dust emissions from the lakebed may decrease health risks from dust in the Wasatch Front.

Zenai Randle

Discipline: Education

Authors:

#1 Charnell Long

Abstract Name: From Notes to Noticing: Measuring Elementary Students' Metacognitive Skills with Digital Science Notebooks

As the U.S. strives to remain competitive in STEM, there is a growing emphasis on equipping students with critical thinking skills and the ability to apply content knowledge innovatively, aligning with NGSS Standard ETS2.B on evolving societal needs. In science education, metacognitive thinking bridges theory and practice, enabling fifth graders to progress from guided reflection to independent planning, monitoring, and evaluating problem-solving approaches. Students with strong metacognitive skills can better understand scientific principles, assess their learning, and refine experiments. It is essential to explore strategies that effectively enhance metacognition and promote deep engagement with science. One promising yet less-examined method is the integration of digital science lab notebooks, which offer students a space to document observations and engage in reflective thinking. My research question, "How well do digital science lab notebooks measure a student's metacognitive skills compared to other methods of assessment in elementary school?" investigates whether these digital tools foster a deeper understanding of scientific concepts. To address this question, the study employs a case study methodology, examining two fifth-grade classes, a sample size of approximately 40 students, who will complete a Qualtrics multiple-choice pre-test and post-test to measure content knowledge, as well as Children's Perceived Use of Self-Regulated Learning Inventory (CP-SRL) surveys to measure metacognitive awareness. Using multimodal discourse analysis, I examine students' responses in their Arduino Digital Science Notebooks to evaluate whether these tools foster more frequent monitoring, regulation, and reflection than traditional measures. While results are preliminary, the structured format suggests stronger metacognitive skill development in elementary students. Thus, I anticipate that using digital lab notebooks will significantly strengthen 5th graders' metacognitive skills by providing structured opportunities for reflection, self-monitoring, and active engagement with scientific concepts.

Devin Randol

Discipline: Education

Authors:

Abstract Name: Breaking the Mold: How Poetry Can Reach Beyond Words in K-12 Curricula

This article explores poetry education within the Virginian high school curriculum, arguing that these curricula should consider including lessons and examples of poetry with more direct visual elements so as to better engage students. Visual poetry, or poetry that combines graphic and visual elements in its message, uses things like variations in spacing, or even different word and letter sizing. Because of these visual elements, this type of poetry serves as a more accessible entry point for less advanced readers, and thus may better reach students and help them to enjoy the benefits of poetry. Currently, there is little research on visual poetry, especially within the United States and visual poetry is not taught as a unit in VA high schools or specifically focused upon as a method of engagement by K-12 ELA teachers. Yet, visual poetry is popular online, reaching younger students through social media and some literary magazines. This article seeks to shed light on the potential of this form to help students develop a love and appreciation for poetry. By examining several well-known figures for visual poetry, examples of social media engagement with visual poets, and an informal observation conducted at my pre-service teaching practicum, this essay argues that visual poetry should be considered as a useful springboard toward more traditional poetic devices and understanding of poetry's general intents of expression.

Aleila Rankin

Discipline: Psychology

Authors:

#1 Sharon Alston

Abstract Name: Exploring Gendered Differences of Youth Located in Public Housing

Health care providers use behavioral health risk assessments to identify trends in youth behavior which are used for immediate intervention (Sappenfield O, Alberto C, Minnaert J, et al,2024). However, risk assessments are needed to identify ways in which gender influences the behavior of youth. Understanding the specific influences of gender on youth behavior allows practitioners in behavioral health settings to develop more appropriate interventions that meet the specific needs of youth. To address this problem, these research questions were posed, what are the differences in behavioral health between boys and girls. Are there significant differences in the participation in delinquency behavior, maternal and paternal supervision/encouragement, and emotional restraint between boys and girls? This study employed secondary data analysis of the Adolescent Health Survey of Hampton Roads conducted in 2023. The final sample was 378 participants with an average age of 14.8. The participants' ages ranged from 10 to 17 years old. Eighty-three percent of the participants identified as African American. Data was collected using a questionnaire that included demographic variables and self-administered standardized scales including The Weinberger Adjustment Inventory Emotional-Restraint subscale (Weinberger,1990), The Self-Reported Delinquency Scale (Elliot,1987), and the Parental Attitude Measure (Lamborn et al,1991). The preliminary analysis revealed statistically significant differences between boys and girls. Boys had a higher level of delinquent behavior ($M=18.48, SD=8.42$) compared to girls ($M=15.91, SD=4.52$) [$t(321)=3.25$ $F(30.61), P=.001$]. Girls had higher levels of emotional restraint ($M=45.74, SD=7.1$) compared to boys ($M=42.84, SD=7.91$) [$t(286)=-3.26$ $F(.459), P=.001$]. Girls also had a higher level of maternal supervision ($M=16.21$ $SD=3.83$) compared to boys ($M=15.11, SD=4.36$) [$t(320)=-.679$ $F(2.70), P=.009$]. These results are evidence of the need for gender-specific behavioral health risk assessments. Implications for further research will be discussed.

Victoria Rankin

Discipline: Chemistry

Authors:

#1 Victoria Rankin

#2 Kelling Donald

Abstract Name: Charge Transfer vs. Electrostatics: The Distribution of Sigma-Hole like Sites on Polarized Alkali Earth Metals and Implications for Bonding in Small Clusters

The experimental and computational studies of the structure and bonding in alkali metal halide dimers and oligomers was historically important in our understanding of molecular cluster formation. That understanding of clusters continues to be important in modern discussions of structure prediction. In examining the bonding in heterodimers combining alkali halides with bases such as ammonia and a model base of the form :E-H to avoid secondary interactions involving the substituents, we found that the linear dimer, F-M *** E-H – which is expected for normal sigma hole interactions – is unstable relative to an angled or no linear structure. Such a system has not been rationalized from molecular orbital or valence bond theory to date, and we draw on those theoretical frameworks in this study, yet we find most remarkably that a detailed analysis of the computed

surface potentials of the metal halide systems, hence evolution of the M atoms in their abilities to participate in sigma hole interactions, offer a surprisingly simple rational for this anomaly in the bonding pattern of the heterodimers as M gets larger. We discuss these observations in our poster presentations as well as the more fundamental question of the link between electrostatics and charge transfer in these compounds, and vantage points of the sigma hole concept and standard bonding models in accounting for trends in highly polarized complexes.

Sienna Ransford

Discipline: Biology

Authors:

#1 Andrea Perreault

Abstract Name: The Role of Fusion Proteins in the Progression of Pilocytic Astrocytoma to Glioblastoma

Pilocytic astrocytoma (PA) is the most prevalent pediatric brain tumor affecting children from the ages of 0-19 years old. Though PA itself is a benign WHO grade 1 tumor, in rare cases it has been shown to progress to a more aggressive and malignant glioblastoma which is WHO grade 4. Glioblastomas (GBM) have a significantly worse prognosis and are much more difficult to surgically treat. Because PA is typically treated with surgical resection, there is a significant gap in research regarding the molecular mechanisms behind both PA formation and the progression to GBM. This gap highlights the need to investigate novel oncogenic factors such as fusion proteins, which have recently been established as key drivers of cancerous formation in other types of tumors. Gene fusion events, caused by structural variations of DNA within the genome, produce these fusion proteins with altered functions. St. Jude Cloud Genomics Platform (SJCGP) is a database hosted by St. Jude Research Hospital which has de-identified patient sequencing data. CICERO is a software that uses the available SJCGP RNA-seq data to predict structural variations, specifically gene fusions. Fusion events found in PA and GBM samples will then be isolated and compared to find genetic similarities between the two cancer types. These specific gene fusions will then be translated into fusion proteins and characterized to determine the altered function. Overall, this comparison will allow for the discovery of any specific fusion proteins which may drive the transition from PA to GBM. We expect to find at least one shared fusion protein from the CICERO output for both PA and GBM, which may indicate its role in PA progression. Fusion proteins found to drive this progression may be used as therapeutic targets in the future as an alternative to surgical resection.

Aarushi Rao

Discipline: Engineering

Authors:

Abstract Name: Surfactant Replacement Therapy in a Rodent Model of Acute Respiratory Distress Syndrome

Introduction: Acute Respiratory Distress Syndrome (ARDS) is a severe form of lung injury in which inflammatory damage causes fluid accumulation in the lung, disruption of gas exchange, and loss of functional surfactant. Reduced surfactant leads to increased alveolar collapse, contributing to fluid buildup in the lung, lack of oxygen in the blood, and respiratory failure. Current therapies, such as mechanical ventilation and various inhaled drugs, treat many symptoms of ARDS but do not directly correct surfactant dysfunction. Synthetic and animal-derived surfactants are used clinically in premature infants, yet no inhaled surfactant treatment exists for adults with ARDS. This study evaluates a dry powder synthetic surfactant

aerosol for its ability to improve lung mechanics and gas exchange in a rat model of lipopolysaccharide (LPS)–induced ARDS. Methods: Sprague–Dawley rats were given intratracheal LPS or saline, allowed to recover 24 hours, and then received either sham intubation or 5 mg of a spray-dried, excipient-enhanced phospholipid surfactant via a custom air-jet dry powder insufflator, as described by Pangeri et al (2023). After an additional 24 hours, lung mechanics, arterial and venous blood gases, bronchoalveolar lavage (BAL) fluid, and lung tissue were collected. Results: IVIS imaging demonstrates distribution of the aerosolized surfactant throughout LPS-injured lungs, indicating effective delivery to distal airspaces. Additionally, BAL protein measurements show a trend toward increased total protein in LPS-injured controls, suggesting decreased alveolar protein leakage, although these changes are not yet statistically significant. Blood gas analysis indicates improved oxygenation and reduced hypoxemia in surfactant-treated animals. Overall, these data suggest that dry powder synthetic surfactant can be efficiently delivered to the injured lung via aerosolization and may attenuate inflammation- associated barrier disruption. Future work will include increasing dosing frequency, extending the observation period, and expanding BAL protein, cytology, blood gas, and histologic analyses to define the therapeutic impact of this formula.

Elizabeth Rapach

Discipline: Environmental Science and Sustainability

Authors:

#1 Pete Puleo

Abstract Name: Understanding how Traffic Levels Influence the Distribution of Tire Wear Particles in Surface Soils at Two Roadside Agricultural Sites

Microplastics delivered to roadside soils by vehicle traffic reduce agricultural productivity. Previous research lacks information on how traffic rates impact tire wear particle concentrations in soils in the Midwest. Through our research we aim to observe how variations in road traffic levels at two sites in Whitewater, Wisconsin affect the amount of tire wear particles dispersed into roadside agricultural soil. We also hope to quantify how tire wear particle concentrations change in a transect away from the roads. At two sites, one with low traffic rates (Anderson Rd) and one with high traffic rates (WI-59), 5 cm deep soil samples were collected along a transect 0.25, 0.5, 1, 3, and 5 m away from the road. We have also sieved each of the ten samples to be greater than 100 micrometers, but less than 1000 micrometers because that's the size range of most tire wear particles. We digested organic matter in the soil samples using 30% hydrogen peroxide for 72 hours. We still have yet to perform a two-step density separation to isolate tire wear particles (1.2-1.4 g/cm³) from each soil sample. To do this, we would collect the particles that float in a zinc chloride solution (1.7 g/cm³) and sink in a sodium chloride solution (1.2 g/cm³). We predict that the soil samples collected at the higher traffic site will contain more tire wear particles than the samples collected at the site with less traffic. As the distance from the road increases, we expect there to be an exponential decrease in tire wear particles. In the agriculturally dominant Midwest, it is important to prevent soil and plant contamination by understanding tire wear distribution. The results of this research will be crucial to protecting agricultural practices from the harmful effects of microplastics.

Aditya Rapaka

Discipline: Computer Science

Authors:

#1 Aditya Rapaka

Abstract Name: Predictive Modeling of Readmissions and Quality of Care in Type I and Type II Diabetes Patients Using Hospital Inpatient Data

Diabetes is a growing concern as in 2024, around 1.2 million people were diagnosed with Type-I/Type-II diabetes in the United States. Understanding of the disease will help to cure it at an early stage. This research analyzes how the characteristics of diabetes patients contribute to understanding diabetes complications. The factors which influence the type of care received by an individual in a specific facility are identified. It allows for the development of benchmarks to determine the quality of care for type-I/type-II diabetic patients. It also assesses how hospitalised diabetes care affects the future health of diabetes patients. Based on the identified characteristics in the 'Diabetes 130-US Hospitals...' dataset, predictive models can be developed by employing AI/Machine techniques. For this purpose, a database of diabetes inpatient encounters from 130 hospitals in the United States between Jan-1999 to Dec-2008. The research includes 50+ features collected from over a decade of inpatient service. The approach to classifying the outcomes of patients who may be admitted to the hospital again will take the form of a classification strategy that establishes three categories: (1) No Readmission; (2) Readmitted within 30 days; and (3) Readmitted at any time after 30 days. The focus of the study will be on the second category. Two modeling approaches are developed: (1) a logistic regression model to provide a baseline for interpretable models, and (2) gradient boosting classifiers for capturing Non-Linear Relationships within the High Dimensional Feature Space. The preliminary results indicate that the gradient boosting classifiers performed better than the Logistic Regression models to predict Readmissions, especially for early Readmissions. The coefficients from the Logistic Regression Models indicated that the test results of HbA1c, number of laboratory procedures, and prior emergency department visits were significant predictors. Detailed results will be presented in the conference.

Natalie Raschka

Discipline: Biochemistry

Authors:

#1 Thilini Fernando

#2 Xiaohua Peng

Abstract Name: Selectivity and Long-Term Proliferation Suppression by the Synergistic Combination of Vitamin C and an H₂O₂-Activated Prodrug Across Diverse Cancer Models

The complexity and heterogeneity of cancer limits the efficacy of single-agent therapies, emphasizing the need for rational combination strategies early in drug development. The Peng group recently developed FAN-NM-CH₃, an H₂O₂-activated nitrogen mustard prodrug that generates a potent DNA-alkylator upon reaction with intracellular hydrogen peroxide. This activation blocks DNA replication and induces apoptosis, enabling selective targeting of cancer cells with dysregulated redox homeostasis. In this study, we systematically evaluated the selectivity and long-term proliferative impact of combining ascorbic acid with FAN-NM-CH₃ across multiple cancer models, including triple-negative breast cancer (TNBC) and glioblastoma (GBM) cell lines, as well as matched normal epithelial cell lines. Mechanistic studies indicate that catalase, a key H₂O₂-scavenging enzyme, contributes to differential sensitivity by limiting ROS-mediated prodrug activation in normal cells. We determined 48-h IC₅₀ values for each agent, identified the Maximum Safe Dose (MSD) of vitamin C, and measured changes in prodrug IC₅₀ in the presence of the vitamin C MSD. Fold-change analysis revealed strong synergy, with the combination significantly reducing IC₅₀ values in TNBC and GBM cells while sparing normal epithelial cells. To assess whether short-term cytotoxicity translated into lasting growth suppression, we performed clonogenic assays. The vitamin C + FAN-NM-CH₃ combination nearly eliminated long-term colony formation in MDA-MB-468 cells, whereas catalase and deferoxamine (DFO) partially rescued survival, consistent with an ROS-dependent activation mechanism. Overall, these findings demonstrate that ascorbic acid markedly enhances both the anticancer potency and the selectivity of the H₂O₂-activated prodrug. Combined with previously demonstrated in vivo tumor regression across three breast

cancer models, these results support advancing this strategy toward preclinical evaluation in patient-derived xenograft (PDX) TNBC models.

Landon Rash

Discipline: Engineering

Authors:

James Smith

Abstract Name: Hot-Wire Anemometer Calibration for Jet Engine Intake Flow to Support Greenhouse Gas Emissions Reduction

The aviation industry accounts for 2.5% of global CO₂ emissions, more than 180 countries. Although jet emissions per plane have decreased, rising flight demand has increased total emissions. This highlights the need for more research into aviation emissions reduction. A hot-wire anemometer is an important device for emissions studies. Its high sensitivity and fast response times make it optimal for air velocity measurements in jet engine intake studies. Accurate intake air velocity data enables calculation and adjustment of the jet engine's fuel map. The intake air velocity and known intake cross-sectional area are used to calculate the mass-flow rate. This shows how much air flows into the engine per unit time. From this, the optimal amount of fuel for reduced emissions can be set. Calculated intake pressure is also used in fluid dynamics simulations. This data improves predictions of combustion and air flow in the engine. Engineers can then optimize engine design to reduce emissions. The expected result of this experiment is a calibrated relationship between hot-wire and real air velocity. This will enable more accurate engine models and fuel-map adjustments for efficiency and reduced emissions. Therefore, a benchtop experiment was designed to calibrate the anemometer under variable air flow velocity conditions. To create the controlled air velocity environment, a variable velocity fan and a variable DC power supply were utilized. This system will create a constant, calculable airflow to create a reference wind velocity to compare to the anemometer.

Samarth Rastogi

Discipline: Engineering

Authors:

#1 William Warden

#2 Kyle Frank

#3 Hannah Kobza

#4 Katherine Rumsey

#5 Nikhil Patel

#6 David Warsinger

#7 Shidan Wan

Abstract Name: Marine Energy powered Desalination using Membrane Distillation

Island cities struggle with high-salinity groundwater compounded by scarce energy resources. Additionally, island nations and their populations are prone to natural disasters such as hurricanes, in which a stable energy source to provide clean drinking water is a necessity. These conditions make island nations prime candidates for ocean thermal energy converters (OTECs), which harness the difference in temperature between the warm surface layer and the colder, deeper layers (a thermocline). The purpose of the project is to explore the potential of thermocline energy for freshwater production and thermal desalination via membrane distillation.

The team plans to use existing marine energy concepts in a novel way. A market will be identified for the planned design, followed by an evaluation of the system's near-term market potential, taking into account prospective end users and key stakeholders. Lastly, the team will create a prototype and test relevant metrics, such as power output and efficiency, to determine whether the design is suitable for the identified communities. The findings from the project will provide insight into the feasibility of implementing a thermocline energy OTEC system for desalination in tropical communities, an economic overview of the market, and input from critical stakeholders for future projects.

Cloe Ratliff

Discipline: Biochemistry

Authors:

Abstract Name: Metabolic Profiling in Orbital Adipose Tissue in TED in Response to Teprotumumab

Introduction: Thyroid Eye Disease (TED) is an autoimmune disease most commonly associated with Graves' Disease. It is characterized by the expansion of orbital fat and inflammation leading to dry eyes, pronounced proptosis, optic nerve compression and ultimately vision loss. The pathophysiology of this disease involves thyroid-stimulating hormone receptor (TSHR) and insulin-like growth factor I receptor (IGF-IR) being expressed in orbital fibroblasts causing a signaling cascade. Ultimately, this leads to inflammatory and tissue remodeling. Teprotumumab was recently approved for treatment and targets IGF-IR with significant outcomes such as 35% fat volume reduction. Currently diagnoses are made using clinical presentation and imaging and identifying molecular biomarkers could aid in this diagnosis process. Metabolomics offers an opportunity to identify dysfunction in metabolic pathways that lead to these diseased states and enhance current treatment options. **Methods:** In the present study, we used a targeted metabolomics approach using liquid chromatography-mass spectrometry (LCMS) to quantify 134 metabolites across orbital adipose tissue. Samples included non-TED controls (n=13) and TED patients both treated with teprotumumab (n=13) and not (n=9). Normalization to account for weight of tissue was completed. **Results:** We found distinctive metabolic alterations in both in control versus untreated TED patients and when comparing untreated TED patients with treated TED patients. 28 metabolites significantly changed in untreated TED compared to controls, with 15 having increased and 13 decreased. When untreated TED patients were compared to treated TED patients 24 metabolites were significantly changed with 19 having decreased and 5 increased. This includes four metabolites that were restored to normal levels with the addition of teprotumumab.

Julia Ravazza

Discipline: Criminology/Criminal Justice

Authors:

#1 James Rhoads

#2 Shannon Smithey

Abstract Name: Perspective of Westminster College Students on Social Theories of Justice and Crime

There are approximately two million people being held in custody across the United States. Now more than ever, understanding justice and crime and the ways in which society perceives them is of the utmost importance. This study uses Q-Methodology, which permits the scientific study of subjectivity, to explore the opinions of a group of Westminster College students and opinions they have on statements pulled from criminology and sociology theorists. The study found three distinct and theoretically supported factors which

viewed criminals and justice in three different ways. The factors parallel already existing viewpoints people have in politics and the criminal justice field as a whole. This study can be used in reflecting upon both historical and ongoing trends and policy decisions in the criminal justice world, alongside analyzing the issues present within society such as poverty, homelessness, and prison overcrowding.

Julia Ravazza

Discipline: Criminology/Criminal Justice

Authors:

#1 Andy Bain

Abstract Name: Rehabilitative Efforts in Prisons - What Has Been Done and What is Needed?

Previous research by Bain (2019), Ward and Maruna (2007), and Robinson and Crow (2009), have made efforts to determine what supports offender rehabilitation. Research has largely focused on discussing differing models and how they align with rehabilitative theory. However, rehabilitation cannot just revolve around one type of treatment, therapy, or program; not every offender responds in the same way and with the same rate of success. This can be due to differences in what is offered and what is needed. This paper provides a thorough review of literature in the field of rehabilitation to consider individual need and responsiveness. It provides for a historical review of rehabilitative work supplemented by evidence from lived experience and academic expertise, beginning with the Quaker movement in the mid 1800's through current practice in the United States. In sum, this research is intended to provide a framework for future studies into offender rehabilitation and a successful desistance. It is essential to efforts to reduce crime and the numbers of victims in society.

Julia Raveneau

Discipline: Biology

Authors:

#1 J.M. Woltz

William Rose

Abstract Name: Effects of Plant Diversity on Insect Communities in Stormwater BMPs

Our project examines the effects of plant community structure on insect diversity in stormwater Best Management Practices (BMPs). BMPs are in-ground structures used to collect and filter stormwater runoff to reduce environmental impacts like water pollution, erosion, and flooding. BMPs may be covered with a variety of different plant communities, from mown grass with unmanaged opportunists to carefully managed native plantings. Small green spaces within urban areas support pollinators and other beneficial insects. Within a green space, the diversity of plant species and availability of floral resources can affect the types and abundance of insects supported. Therefore, the structure of the plant community growing on BMPs will likely affect the insect community present. We assessed the plant community in each BMP using four randomly placed 1-m² quadrats. We identified plant species in the quadrats using PlantNet to calculate species richness and counted stems of each species to assess relative abundance. We noted all species in-bloom and measured plant height (cm) at three points in each quadrat. We assessed the insect community in each BMP using 5 sets of yellow, blue, and white bee bowls suspended at vegetation height from step-in fence posts, deployed for 24 hr. Collected insects were preserved in 70% EtOH and identified to family. We assessed the relationship between plant species diversity, richness of species blooming, and insect diversity. We expect to find a

positive relationship between both the species richness and the number of species blooming and the number of insect families captured in each BMP. Additionally, we will repeat these samples monthly from Mar-Oct 2026 to determine how these relationships change seasonally. This information can be used to manage BMPs in ways that will maximize conservation benefits.

Shreya Ravi

Discipline: Physical/Occupational Therapy and Speech Language Pathology

Authors:

#1 Samuel Lauman

Abstract Name: Heart Rate Variability and PROMIS Outcomes in Pediatric Rehabilitation

Chronic pain affects up to 30% of children and adolescents, impairing quality of life. Within a biopsychosocial framework, multidisciplinary pain management remains essential. The Monitored Augmented Rehabilitation System (MARS) delivers individualized, technology-assisted exercise therapy while simultaneously capturing physiological metrics, including heart rate (HR) and heart rate variability (HRV). This study evaluated whether routine pain management interventions incorporating MARS were associated with improvements in self-reported outcomes measured by PROMIS domains and physiological measures of autonomic regulation. Twenty pediatric patients with chronic pain diagnoses completed two MARS sessions at least four weeks apart. HR and HRV data were recorded using a validated H10 Polar Heart Rate chest strap during 3-minute intervals: rest (HRV-0), the first 3 minutes of exercise (HRV-1), the middle 3 minutes of exercise (HRV-2), and the final 3 minutes of exercise (HRV-3). Patients returned ≥ 1 month later to repeat the initial session. Paired-sample t-tests evaluated changes between time points ($\alpha = 0.05$), and effect sizes were calculated using Cohen's d. PROMIS domains (Anxiety, Depression, Fatigue, Pain Behavior, Pain Interference, and Pain Intensity) and CES-D scores were collected pre- and post-intervention. Paired t-tests and Wilcoxon signed-rank tests assessed pre-post changes, and Spearman's rank-order correlations examined relationships between changes in resting RMSSD and PROMIS scores. Pain Behavior T-scores significantly decreased post-intervention ($p = 0.009$), with no other PROMIS or CES-D domains showing significant change. RMSSD increased during the 6-9 minute exercise segment in Session B relative to Session A ($p = 0.037$), suggesting improved parasympathetic modulation. No significant associations were found between HRV changes and PROMIS ($p > 0.05$). MARS-based rehabilitation was associated with reductions in pain behavior and modest improvements in autonomic regulation during exercise. However, HRV changes did not correspond with self-reported outcomes, suggesting that physiological and subjective recovery may occur on different trajectories in pediatric pain rehabilitation.

Sanjaykrishnan Ravikumar

Discipline: Computer Science

Authors:

#1 Sanjaykrishnan Ravikumar

Abstract Name: Defense Approaches against Adversarial Attacks on Remote Sensing Applications

Deep learning based models are utilized in remote sensing systems to interpret satellite imagery, classify land, and monitor objects. However, these deep learning models are vulnerable to adversarial attacks—small input perturbations that can cause critical misclassifications. This work explores the impact of adversarial attacks, e.g., Fast Gradient Sign Method (FGSM) attack, on satellite images, e.g., UC-Merced Land Use Dataset. We

perform a comparative study of existing defense strategies, including Projected Gradient Descent-based adversarial training, gradient masking, detection-based classifiers, and input transformations such as Gaussian and Median filtering. We propose an input transformation-based dual-stage defense method combining Gaussian and Median filtering against adversarial attacks. We improved adversarial testing accuracy (ATA) to 66.90% while maintaining 75.00% clean accuracy using Gaussian filtering ($\sigma = 2$) with 5×5 Median filtering without fine-tuning the underlying model. Additionally, gradient masking (with a noise of 0.10) also boosted robustness, increasing ATA to 54.05% with a clean accuracy of 75.24%. We also apply an effective ensemble surrogate models-based black-box attack, iterative FGSM, and achieved an attack success rate (ASR) of 60.00% compared to traditional FGSM (ASR = 49.29%), demonstrating stronger transferability. Even after applying the combined filter defense, the attack remained effective with an ASR of 56.62%, highlighting the robustness & practicality of multi-step ensemble attacks in black-box settings. Our findings reveal the strengths & trade-offs of each defense, providing insights for enhancing robustness in remote sensing systems against adversarial attacks.

Tisya Rawat

Discipline: Mathematics

Authors:

#1 Riccardo Caniato

Abstract Name: The Gaussian Curvature of Superminimal Immersions in the Round 4-Sphere

Through this research project in Differential Geometry, we investigated the existence of negatively curved minimal surfaces in spheres, particularly in S^4 , which is the unit sphere centered at the origin in the 5-dimensional R^5 space. We studied the following problem: Is there a negatively curved, closed, minimal surface in a round sphere? The problem has remained open for decades, since there are serious obstructions, given by the positive curvature of the ambient space, to the existence of negatively curved minimal surfaces in spheres. Bryant and Hano have invented methods to generate minimal surfaces in spheres with semi-explicit twistorial constructions. We studied new methods to understand the Gaussian curvature of Bryant-Hano surfaces. We show that no smooth superminimal immersion in S^4 can have strictly negative Gaussian curvature, as any such immersion of genus g , greater than or equal to 2, must have at least one umbilic point. We studied an alternate proof for the following: No smooth superminimal immersion in S^4 can have strictly negative Gaussian curvature. This is a corollary of the following theorem: For a smooth superminimal immersion into S^4 , the Euler characteristic of the domain surface is strictly greater than zero, or the immersion map, ϕ , has at least one umbilic point.

Dallas Rawls

Discipline: Education

Authors:

#1 Charnell Long

Abstract Name: The Impact of Linguistic and Cultural Contexts on Elementary Science Education

The National Science Teaching Association emphasizes that STEM should be taught through hands-on, interdisciplinary projects that connect classroom learning to real-world applications. STEM learning also equips students with essential skills such as problem-solving, collaboration, and critical thinking. Given its importance in K–5 education, effective STEM instruction is crucial for student success. However, culturally

holistic science instruction remains uncommon in many classrooms. To address this gap, we examine the impact of integrating students' cultural experiences into science curricula and learning activities. In this study, culture is defined as the customs, arts, social institutions, and achievements of a particular social group. Specifically, our work aims to identify the cultural assets of students in the Greensboro community and investigate how leveraging these assets can directly impact success in science education. Grounded in a "whole child" approach, this framework invites students and educators to engage in STEM learning while recognizing and valuing the cultural strengths each group contributes. Using comparative methods to analyze students' science journals alongside pre- and post-surveys, this case study examines the effects of implementing this approach. For this project, we designed a science lesson that embedded local cultural elements through field trips and active learning experiences within students' own communities. We then analyzed the resulting data to measure its impact on student outcomes. Our findings suggest that students benefited from holistic science instruction, developing deeper connections with the content and an enhanced ability to communicate their scientific understanding.

J. Travis Ray

Discipline: Biology

Authors:

#1 M. Elizabeth Barnes

Abstract Name: Exploring Undergraduate Biology Students' Vaccine Education and Communication: A Qualitative Interview Study

I aim to explore undergraduate biology students' vaccine attitudes and experiences with vaccine communication and vaccine education to provide recommendations for improving vaccine education. My research questions are: What are undergraduate biology students' current knowledge, attitudes, and beliefs about vaccines? How are undergraduate biology students communicating with others about vaccines? In what ways are undergraduate biology students learning about vaccines in their biology courses, and how do they think vaccine education can improve? To prepare students for having careers in science and healthcare, biology scholars identified that students need science knowledge and the ability to communicate science. Despite being regarded as a key competency of the undergraduate biology curriculum, the teaching of science communication is largely absent from these programs, and even more so within the teaching of communicating culturally controversial science topics (CCSTs). Vaccines are an example of a CCST, as scientists recognize vaccines as an important medical advancement, yet vaccines also carry mistrust within the public. It is important for biology educators to have information on student knowledge, attitudes, and communication about vaccines so they can implement effective instruction. However, educators currently lack this information. I am recruiting 30 participants to participate in 60-minute semi-structured interviews. Prior to interviews, participants will complete a pre-interview survey that gauges their vaccine knowledge & education history. Interviews will be audio-recorded and transcribed. Inductive and deductive content analysis with constant comparison methods will be used to identify themes, and I'll create a codebook to describe these themes. A second researcher will analyze a subset of interviews to determine the codebook's interrater reliability. Currently, I have conducted three interviews. Although data are preliminary, participants infrequently communicate vaccines due to feeling underprepared. Participants feel underprepared with communicating vaccines due to a lack of vaccine instruction in biology courses. However, participants display positive attitudes towards vaccines.

Sofia Rayon

Discipline: English and Literature

Authors:

Abstract Name: The Future of Poetry: Transliteracy and Literary Practice in the Digital Age

The digital age has revolutionized the conditions of cultural production and reception; people create, circulate, and encounter literary expression in forms that are far beyond conventional expectations of what literature looks like or where it belongs. Existing scholarship indicates that the newest generations spend more time engaging with digital spaces rather than traditional forms of media. Yet despite extensive study of digital media's cultural and psychological effects, few accounts have analyzed the lived practices of young readers and writers who intersect their approach to literature with technology. This essay addresses that gap by showing that poetry is prevalent in contemporary culture due to innovative digitization efforts and the creation of poems unique to digital culture. Using a mixed interpretive approach that combines close reading, media analysis, and recent transliteracies research, a concept originally developed in 2005 by Professor Alan Liu at the University of California at Santa Barbara, this essay traces poetry's journey into its current forms in blogs, video games, and social media platforms. Findings suggest that transliteracy is the defining quality that has enabled younger generations to incorporate poetry in digital platforms, fostering active participation in virtual environments that support collaborative authorship, accessibility, and cross-cultural connection in that process.

Mahreen Raza

Discipline: Psychology

Authors:

#1 Mahreen Raza

#2 Yara El Zoghby

#3 Christa McIntyre

Abstract Name: Molecular Changes in the Basolateral Amygdala Following Vagus Nerve Stimulation-Enhanced Extinction of Conditioned Fear

Post-Traumatic Stress Disorder (PTSD) is a psychiatric condition characterized by the persistence of maladaptive fear memories. Symptoms include anxiety, hypervigilance, and functional impairment. Exposure therapy is one of the treatments for PTSD, but dropout rates are high, and half of patients lack optimal responses, therefore the need for alternative treatment methods that accelerate therapeutic effects. Vagus Nerve Stimulation (VNS), an FDA-approved neuromodulatory technique, has been shown to enhance fear extinction in male rats, particularly through plasticity in the infralimbic cortex (IL) to basolateral amygdala (BLA) pathway. However, the molecular mechanisms underlying this effect remain incompletely elucidated. Additionally, little is known about whether VNS has similar effects in female rats, despite their higher prevalence of PTSD. The aim of this initial study is to test auditory fear conditioning (AFC) and extinction in female rats. AFC consisted of administration of a 1-sec 0.4mA footshock to rats during presentation of a 30-sec, 9Khz, 85dB sound. Following AFC training, rats were given a single day of extinction training, where the sound was presented without the footshock. Conditioned fear was measured 24 hours later, and brains were extracted, sectioned on a cryostat, and BLA tissues were punched for downstream proteomic analysis. Our behavioral results showed that VNS failed to enhance extinction in female rats, suggesting sex-differences in neural nodes involved in VNS-accelerated extinction effects. Future work includes assessing the sex-specific molecular signature underlying VNS effects on extinction by conducting an unbiased proteomic analysis of the BLA tissue.

Tyler Rector

Discipline: Biology

Authors:

#1 Venkat Maruthamuthu

#2 Zaria Booth

Abstract Name: Optogenetic stimulation of Rho GTPases in MDCK cells

Rho GTPases, such as RhoA and Rac1, control the spatiotemporal organization of the actin cytoskeleton, enabling cell adhesion, force generation, shape changes, and migration that underlie tissue dynamics. Ras homolog family member A (RhoA) in particular plays an important role in actin organization and cell contractility. Optogenetic stimulation of RhoA provides an experimental means of controlling when and where it is activated, enabling mechanobiological studies of force generation in epithelial cells. It was previously shown that optogenetically induced clustering of RhoA can lead to increased RhoA activity. To test this approach in epithelial cells, we transfected Madin Darby Canine Kidney (MDCK) cells with an optogenetic RhoA clustering construct via electroporation and confirmed expression by fluorescence imaging of the associated mCherry tag. RhoA of the expressed construct was observed to be initially diffusely located in the cell. When stimulated using 470 nm light, we found that RhoA began to cluster into oligomers that were visible as supra-micron-scale puncta within 10s of seconds. Phase imaging showed that the MDCK cells maintained their morphology during stimulation over several minutes. This suggests that RhoA activation via clustering was not excessive enough to cause very high contractility and adverse cell morphological changes. Additional testing of the opto-RhoA-mCherry and opto-Rac1-mCherry constructs will evaluate whether direct membrane recruitment of each Rho GTPase induces either contractility or protrusions, respectively. Overall, we have successfully optogenetically clustered RhoA in MDCK using blue light, establishing a platform for spatiotemporally resolved mechanobiology studies that can help understand how epithelial cells generate and transmit force.

Journey Reddick-Umoja

Discipline: Biology

Authors:

Abstract Name: Conditional Degradation of CHC-1 in *C. elegans* Using the Auxin-Inducible Degron System

Clathrin is an essential component of intracellular transport, a process required for proper cell division. When clathrin function is disrupted, uncontrolled cell growth can occur, contributing to cancer progression and neurodegenerative diseases. In the nematode *Caenorhabditis elegans* (*C. elegans*), the clathrin heavy chain protein CHC-1 regulates intracellular vesicle transport during early embryogenesis. However, clathrin has also been observed at the centrosomes and mitotic spindle, and the function of CHC-1 at these locations in *C. elegans* remains unknown. This study aims to determine how CHC-1 degradation affects cell division dynamics in *C. elegans* embryos. To conduct these experiments, we used a strain containing four components: TIR1-Flag (used to recruit AID-tagged proteins for degradation in the presence of auxin), AID-tagged CHC-1 (used to conditionally deplete CHC-1 upon auxin treatment), mNeonGreen-tagged CHC-1 (used to visualize CHC-1 localization and monitor degradation efficiency), and mCherry-tagged tubulin (used to visualize microtubules and mitotic spindle structure). This system enabled conditional degradation of CHC-1 using 2 mM auxin. Ethanol-treated worms served as the control because ethanol was the solvent for auxin. Preliminary results reveal that auxin-treated embryos show reduced mNeonGreen-CHC-1 fluorescence, whereas ethanol-treated embryos display a strong CHC-1 signal. These data confirm successful CHC-1 depletion in the presence of auxin. Variations in early cell division patterns were also observed, suggesting that CHC-1 is required for proper cell-cycle progression. However, worms exposed to 2 mM auxin

grew significantly more slowly than controls, resulting in far fewer gravid worms available for imaging. Because 1-cell embryos constitute a small proportion of total embryos, this growth delay limited the number of embryos available for analysis. To address this limitation, future experiments will include additional auxin-treated plates to ensure adequate embryo yield. Successful completion of this work will reveal new insights into the role of CHC-1 in *C. elegans* cell division.

Natalie Redding

Discipline: Biology

Authors:

#1 Juliannah Rua-Avendano

#2 Dustin Fetch

#3 Tiffany Bastos

#4 Alexey Soshnev

Ava George

Marzieh Rouzbehani

Abstract Name: Genetic studies of dominant lethal mutations in core histone genes

The nucleosome core particle (NCP) is a universal subunit of eukaryotic genomes, comprised of an octamer of four core histones H2A, H2B, H3, and H4, and ~146 base pairs of DNA. Histones are essential proteins, and their post-translational modifications make up the basis of “epigenetic” (i.e. sequence-independent) regulation of all genomic functions. Histones are exceptionally conserved across all eukaryotes. Further, in all multicellular organisms each core histone isoform is encoded by dozens of near-identical paralogs. Missense mutations in core histone genes occur frequently in many cancers, yet the biological effects of most of those are poorly understood. To refine the true “driver” mutations we reasoned that critical residues in histones must be constrained in healthy population. Interrogating gnomAD 4.1 data encompassing over 800,000 human exomes and whole genomes from diverse healthy subjects – corresponding to ~30 million individual histone alleles – we assembled a saturated map of synonymous and missense variants across all core histone genes. These studies identified only three entirely invariant residues (i.e. ones that tolerate no substitutions), as well as cases where a specific expected missense variant was missing from the population, all suggesting yet-unknown dominant mechanisms of extreme biological significance. As all such mutations have strong dominant effect, we developed a stable, selectable, inducible expression system allowing us to switch the accumulation of the mutant histone on demand, in a time-controlled manner. To investigate whether dominant phenotypes of histone mutants require incorporation into the NCP and genome, we generated a series of double mutants, disrupting the invariant residues together with critical hydrophobic surface required for the histone fold domain “handshake”; effects of such double mutations are currently under investigation by a combination of cell-based and transcriptomic analyses. Together, our studies aim to understand the biochemical and biological role of exceptionally conserved, essential amino acids in core histones.

Varsha Reddy

Discipline: Nursing and Public Health

Authors:

#1 Samuel Stowe

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Abstract Name: A Preliminary Investigation of E-cigarette Usage among Pregnant Patients in Alabama

Rates of electronic cigarette (e-cigarette) use during pregnancy have been increasing over the past decade, raising concerns about the potential effects on perinatal health. Pregnancy-related physiological changes make pregnant women more susceptible to e-cigarettes due to the many flavors provided. The perception of e-cigarettes being less harmful than other tobacco products is another reason that pregnant women may choose to use e-cigarettes during their pregnancy. Physiological and hormonal changes can make pregnant women more vulnerable to nicotine and other toxicants found in e-cigarette aerosols. However, research on the effects of vaping during pregnancy is extremely limited. This study investigates the extent of e-cigarette usage during pregnancy in a cohort of patients at the University of Alabama at Birmingham (UAB) hospital. Participants were recruited from prenatal clinics to complete a smartphone-based survey on tobacco use. The demographic portion of the survey included questions about race, education level, employment status, and residency. The survey then included detailed questions about primary use and secondary exposure to e-cigarettes. To date, 523 participants have taken our survey. Of the total, 422 answered tobacco-related questions. The average age was 29 years. The cohort was predominantly White (48.1%) and Black (40.6%). Of those surveyed, 20 (4.7%) reported exclusive vaping during pregnancy. Vapers were disproportionately White (60%). Self-reported vapers had a significantly lower level of education compared to participants reporting no tobacco use ($p = 0.0012$). Most vapers reported daily use of disposable e-cigarettes with 1–10 puffs per day. Vapers also reported exclusive use of flavored e-liquids and switching from cigarettes to vaping. The current findings highlight the need for future research into vaping during pregnancy. Ongoing analyses will further clarify the effects of vaping on maternal and perinatal health outcomes.

Lucy Redlich

Discipline: Psychology

Authors:

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Abstract Name: Dreaming Across the Lifespan: A Content Analysis

This study investigates longitudinal changes in dream content across multiple decades to empirically examine how dreams evolve over time. Dream narratives were recorded by the principal investigator (PI) and are randomly selected to be coded by a trained team of researchers. Dream elements were categorized into six core domains: objects, actions, people, emotions, settings, and complexes. Rigorous coding guidelines were implemented to ensure reliability and consistency in analysis. The study utilizes an autoethnographic approach, where the PI serves as both researcher and participant to enhance narrative depth and reflexivity. Statistical analyses will be conducted to examine variations in dream content between different decades of the PI's life. This paper examines whether significant differences exist between 100 dreams recorded during the principal investigator's twenties and 100 dreams recorded during their thirties, and characterizes the nature of these differences. The continuity hypothesis posits that dreams reflect waking life, and this research adds onto that premise by arguing that transformations in life circumstances correspond to shifts in dream patterns (Erdelyi, 2017). This study is currently ongoing, but the findings aim to advance scholarly discourse on dream analysis and contribute to theoretical frameworks for understanding the evolution of dreams over time.

Maelynn Reed

Discipline: Nursing and Public Health

Authors:

#1 David Ramos

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Abstract Name: Warm Hands, Warm Hearts: Emergency Winter Preparedness

Flagstaff's extreme winter climate places unsheltered individuals at high risk for hypothermia, frostbite, and other preventable cold-related illnesses. These risks have disproportionately affected Native Americans and low-income community members, reflecting persistent health inequities in Northern Arizona. Compounding these disparities, limited shelter capacity and rising living expenses reduce access to adequate winter protection, underscoring the need for emergency winter preparedness as a critical public health priority. This project worked closely with Community Assistance Teams of Flagstaff (CATs), which assist unsheltered residents in Flagstaff and help meet their basic needs, including food and clothing. This intervention aimed to reduce cold-weather health risks by implementing a community-based winter preparedness intervention using 3 activities: (1) collected winter clothing donations, (2) assembled winter preparedness kits containing blankets, thermal wear, and hand warmers, and (3) fundraised \$432.23 To evaluate the intervention's impact, participants completed pre- and post-surveys to assess their perceived preparedness, likelihood of using kit items, and their overall sense of winter preparedness. Program effectiveness was measured by tracking the number of items donated, assembled, and distributed across the intervention period. These assessment strategies provided both quantitative and qualitative insights into the intervention's reach and its influence on participants' preparedness. By addressing immediate cold-weather needs and promoting safer behaviors, this project contributed to ongoing efforts to reduce winter-related health disparities in Flagstaff. Surveys showed that 19 individuals were very likely to use kit items, showing a high perceived utility. Fewer than five individuals reported being unsure whether they would use kit items. Surveys also revealed that 42.9% felt prepared for winter, 28.6% felt moderately prepared, and 28.6% felt unprepared. These findings will inform future health initiatives aimed at protecting vulnerable populations during extreme weather conditions.

Karen Regalado

Discipline: Geography/Geology

Authors:

#1 Eleanor Ahdieh

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Nichole Seward

Abstract Name: Qualitative Analysis of Tropical Crop Cultivation in Eastern Thailand Caused By the Effects of COVID-19 and Climate Change

Will the future agricultural landscape return to a pre-pandemic state? If yes, how fast? If not, what will be different? The combined impacts of the COVID-19 pandemic and climate change have reshaped Eastern

Thailand's agricultural industry with dramatic implications. Urbanization, which heavily fuels climate change, is also becoming an increasingly noteworthy threat to farmers in areas near megacities. This study examines the dual impacts of climate change and a pandemic on tropical agriculture, and predicts the extent to which land cover will urbanize by the year 2030. As part of a mixed-methods convergent-parallel approach, the qualitative portion gathered information from stakeholders with acute insight into the factors driving this dramatic transition away from pre-pandemic agricultural practices. These were done through interviews with farmers and key stakeholders in the agricultural sector. Concurrently, these findings were used to inform predictive models for the quantitative portion, which reveal futures of increased urbanization into forests and farmland based on current socioeconomic and environmental trajectories. Many farmers have invested in agricultural technology to adapt to climate change and labor shortages, especially with the increased market price of exported fruits like durian. Water availability has been one of the most prevalent challenges for farmers as floods and droughts increasingly become unpredictable. These findings make a return to the pre-pandemic state unlikely.

Zaira Rehman

Discipline: Biology

Authors:

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Abstract Name: Investigating Arc Expression in the Hippocampus Across the Sleep-Wake Cycle

The Arc gene is rapidly activated during learning and is essential for the structural changes that underlie the consolidation (stabilization) of long-term memories—most notably in the hippocampal region of the brain. Although memory consolidation may occur exclusively during sleep, and Arc is required for consolidation, available data show conflicting evidence as to whether sleep impacts Arc expression. Our goal is to quantify Arc expression in the hippocampus region of the brain in relation to sleep versus wake. We confirmed rat sleep/wake state by using video recording software for the last three hours prior to brain collection. We examined four different time points in the sleep-wake cycle: 3 hours/8 hours into the wake period and 3 hours/8 hours into the sleep period. We performed immunohistochemistry to visualize Arc positive cells in the hippocampus. The hippocampal area was measured using ImageJ software, cells were manually counted using microscopy, tissue thickness was calculated using confocal microscopy, and these values were used to calculate cell density. Video recordings confirmed that rats were predominantly sleeping during the light period and awake during the dark periods. Preliminary data were analyzed using a one-way ANOVA, which revealed that there was no statistical significance in cell density between the four sleep/wake timepoints ($F(3, 38) = 0.8256$, $p = 0.4880$). Nominal differences show that Arc-positive cell density is higher during wake. The data provides important insight into the molecular mechanisms underlying sleep-mediated memory formation and begins to reconcile the conflicting findings on Arc expression during wake and sleep. Future studies should incorporate a behavioral component in order to examine Arc expression during post-learning sleep; potentially providing greater insight in the temporal dynamics of Arc expression during memory consolidation.

Cassandra Reichert

Discipline: Film/Photography Studies

Authors:

Abstract Name: Body Horror, Cronenberg, and Society

Body horror is an incredibly influential subgenre within the horror film space. This cinematic subgenre is defined by its depiction of unnatural and grotesque transformations of the human body. Body horror films are filled with fascinating and meaningful explorations of how humans relate to society, to one another, and to their bodies. David Cronenberg is arguably the most influential director to work within this subgenre. Cronenberg has directed 23 feature films, including *The Brood* (1979), *Videodrome* (1983), *The Fly* (1986), *Dead Ringers* (1987), *Crash* (1996), and *Crimes of the Future* (2022). With my research, I seek to answer the question of what Cronenberg's work, and body horror cinema in general, can tell us about the things we fear happening to our bodies, and what that says about society at large. My methodology involves reading books, interviews, and articles about his work, as well as watching his entire filmography. I am also watching other body horror films released across multiple decades and around the world as a point of comparison. In my research, I utilize an auteurist perspective to explore recurring characters, themes, and cinematic markers in Cronenberg's work. Specifically, I focus on Cronenberg's frequent depiction of scientists, physical transformations, technological overreach, and fluid sexualities. These elements combine to create a deeply impactful psychological experience for the audience. I conclude that by utilizing imagery that other subgenres, including those in the horror space, avoid, body horror films are uniquely able to reflect societal anxieties over our relationships with ourselves, technology, and our obsessive desire to constantly change our bodies and minds.

Ramirrah Reid

Discipline: Biology

Authors:

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Abstract Name: Genomic Characterization of a Novel *Pseudophaeobacter* Strain Isolated From Antarctic Ice Cores

We present the first novel strain of *Pseudophaeobacter* cultured from the Antarctic region and highlight differences between strains found in the U.S., China, and Western Europe. Isolates were cultured from long-term enrichment using seawater ice cores from the McMurdo Sound station. Specifically, two samples were enriched to culture bacterial isolates that can degrade complex sugars as part of their metabolic process. The samples underwent serial dilutions, plating, and streaking to obtain a pure culture. Taxonomic classification based on 16S rRNA gene comparison and phylogenomics identified the isolate as *Pseudophaeobacter* sp. Growth rate analysis indicates that both isolates were unable to utilize the algal polysaccharides and relied on public goods produced by other microbes in the communities. Genomic DNA was obtained, sequenced using a shotgun approach, and analyzed using an established HU genome assembly pipeline (FASTQC, Trimmomatic, SPAdes, QUAST, and PROKKA). A total of 4,275 protein-coding genes and 54 tRNAs were predicted for the 01NG25A isolate, while 4,376 protein-coding genes and 54 tRNAs were predicted for the 01RR25 isolate. Compared to reference genomes, both isolates clustered together, and singleton genes were associated with responses to cold (thermal shock, protein misfolding, and transmembrane proteins) and oxidative stress (nucleic acid protection, modulators of detoxification, and integrity of chaperone proteins). Phylogenomics using 95 unique single-copy core genes placed the isolates closest to *Pseudophaeobacter arcticus* with an ANI of 89–92% across the full genome. Additionally, the ANI of the aligned regions exhibited >98% identity. These results suggest that the isolates are novel strains within the genus *Pseudophaeobacter arcticus*, cultured from opposite poles (Arctic and Antarctic).

Ethan Reisler

Discipline: English and Literature

Authors:

Abstract Name: The Analysis of Video Games as Text: How The Elder Scrolls III: Morrowind Uses Focalization Under a Structuralist and Meta-narrative Analysis.

How are structuralist elements of narrative recontextualized and a player-driven meta-narrative revealed under the interactivity of a video game like Morrowind? This project draws upon structuralist and meta-narrative literary theories to analyze the video game, The Elder Scrolls III: Morrowind, exploring how critical literary theories unravel the non-traditional medium of video game storytelling and how players' interactive role enhances narrative elements. Previous research has investigated video games as literature, role-playing opportunities in interactive storytelling, and the general application of literary theory in critical analysis. This project addresses the gap in existing research by exploring how literary analysis explains gameplay mechanics—like role-playing choices—that redefine narrative elements and expand the literary storytelling in and beyond video games. In Morrowind, players control the supposed reincarnation of a religious figure in a medieval fantasy. Players navigate political tensions and different interpretations of religious history through

characters' differing perspectives, dictating their own truth through role-playing choices. Using structuralist and meta-narrative criticisms, the research explores interactivity as narrativity, unreliable narration through focalization points and rhetorical relative truths, and communal discussion of canonicity in subjective truths. Structuralist findings indicate that traditional storytelling elements are recontextualized and overlapped due to interactivity implicit in video games, thereby redefining how audiences engage with progression/digression, identity-making, and narration; as all narration takes place in-text, objectivity is obscured through focalized, subjective, lived truths. Meta-narrative findings indicate that players use a combination of in-text lived truths, role-playing choices, and gameplay systems—like character creation—to develop their own lived truth, replicating the discourse of canonicity, first seen in-game, with other players in the real world to establish an objective truth. These conclusions contribute to ongoing applications of literary theory in the critical analysis of video games and how non-traditional storytelling mediums subvert narrative elements due to audience interaction.

Irini Remboulis

Discipline: Art History

Authors:

Abstract Name: Tradition Reconsidered: Fikos and Contemporary Byzantine Painting

When considering Byzantine art, it's tempting to associate it with the past, but doing so obscures its vibrant relevance today. Artists around the world still draw from its techniques, most notably the Greek artist Fikos Antonios (b. 1987), who coined the term Contemporary Byzantine. This research examines how Fikos sustains and reimagines the Byzantine visual tradition within a contemporary cultural context. Though often viewed as a relic of the past, tied to sacred subjects, this study argues that Byzantine art's visual system, rooted in rhythm, line, and color relationships, remains active and adaptable within Contemporary Byzantine art. Through a visual analysis of his mural *Peace* (2024), located along the UN buffer zone in Nicosia, Cyprus, this study demonstrates how Fikos revives Byzantine structures while expanding their role beyond ecclesiastical spaces. Integrating stylistic analysis with cultural studies and postcolonial theory, this paper examines *Peace* within its socio-historical context. The mural's composition, relational perspective, and chromatic rhythm sustain the internal logic of Byzantine image-making, yet its public placement and explicitly political subject recast this visual language as a vehicle for collective memory and cultural resilience in a post-occupation landscape. The writings of Photis Kontoglou and George Kordis help establish a coherent formal lineage, while Homi K. Bhabha's *The Location of Culture* (1994) and Edward Said's *Culture and Imperialism* (1993) situate the work and Contemporary Byzantine art within wider discourses of identity, hybridity, and cultural continuity. Through this discussion, I demonstrate how Byzantine art operates as a "living tradition," negotiating between preservation and innovation, sacred inheritance and modern identity. By bridging stylistic analysis with cultural and postcolonial theory, this study contributes to the emerging scholarship on Contemporary Byzantine art and reconsiders how historical visual languages endure, transform, and communicate in today's globalized public space.

Karl Rennick-Zuefle

Discipline: Biology

Authors:

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Abstract Name: Shift Work History Moderates Relationships Between Measures of Sleep Health and Blood-Based Synuclein Biomarkers

Introduction: Night shift work is associated with poor sleep both during work exposure and in retirement. Both poor sleep and night shift work are also associated with dementia. Characterizing the health risks of shift work is key to forming health recommendations surrounding this growing line of employment. Few studies examine multidimensional, habitual sleep patterns in individuals previously exposed to shift work. Newly identified biomarkers of neurodegeneration offer opportunities to identify disease processes before they manifest clinically. This study examined relationships between sleep health and neurodegenerative biomarkers in retired day workers (RDW) and retired night shift workers (RNSW). Methods: Participants (mean age=67.7) were 33 RDW and 25 RNSW. Multidimensional sleep health (MDSH) was quantified using actigraphy-derived sleep efficiency, timing, duration, and regularity, a diary measure of sleep satisfaction, and an Epworth Sleepiness Scale (ESS) score to measure daytime alertness. A panel of neurodegenerative biomarkers were quantified by Nucleic Acid Linked Immuno-Sandwich Assay (NULISA). Principal component analysis of biomarkers revealed 8 components including degenerative and protective characteristics for various neurodegenerative patterns. Interaction models tested associations of MDSH with these biomarker components in RDW and RNSW. Results: Shift work history moderates the relationship between sleep timing and protective synuclein biomarkers, with later-sleeping RNSW exhibiting higher protective synuclein biomarker levels (interaction coefficient=0.037, FDR-corrected $p=0.028$). Shift work history also moderates a quadratic relationship between sleep duration and biomarkers of synuclein-related degeneration, with RNSW exhibiting lower degenerative synuclein biomarker levels at short and long sleep durations (interaction coefficient=-0.00041, FDR-corrected $p=0.049$). Conclusion: At extreme values of sleep duration and late sleep timing, RNSW are better protected against synaptic and synuclein dysfunction than RDW. RNSW are more likely to have abnormal sleep patterns during their working years, which may have allowed for greater resilience to late sleep timing and extreme sleep duration in retirement.

Rose Reohr

Discipline: Engineering

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#1 Sydney Regehly
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Abstract Name: Characterizing the Heterogenous Mechanical Properties of the Patellar Tendon

Ligaments and tendons are composed of two distinct heterogenous materials: fascicles and the interfascicular matrix (IFM). These connective tissues are viewed as a single transversely isotropic material to make computations easier. However, recent work suggests that separating these two materials is necessary to model tissue failure. While previous research has explored fascicular mechanical properties, IFM mechanical properties have not yet been characterized. The goal of this study is to characterize the mechanical properties of the IFM and fascicles using heterogeneous patellar tendon samples. 24–36 hours post mortem, a sheep patellar tendon was resected. After dissection, 3 mm samples were obtained, dyed to differentiate fascicular vs IFM regions, speckled with white and black paint from a 25 psi airbrush, and pulled at 1%/s using an universal mechanical testing system. Images were acquired at 1 Hz for digital image correlation (DIC).

Through DIC analysis, the displacement and strains of the samples were obtained. This study found that strain hotspots occur in the IFM, with failure often initiating in the IFM. These findings demonstrate that failure occurs locally within a patellar tendon sample, improving the ability to model failure of whole ligament and tendon specimens.

Reese Resheske

Discipline: Chemistry

Authors:

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Abstract Name: Polymer-modified Copper Based Catalysts for the Conversion of Carbon Dioxide

Carbon Dioxide (CO₂) is abundant in our atmosphere, and its conversion to value-added chemicals using renewable electricity is an active area of investigation. Previous research has shown that copper-based catalysts can produce a wide range of valuable chemicals and fuels such as methane through the electrochemical reduction of CO₂. Recently, we have demonstrated the synthesis of an organic polymer called polypyrrole (pPy) and its use to support the primary copper catalyst for this conversion. These polymers are an intriguing topic of research because they are plastic-like materials that, but unlike most plastics, conduct electricity and can be modified to have different functional properties through traditional organic synthesis. These nitrogen-containing polymers are hypothesized to have a co-catalytic effect that enhances CO₂ conversion due to the coordination chemistry between the nitrogen atoms and the CO₂ substrate, which help stabilize the reaction intermediates. Herein, we report our findings on the electro-deposition of pPy films of varying thickness (100 nm – several microns) on sputter coated copper substrates and their use as catalysts for the conversion of CO₂ using a flow-type cell at neutral pH. Catalysts are characterized by using various tools such as X-ray diffraction (XRD) and scanning electron microscopy (SEM) to understand changes to their crystal structure and morphology. We also use X-ray photo electron spectroscopy (XPS) to understand changes in the chemical makeup of the surface before and after electrocatalytic testing. Finally, we will present preliminary findings on the synthesis of co-polymers containing various nitrogen containing chemical moieties that promise to demonstrate enhanced catalytic activity.

Maxim Reyderman

Discipline: Criminology/Criminal Justice

Authors:

Abstract Name: Enhancing Digital Forensic Investigations: A Study on the Accuracy of Magnet.AI

Magnet.AI is a feature of Magnet Axiom's digital forensics platform that automatically classifies digital evidence based on user-specified criteria. While designed for efficiency, questions remain about its accuracy and reliability under real-world conditions. Located under the AXIOM Process "Processing Details" section, two options for Magnet.AI analysis are available: "Analyze pictures with Magnet.AI" and "Analyze chats with Magnet.AI." Multiple criteria exist for each, such as "Animals" and "Human Faces" for pictures, and "Grooming/luring" for chats. This study aims to evaluate Magnet.AI's performance through two photo criteria, "weapons" and "drugs", and test five key metrics: False Positive Rate, False Negative Rate,

Precision, Recall, and Accuracy Rate. A controlled dataset of 60 verified images of weapons and drugs, as well as 1500 out-of-criteria photo files, will be analyzed to measure these metrics. Each file will be reviewed for content, format, and type. The data will be processed through AXIOM Process and reviewed in AXIOM Examine. Results will be documented in an Excel spreadsheet, where analysis will be performed. By validating Magnet.AI's functionality for identifying the "weapons" and "drugs" categories, this study aims to determine whether the feature provides dependable support for digital forensics examiners or if its inconsistencies risk compromising evidentiary integrity.

Jacky Reyes

Discipline: Architecture, Construction Management, and Interior Design

Authors:

Abstract Name: Designing a Modern Church to Contribute to the Community and Create a Welcoming Environment

Churches often carry a negative reputation shaped by past experiences, such as feelings of rejection, unwelcoming interactions, or environments that appear intimidating due to their design or layout. The core message of Jesus Christ is love and welcome for all, and churches that genuinely embody this by being open to people of any background can greatly reduce these negative perceptions. In response to these challenges, this project aims to design a modern church with community-centered spaces that reshape how people perceive churches. Data was gathered through in-person group interviews with young adult members of a local church in Oklahoma City to explore their experiences and their needs and preferences in a church setting. The proposed church emphasizes community service by offering public spaces accessible throughout the week to provide comfort, connection, and support for real needs identified through local research, including rising poverty rates, lower test scores, and increasing technology-related anxiety among Gen Alpha. To address these needs, the design includes a donation center, children's playground, student study area, and gym/basketball court, along with a welcoming lobby, a 600-seat worship room, and a large café and event space. These areas incorporate natural light and connections to the outdoors to support well-being, while promoting a culturally diverse and welcoming environment. These thoughtful, community-focused design features help transform the church environment, removing barriers and creating a home-like place where everyone feels welcomed and supported.

Valeria Reyes

Discipline: Gender, Ethnicity, Diversity, or Cultural Studies

Authors:

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Samanta Cornejo

Abstract Name: Queering Liberatory Movements: Willful Cross-Solidarity Action in the Face of Fascism and Domination

This research study examines the activist organizing that communities of color, queer and transgender communities, and disabled communities are engaged in to resist the impact of fascism in our current political moment. Our team focuses on how the survival tactics, ancestral knowledge, and cross-solidarity commitment of organizers counter fascism's hate, divisiveness, and domination. We argue that the only way

to create sustainable change is to create beloved communities rooted in what Black feminist bell hooks names a “love ethic.” “Beloved community is formed not by the eradication of difference but by its affirmation, by each of us claiming the identities and cultural legacies that shape who we are and how we live in the world.” We know that fascism’s foundation is built on hate and that it is a porous and exploitable system. Through an intersectional and interdependent network of cross-solidarity movement organizers, we center the work that is currently being done in Southern California to dismantle and deter fascism nationwide. What does our future hold if our movements refuse to leave anyone behind?

Mckensi Rice

Discipline: Psychology

Authors:

Abstract Name: Beauty Standards in Social Media: Differential Impacts on Young Women's Self-Perception

Instagram and TikTok are where most young women see beauty standards every day. While these apps let people be creative and connect with others, they also show heavily edited and perfect-looking images that can change how young women feel about themselves. Recent research shows that even "body positive" videos on TikTok usually feature thin, white women (Harriger et al., 2023), and beauty filters make people look lighter-skinned and more European (Riccio et al., 2024). But most studies look at "social media" as one thing and mostly study white women, so we're missing important differences between apps and between different racial and ethnic groups. This paper reviews existing research on how Instagram and TikTok affect self-perception in young women from different backgrounds. Using social comparison theory, objectification theory, and recent studies (Bonfanti et al., 2025), I found four major gaps in what we know: (1) no studies directly compare Instagram and TikTok even though they work differently—Instagram shows perfect still photos while TikTok has constantly changing beauty trends, (2) most research focuses on white women and doesn't look closely at Asian, Latina, Black, and Native American women separately, (3) research focuses on negative effects and rarely studies what protects women from harm, like strong connection to their cultural identity, and (4) most studies collect data at just one moment rather than following the same women over time, so we cannot prove social media actually causes these problems versus just being connected to them. Based on these gaps, I propose a new framework showing how different apps and different cultures combine to affect young women differently. This framework suggests that strong ethnic identity helps protect women of color and can guide better, culture-specific ways to help young women stay healthy online.

Natalie Richards

Discipline: Biology

Authors:

#1 Callehan Lamarche

#2 Emma Campbell

#3 Jaime Blair

Abstract Name: Genetic and Phenotypic Diversity of Novel Oomycete Species Isolated from Freshwater Streams in Lancaster County, PA

Oomycetes are fungal-like microbial eukaryotes that are ubiquitous in nature. The group contains many well known plant pathogens that can cause significant damage in agricultural systems; for example, *Phytophthora infestans*, the causal agent of potato late blight, is infamous for driving the 19th century Irish potato famine.

Less is known about the diversity of aquatic oomycetes and their ecological role as potential pathogens. Some oomycete genera, including *Saprolegnia*, *Aphanomyces*, and *Pythium*, contain aquatic species that are known to infect invertebrate and vertebrate animals, including mammals, even when closely related species are soilborne plant pathogens or saprotrophs. In this study, we describe several novel aquatic lineages that have been isolated by our laboratory through repeated stream sampling in Lancaster County, Pennsylvania. Four of these lineages likely represent new species, and two others are possible hybrid lineages of unknown origin. Genetic diversity was assessed through phylogenetic analysis of both nuclear (ITS, Beta-Tubulin) and mitochondrial (COI, COII, rps10) loci. Phenotypic traits such as growth pattern and rate on multiple agar substrates, as well as optimal growth temperature, were measured for a subset of isolates from each novel lineage. Some isolates from two of the potential new species showed high thermotolerance up to 40°C, suggesting the evolutionary potential for mammalian pathogenesis. The basis for high thermotolerance in these novel species is unclear; the temperatures survived by isolates far exceeds that of the waterways they were collected from. Interestingly, there was no genetic variation among isolates that differed in their thermotolerance. Next we will examine differences in expression levels for several genes, including heat shock proteins and potential virulence factors, among isolates grown at different temperatures. These results will contribute to our broader understanding of the biology of emerging pathogens, and emphasize the importance of routine biodiversity surveys in our local waterways.

Eli Richardson

Discipline: History

Authors:

Abstract Name: The Imperialists of the Peloponnesian War

The Sicilian Expedition is known as the foremost strategic failure that led to Athens' downfall in the Peloponnesian War. While this undoubtedly played a role in the fall of Athens, it is not the sole perpetrator. A revisiting of the Persian Empire, the Delian League, and the Peloponnesian League can show how their political, cultural, and social norms affected the outcome of the Peloponnesian War. By the 6th century BCE, the Persian Empire had conquered an immense amount of land, spanning multiple cultural, national, and ethnic groups across the Middle East. During their rise, Sparta began to accrue several allies through a series of oligarchy-based treaties known as the Peloponnesian League. Athens, fresh off the victory against the great Persian Empire, formed a fresh democracy under the Delian League in 479. These governing systems may not seem comparable at first, but when one takes a step back to view their political patterns, they can realize the similarity between the three. By the end of the Peloponnesian War, however, both Sparta and Athens had lost immense amounts of resources. With Athens on the ropes, Sparta neck deep in corruption, and Persia scheming in between, these three figure heads of the late 5th century BCE would collide in a chaotic race for power. Through a dive into the cultural and political natures of Athens, Sparta, and Persia, this essay will add to the academic discussion of the Peloponnesian War by discussing how Sparta, Athens, and Persia, while under the guise of different governments, are all imperialistic in nature. Although they have different means, their end goals are the same; conquer.

Kylie Richardson

Discipline: Biology

Authors:

#1 Kimberly Dobrinski

Abstract Name: RRBS Profiling for Identification of Obesity-Induced Liver Methylation Changes of Metabolic Regulation in *Danio rerio*

DNA methylation is an epigenetic modification that plays a crucial role in regulating gene expression and maintaining genomic stability. Cytosine residues at CpG sites are primary targets of methylation, and aberrant patterns at these loci have been closely linked to obesity and subsequent metabolic dysfunction in humans. The model organism, *Danio rerio* (zebrafish), was used to evaluate obesity-associated alteration of liver methylation patterns. To analyze discrepancies between control and obese zebrafish, reduced representation bisulfite sequencing (RRBS) was performed. Raw sequences were trimmed through Trim Galore, aligned to the zebrafish reference genome using Bismark. SeqMonk and methylKit in R software analyzed the sequences in preparation for the differential methylation analysis performed by Gene Ontology (GO) to characterize the functional impact of the methylation alterations. Initial findings indicate that obesity induces methylation alterations in pathways central to metabolic homeostasis. Methylation changes were found to impact genes involved in lipid metabolism, inflammatory signaling, and glucose regulation. These results suggest that obesity-driven epigenetic modifications may predispose individuals to comorbidities such as NAFLD, type II diabetes mellitus, and hypertension. This study builds a foundation for future work that integrates methylation and gene expression analyses for obesity epigenetics and advances understanding of the molecular pathways that link obesity with chronic metabolic disease.

Kaden Richardson

Discipline: Education

Authors:

Abstract Name: Stephen King's *The Long Walk* for the 10th Grade Classroom

Authors are inspired by past and current fears of society, using their craft to expose the latent fears of humanity. Dystopian fiction is the manifestation of these fears, pulling hypotheticals based in reality to craft worlds held in the iron grip of a malevolent power. Stephen King's *The Long Walk* explores the grotesque union of game-show motifs and slaughter as characters compete for a grand prize, and the losers are murdered. Scholars have discussed the potential for studying King and dystopian novels in the classroom, yet school districts often overlook dystopian novels in their approved literature. This project seeks to fill the gap in high school literature curriculum by formulating a unit plan for teaching *The Long Walk* for the 10th-grade English language arts classroom. Students will be responsible for researching the context *The Long Walk* was written to explore how the dystopian fiction genre reflects reality. Students will also research banned books to question why many of King's novels are banned, and consider the validity of censorship in public schools. Following the Maryland College and Career Ready Standards, engaging project-based lessons and activities have been designed to challenge students with a thorough study of society and literature. Students will be proficient in research and close reading, using these skills to reflect on history, dystopian literature, and politics, to grow as academics.

Zoe Richardson

Discipline: Philosophy, Ethics, and Religious Studies

Authors:

#1 Rebecca Leiby

Abstract Name: *For the Love of Fate: Observing the Possibilities of Friedrich Nietzsche's Concept of Amor*

Fati as a Tool for Collective National Memory

Amor fati is a concept associated with philosopher Friedrich Nietzsche that embraces the active loving of one's fate, including all the hardships endured—as without them, one would not be as they are. While this concept is often discussed at the individual level, the core idea is that this collection version of amor fati can be a guiding principle for reconciliation and progress after mass violence, as it focuses on transforming guilt into action and acknowledgement into improvement. Using an upside-triangle method starting with the individual level, I move upward describing what the uptake of collective amor fati would look like at a small collective, proximal community, population community and identity-based collective level along with the three conditions necessary for amor fati to be established. I also describe markers of successful adoption of amor fati as well as address common political problems that arise when working with larger communities. For my main example, I use Germany's post-Holocaust national memory to explain how collective amor fati might be conceptualized, and more broadly propose some of the related lessons that other post-atrocity states can draw from it. I am providing my own theory of collective amor fati, offering a realistic glimpse of what application to different population levels looks like and what successful outcomes might be. Applying amor fati to the collective sphere can change how history is seen and valued, without leading to the evasion of responsibility. It also serves to alter a nation's relationship with their past for the better while actively envisioning the construction of a healthier and hopeful future. Collective amor fati aims to benefit entire populations and serves as a realistic option for those who are dedicated to self betterment and supporting collective flourishing.

Elizabeth Richardson

Discipline: English and Literature

Authors:

#1 Elizabeth Richardson

Abstract Name: Sexual Liberation and Exploration through Erotica or “Smut”: The Importance of Subversive Literature in a Suppressive America

In a country that censors and suppresses information that it deems inappropriate or obscene, sexual education often receives the fate of ignorance or shame. This is especially seen in women's health and knowledge surrounding sex and their bodies. However, the rise of erotic novels or more colloquially known, “smut” allows women to freely read and inform themselves of sex and intimacy. From one of the first erotic novels *Fanny Hill: Memoirs of a Women of Pleasure* by John Cleland to *Fear of Flying* by Erica Jong, and every romance novel in between, the theme of erotica as liberation for women has been a constant trend. Even as shame trickles back in for many female readers, the desire to know more about sex, pleasure, and relationships lead women back to the romance section. This paper examines the role of erotica in literature and its significance to women, especially considering the largely female audience of romance novels containing erotica. The research methodology used in this research paper is textual analysis and scholarship surrounding the ideas represented in the novels. Through close-reading analysis of *Fanny Hill* and *Fear of Flying*, and the theories regarding female eroticism offered by literary theorist Susan Rubin Suleiman in her novel *Subversive Intent: Gender, Politics, and the Avant-Garde*, this research paper will analyze the importance of erotica and smut in sexual exploration and liberation in a suppressive society.

Alexis Ricketts

Discipline: Gender, Ethnicity, Diversity, or Cultural Studies

Authors:

Abstract Name: Visual Rhetorics of Black Power: Hair, Gender, and Ideology in 1970s Blaxploitation Cinema

“You’re a disgrace to everything the Black fists stand for.” – Cleopatra Jones (1973) For Black Americans, hair has never been just a style; it’s a statement, a symbol, and a battleground. The 1970s Blaxploitation era sharpened this tension: afros defied Eurocentric beauty standards as crowns of Black Power, while wigs and straightened hair became survival tools in a white-dominated industry. Films like *Shaft* (1971) and *Coffy* (1973) weaponized these choices, turning hairstyles into cinematic code for power, rebellion, and assimilation. This project decodes how the decade’s 10 highest-grossing Blaxploitation films used hair as visual rhetoric. Through close analysis of *Super Fly* (1972), *Cleopatra Jones* (1973), and others, I reveal: Afros radicalized protagonists (e.g., Foxy Brown’s halo-like ‘fro), while straightened styles villainized antagonists (e.g., *Super Fly*’s Priest’s conk). Gender split the symbolism: Women’s hair balanced respectability politics (straightened bobs) with tactical subversion (wigs as disguise), while men’s styles pit bald individualism (Truck Turner) against Afro solidarity (crowd scenes). Screen time hierarchy: Leads’ evolving hairstyles marked agency (*Coffy*’s wig-to-Afro arc), while background characters’ static Afros echoed collective struggle. Drawing on critical race theory and film semiotics, I argue that Blaxploitation’s hair politics reinforced and disrupted Hollywood’s racial narratives. The afro wasn’t just a style, it was a frame-by-frame revolution.

Cassandra Riehle

Discipline: Economics

Authors:
Yifan Sha

Abstract Name: Nutrition incentive program participation trends and economic contributions of a SNAP farmers market match program

Food insecurity and limited access to fruit and vegetables (FV) remain significant challenges for many low-income households. Although the Supplemental Nutrition Assistance Program (SNAP) improves food access, cost barriers continue to limit FV consumption, and SNAP households shop at farmers’ markets at lower rates than higher-income shoppers. The Eau Claire Downtown Farmers Market operates a nutrition incentive program, Market Match, that provides additional dollars for FV purchases for SNAP households. We analyzed eight years of linked administrative data (2018–2025) to describe long-term participation patterns and the economic contributions of Market Match to the local food system. The dataset includes 2,457 unique households, enabling the assessment of multi-year engagement both before and after the COVID-19 pandemic. Annual participation, seasonal return patterns, and vendor-level SNAP redemption data were analyzed using descriptive statistics and year-over-year comparisons to estimate economic impacts. More than one-third of participating households returned for multiple years, and over 100 households used the program for at least three seasons, indicating sustained interest and consistent program utilization. In 2025, SNAP shoppers spent \$29,082 at the market, supporting a range of small-scale producers. Using a conservative farmers-market economic multiplier of 1.6, this spending likely generated more than \$46,500 in total local economic activity. These findings highlight the essential role of nutrition incentives in increasing farmers’ market access for low-income shoppers while also strengthening Wisconsin’s local food economy. By documenting multi-year participation trends and economic outcomes, this case study evaluation provides evidence to inform the design of a statewide nutrition incentive model that can improve both food security and agricultural viability.

Matthew Riggs

Discipline: Engineering

Authors:

#1 Khowshik Dey

#2 Murat Barisik

Abstract Name: Molecular Dynamics Study of Electrothermal Response of Classical Water Models Under an Electric Field

Understanding water's electrical and thermal response under an electric field is crucial for advancing technologies in energy storage, desalination, and electrochemical systems. This study investigates the electro-thermal behavior of non-polarizable water models subjected to varying strong electric field conditions. Although polarizable water models exist, non-polarizable water models remain widely used due to lower computational cost. However, their accuracy under strong electric fields is less understood. Molecular dynamics simulations were performed using 3-site and 4-site water models: TIP4P, TIP4P/2005, TIP4P/ε, TIP4P/XAIE, and SPC/E. The water models were simulated at 298 K with an electric field ranging from 0.0 to 0.3 volts per angstrom (V/Å). Dielectric constant was calculated and compared to experimental data and to the theoretical Kirkwood-Booth equation for dielectric constants at high electric fields. Thermal conductivity and self-diffusion coefficient were calculated and compared with experimental values to assess the accuracy of all five models. Results show that the dielectric constant is modeled more accurately with TIP4P/XAIE and TIP4P/ε, although they are more computationally intensive than TIP4P/2005, which offers lower accuracy. TIP4P/XAIE is the better choice and aligns the closest to the theoretical Kirkwood-Booth equation. Thermal conductivity is best represented with TIP4P; however, all non-polarizable water models yield thermal conductivity values with errors of up to 50 percent. The self-diffusion coefficient is captured accurately with TIP4P/XAIE and TIP4P/ε while TIP4P/2005 provides a less computationally intensive alternative. This demonstrates that while non-polarizable water models capture the dielectric constant and self-diffusion coefficient correctly, non-polarizable models tend to overestimate thermal conductivity, causing significant deviations from experimental observations. These findings advance understanding of the appropriate use of water models and water's electro-thermal behavior that can guide the selection of water models for large-scale simulations, supporting the design of next-generation batteries, capacitors, and water purification devices.

Isabella Riggs

Discipline: Engineering

Authors:

#1 Murat Barisik

#2 Ege Ek

Abstract Name: Direct Simulation Monte Carlo Analysis of Rarefaction Effects during Chemical Vapor Infiltration

Nuclear reactors, automotive engineering, aerospace, and industrial furnaces are applications that require materials that can withstand extreme thermal and chemical environments. This is because the material must maintain structural integrity and performance while resisting degradation. Silicon Carbide (SiC) has these properties, but the low fracture toughness limits its usage. This has led to the development of high-purity, fiber-reinforced SiC matrix composites produced by Chemical Vapor Infiltration (CVI). This study examines the impact of rarefaction, a decrease in gas density, on the deposition rate of SiC. Understanding this relationship is crucial. Rarefaction influences the behavior of particles during the deposition process, impacting the velocity, temperature, deposition rate, and coating quality. CVI works effectively in a rarefied

regime because the lower pressure used allows for better control of the gas flow and reaction rates. To analyze CVI's deposition rate, simulations were performed in Direct Simulation Monte Carlo (DSMC). The simulations were conducted for a range of Knudsen numbers -the ratio of mean free path to a characteristic length- (0.1 to 10), and the continuum model that is based on the Navier-Stokes equations start to break down. Traditional computational fluid dynamics (CFD) software cannot capture the non-equilibrium caused by rarefaction, while DSMC can. DSMC is a stochastic particle-based numerical method used to simulate gas flow at the molecular level in non-equilibrium gas dynamics based on the Boltzmann equation, which can accurately capture the effects on rarefied flow on deposition rate. Simulations were done under Isothermal Forced Flow (IF-CVI) as traditional CVI has long processing times. Preliminary results show that as the Knudsen number increases, the deposition rate decreases along the channel length. These findings demonstrate the influence of rarefaction on the surface reactions that occur on the channel surface, which provides valuable insight to optimize the CVI process and coating efficiency.

Luke Riggs

Discipline: Engineering

Authors:

#1 Murat Barisik

#2 Reetesh Ranjan

Abstract Name: Numerical Investigation of Silicon Carbide Deposition Kinetics under Varying Process Conditions in a Plug Flow Reactor

Many of today's engineering applications—such as nuclear reactors, automotive systems, and furnaces—require materials that can withstand high-temperature environments. Silicon Carbide (SiC) is one such material with an excellent array of properties like high strength, thermal stability, and chemical resistance. However, it has a relatively low toughness, which is the motivating factor in the interest of high purity and high-quality fiber-reinforced matrix composites. This study investigates the effects of varying the operating conditions on the heterogeneous surface chemistry, the amount of SiC deposited, and the production of intermediate species. Understanding the effects of operating conditions is pivotal to optimizing the deposition of SiC, which enables optimized manufacturing and broader accessibility of advanced materials. To address these challenges, complex chemical kinetics involving SiC deposition were modeled using the open-source software Cantera integrated with Python. The simulations employed a validated chemical mechanism file sourced from published literature and experimental data. A Plug Flow Reactor model was selected to efficiently capture both rapid gas-phase and heterogeneous surface reactions while minimizing computational costs compared to full Computational Fluid Dynamics or Direct Simulation Monte Carlo methods. This framework enables extensive parametric sweeps to systematically investigate how operating conditions influence SiC deposition. Results have shown that the deposition of SiC increases significantly with an increase in reactor temperature and residence time, while increasing then plateauing with an increase of the reactor pressure. The intermediates produced during the deposition reactions of SiC such as hydrogen chloride, methane, and other silicon bearing compounds also follow this pattern. Tracking these species is important as for they directly impact the deposition and quality of SiC. These results are important for advancing the materials used in today's engineering applications.

Maëlle Rihouey

Discipline: Gender, Ethnicity, Diversity, or Cultural Studies

Authors:

#1 Khalil Dokhanchi

Abstract Name: Secularism and French minority women: how women's exclusion from sports affects French people's perception of a minority?

This project examines how secularism in France shapes the experiences of minority women in sports and how their exclusion from athletic spaces affects broader social attitudes. The central research question asks: Secularism and French minority women: how women's exclusion from sports affects French people's perception of a minority? This study builds on existing scholarship on secularism, gender norms, and social integration in France, highlighting how minority women's visibility, or lack of, has become a key point of cultural and political debate. Using a mixed-methods approach, the project includes a review of current literature on *laïcité* (secularism), gender, and sport, as well as an analysis of previous surveys and reports on minority women's participation and public perceptions surrounding them. The research focuses on four interconnected themes: absence from mainstream sports culture, gender-specific discrimination, nationalist stereotypes, and religious stereotypes. Early observations suggest that exclusion from sports restricts opportunities for minority women while reinforcing misconceptions and biases among the wider French population. These patterns not only shape broader public discussion but also inform policies and practices that further marginalize these communities. The anticipated outcomes will help illustrate how expanding access to sports may counter dominant stereotypes, strengthen social cohesion, and promote more equitable opportunities. Overall, this project aims to contribute to ongoing conversations about gender, religion, and belonging in contemporary France by demonstrating how apparently small barriers in sports participation reflect much larger social dynamics.

Jollie Riley

Discipline: Art History

Authors:

Abstract Name: Ferdinand Hodler versus Symbolism: Fairies, Muses, and Femme Fatales

Nineteenth-century Symbolist artists frequently portrayed women through restrictive archetypes, such as the Bathing Venus, the pious maiden, or the seductive femme fatale, to reinforce contemporary beliefs that moral decline was embodied in the female figure. This paper examines how Swiss Symbolist painter Ferdinand Hodler diverged from these dominant conventions and constructed an alternative visual language for representing women. Through close visual analysis of two major works, *Day* (1899–1900) and *Truth II* (1903), this study demonstrates that Hodler rejected traditional tropes in favor of depicting women as active agents and symbols of spiritual, social, and moral progression. In *Day*, Hodler's figures do not invite a voyeuristic gaze; instead, they occupy their environment with autonomy, refusing the passive associations typically assigned to femininity. In *Truth II*, the female nude becomes an emblem of clarity, vitality, and liberation rather than an object of male desire. This research further argues that Hodler's geographic and philosophical distance from Parisian Symbolism shaped his distinct approach. While French Symbolists pursued metaphysical ideals, Hodler's self-developed doctrine of Parallelism sought universal truth grounded in the physical world, leading him to formulate imagery unburdened by the gendered narratives of his contemporaries. Ultimately, this study positions Hodler's work as a compelling countercurrent within Symbolist art, illustrating that mainstream artistic thought does not inherently represent the most insightful or progressive perspectives.

Yudieth Rios

Discipline: Psychology

Authors:

Abstract Name: Existential Meaning, Resilience, and Psychological Well-being in University Students

Psychological well-being is a multidimensional construct encompassing autonomy, personal growth, and a sense of purpose in life. It is increasingly challenged among college students through constant academic pressures that create significant stress and anxiety. National data show high rates of psychological distress, loneliness, and diminished resilience in this population, often linked to not only high academic demands but also struggles with meaning-making. The literature revealed that existential meaning (i.e., the perception that life has coherence, purpose, and significance) and resilience (i.e., the capacity to adapt and recover from adversity) are protective factors that promote psychological well-being. Together, these constructs play a critical role in sustaining psychological well-being during the transition to higher education. This study examined how existential meaning (presence and search), resilience, and psychological well-being are related in college students. Based on the literature, the following hypotheses were proposed: the presence of existential meaning and resilience would positively correlate with psychological well-being, while the search for existential meaning would negatively correlate with psychological well-being. Upon IRB approval, instrument packets and consent forms were completed by a sample of 135 undergraduate students. Students completed the Meaning in Life Questionnaire (MLQ), the Connor-Davidson Resilience Scale (CD-RISC-25), and the Well-Being Scale (WeBS). Results supported two of the hypotheses: resilience was strongly and positively correlated with psychological well-being ($r = .681, p < .001$), and presence of meaning was positively correlated with psychological well-being ($r = .496, p < .001$). In contrast, search for meaning was not significantly correlated with psychological well-being ($r = .126, p = .073$). These findings suggest that resilience and the presence of meaning serve as protective factors for psychological well-being in college students, whereas searching for meaning may not directly predict well-being. Implications highlight the importance of fostering resilience and meaning-making in counseling and educational contexts to promote student flourishing.

Karen Ripenburg

Discipline: Psychology

Authors:

Abstract Name: Are Age at Diagnosis and Long-term Mental Health Related for People with Autism Spectrum Disorder?

Though the exact number of individuals with Autism Spectrum Disorder (ASD) is unknown, the CDC estimates that 1 in 31 children (3.2%) aged 8 years old have been diagnosed with ASD, and recent population studies suggest approximately 5.4 million adults may have ASD. People with ASD report a lower quality of life than their neurotypical peers, measuring for factors like loneliness, social anxiety, support and satisfaction with life. The timing of ASD diagnosis plays a critical role in mental health outcomes; it has been shown that early diagnosis for those with ASD prompts individuals to seek ASD-related therapies that improve their mental health and encourage greater self-understanding and acceptance. People who receive an ASD diagnosis later in life do not have access to this mental health care or other early interventions. Amongst those who are diagnosed, significant gender disparities exist because of implicit bias, structural inequalities, and male-coded diagnostic criteria for ASD. Females are often misdiagnosed with other mental health issues or diagnosed later in life, impacting their mental health outcomes. This research studied the relationship between age of ASD diagnosis and mental health, and whether gender moderated that association. I recruited 80 people with ASD through social media, support groups and university classes. Participants answered questions about the age at which they were diagnosed with ASD or “suspected” they had ASD; completed The Satisfaction with Life Scale and the Generalized Self-efficacy scale; and completed a checklist of any co-occurring psychological diagnoses. I expect to find a statistically significant relationship between the age of

ASD diagnosis and measures of mental health, with the early age of diagnosis correlating to greater mental health. I predict that gender will moderate this relationship, with age of diagnosis exhibiting a stronger relationship to mental health outcomes among women than men.

Natalie Rippy

Discipline: Art History

Authors:

Abstract Name: Decolonizing Art Education: A Comparative Study of Indigenous Beadwork in Canadian and American Art Lesson Plans

This research focuses on Canadian and American Indigenous multicultural art education methods in the 21st century, focusing on beadwork use in art lesson plans. The aim of this study is to illustrate the importance of teaching Indigenous art within the framework of social power relations in the respective countries. The art lesson plans consider Indigenous backgrounds of artworks, Smallpox (Canadian) and Miniature Wampum Belt (American), both representing beadworks commonly studied in schools. A brief introduction to multicultural art education, considering Indigenous art, will provide insight into approaches that reduce stereotyping in art education. Following, the examination of two respective art education lesson plans to demonstrate different approaches to art education regarding indigenous. While Canadian art education emphasizes the anti-racist approach considering the colonial framework, the American art education promotes diversity and inclusion, ignoring the power relations of the colonial framework. Historical and art historical studies will be utilized to discuss the artworks' respective cultural meanings. This study is important considering the existence of stereotyping in art education, a limited comparative study of art educational practices, and the need to advance Indigenous multicultural art education.

Royce Risinger

Discipline: Biology

Authors:

#1 Mona Easterling

Abstract Name: Geographic Disparities in Adult Smoking Near the Tulsa–Osage County Boundary

This project examines geographic disparities in reported adult smoking rates near our community campus along the Tulsa–Osage County boundary. Using Smoking-Attributable Mortality (SAM) data for Oklahoma and Behavioral Risk Factor Surveillance System (BRFSS) survey results, local patterns will be compared to state and national trends. Smoking remains the leading cause of preventable death in the US, accounting for approximately 480,000 deaths annually, and over 16 million Americans live with smoking-related diseases. Historically, the state of Oklahoma reports adult smoking rates that are higher than national data, underscoring the need for targeted interventions. Secondhand smoke has caused an estimated 2.5 million deaths since 1964, affecting both smokers and non-smokers. Additionally, environmental concerns such as thirdhand smoke contamination and cigarette butt pollution highlight broader public health implications. Preliminary BRFSS data shows Osage County has higher rates of adults reporting a diagnosis of COPD, current smoking, mental distress, physical distress, and disability of all types compared to Tulsa County and the US average. Findings will guide campus initiatives, inform educational public health strategies, and serve as a foundation for future undergraduate research. In subsequent semesters, this data will be available for future students to use as a starting point for undergraduate research questions. Public education and

awareness of health benefits associated with smoking cessation could positively impact the surrounding community. Evidence suggests that smoke-free environments support cessation efforts, and individuals employed in smoke-free workplaces were more likely to maintain smoke-free homes. Promoting cessation and advocating for smoke-free workplace policies are evidence-based strategies to support students and the community. This project will include SAM data, BRFSS survey results, and resources from the US Office on Smoking and Health (OSH) to identify disparities and describe primary, secondary, and environmental impacts.

Benjamin Risley

Discipline: Economics

Authors:

#1 Adam Biener

Abstract Name: The Impact of Mobile Methadone Units on Crime Rates

Methadone has been an effective form of medication-assisted treatment (MAT) for people suffering from opioid use disorder (OUD) since the 1960s. Given Methadone's status as a controlled substance, many doctors are unable or unwilling to prescribe it to patients. Since brick-and-mortar treatment facilities can be difficult to access, recipients also face barriers to necessary treatment. Limited access to effective treatment for OUD can lead to increased drug usage and high rates of criminality in underserved areas. A pandemic-era regulatory shift attempted to expand networks for MAT by allowing mobile methadone units (MMUs) to enter communities and provide treatment for OUD. This paper aims to assess the impact of MMU implementation on local crime. I use 2017-2024 data from the Uniform Crime Reports, which tracks monthly crime counts reported by every law enforcement agency in the United States. I use a difference-in-difference estimation strategy to determine the effect of this revised regulation relative to control localities that did not adopt MMUs as a means of treatment. I expect MMUs to decrease some low-level crime rates, such as petty theft and drug-related offenses, which are correlated with high rates of untreated substance abuse. These findings could impact the way methadone is dispensed regularly to rural communities where people struggling with OUD have persistent difficulties overcoming addiction.

Harper Ritchey

Discipline: Environmental Science and Sustainability

Authors:

#1 John Grove

#2 Edwin Ritchey

Abstract Name: Lime and Phosphorus Interactions on Soil Phosphorus Availability

Production agriculture is responsible for feeding an increasing global population. Understanding how to maximize phosphorus (P) availability can ensure optimized fertilizer rates, maximized crop yield, and improved plant P nutrition. Adding fertilizer P and maintaining soil pH between 6.0 and 7.0 are two strategies used to increase P availability. However, it is often stated that adding lime and P fertilizer at the same time reduces the effectiveness of the added P fertilizer in raising soil test P (STP) levels. In this study, the effect of soil type, lime application time relative to P application time, lime application rate, P application rate, length of incubation time, and combinations thereof on STP levels were evaluated. Soil types differed in the amount of change that resulted in soil pH and STP where the soil with the greatest amount of clay was exhibited the

smallest change. Adding lime one month prior to P fertilizer resulted in a lower STP value. Adding lime or P alone increased STP. Adding both lime and P further increased STP. The higher P rate (200 lb/acre) was more impactful than the lower P rate (100 lb/acre). The four-month incubation resulted in lower STP values than the two-month incubation. Overall, applying lime at the same time as P – at the higher P rate (200 lb/acre) – was the most effective treatment combination maximizing P availability. This research suggests that adding both lime and P close to the start of plant growth would be ideal to maximize P availability to the crop.

Miguel-Angel Rivera

Discipline: Engineering

Authors:

Abstract Name: Manufacturing and High-Temperature Performance of Inconel 718 for Extreme Environments

Inconel 718, a nickel-based superalloy, is valued for its strength, corrosion resistance, and stability in extreme environments, making it essential for critical components in aerospace, energy, and nuclear applications. This study examines the oxidation behavior of Laser Powder Bed Fusion (L-PBF) manufactured Inconel 718 from 800 °C to 1000 °C to determine optimal service conditions for nuclear fasteners. Samples were polished, heat-treated, and analyzed via mass gain measurements, oxide thickness profiling, and Raman spectroscopy. Results show that 850 °C produces a stable, adherent oxide layer rich in Cr₂O₃ and Al₂O₃, balancing protection and structural integrity. Temperatures ≥950 °C accelerated oxide growth, caused blistering, and reduced scale stability, conditions that threaten mechanical performance under thermal cycling. These findings highlight the need for precise control of additive manufacturing parameters and post-processing to achieve maximum high-temperature durability, offering a pathway to reliable Inconel 718 components in next-generation reactor environments.

Erika Rivers

Discipline: English and Literature

Authors:

#1 Madelyne Rivers

Abstract Name: Analysis of The Little Thumbling: A Multifaceted Ogre Against the Isolated French Peasantry

Fairy tales tell so much more than just a story, they are a reflection of what life was like for their storytellers. This paper is a reflection on The Little Thumbling, a French fairy tale that was created in the midst of great political, financial, religious, and environmental turmoil. Looking at The Little Thumbling through the lens of Marxism, and ecocriticism, the reader is challenged to think more about how The Little Thumbling symbolizes the French peasants of the 16th century's struggle with famine, sickness, and the oppressive government as shown through cannibalism, the Little Thumbling himself, and through the abandoning of the children due to an oppressive government because of the environment and quality of life. Fairy tales like The Little Thumbling are significant because they prove how the best art is created through restriction. It is art validating the struggle of real people. Peasants are crafters of the fairy tales we know and love. Learning why these stories were made and understanding what it meant to these groups of people is important for appreciating these powerful stories.

Turab Rizvi

Discipline: Engineering

Authors:

#1 Radhika Barua

Abstract Name: Extrusion-based Additive Manufacturing of Magnetic Heat Exchange Structures for Caloric Applications

Developing sustainable, high-efficiency cooling technologies is vital to addressing 21st century energy challenges. This research focuses on magnetic refrigeration, an environmentally friendly cooling method utilizing the magnetocaloric effect to regulate temperature using magnetic fields. This approach offers greater energy efficiency than conventional vapor-compression systems by eliminating harmful refrigerants. The critical component is the regenerator, made of magnetocaloric material and transfers heat between the magnetic material and a fluid through parallel channels. Traditional designs such as packed beds of particles are prone to particle segregation, creating an undesirable pressure drop. The main goal of our research was to fix those flaws by building brand new heat exchanger structures that we could easily install and test inside a working prototype magnetic cooling machine. Our methodology involved utilizing Additive Manufacturing (AM), specifically Laser Powder Bed Fusion (L-PBF), to produce complex and customized geometries that are difficult to create with traditional methods. We tested several advanced designs, including Schwarz diamond, Gyroid lattices, and foil pin arrays. These AM regenerators were tested in a CaloriSMART test bed for experimental validation of their thermal performance. The experiments were conducted without an applied magnetic field to isolate structural effects and yielded compelling results. The foil pin array achieved a 10°C temperature span, a 66% increase over the 6°C span of the packed particle bed baseline. Both the foil pin and Schwarz diamond structures demonstrated an 8% increase in cold blow effectiveness. Furthermore, the AM designs significantly reduced pressure losses. At a mass flow rate of 0.00299 kg/s, the foil pin array reduced the pressure drop by 41.9% compared to the packed bed baseline (24.70 kPa vs. 42.55 kPa). Ongoing research aims to democratize access to this technology through exploring Fused Filament Fabrication (FFF) as a portable and low-cost alternative to L-PBF.

Zahra Rizvi

Discipline: Health and Human Development

Authors:

#1 Yi He

Abstract Name: Cancer Disparities in Virginia: A Geospatial Analysis of Incidence, Mortality, and Environmental Determinants (2011–2020)

Cancer remains a major public health challenge in Virginia, with clear differences in who is affected and where the burden is highest. Using ten years of statewide cancer data, this project examines how geography, environment, and community characteristics shape cancer outcomes across Virginia. Cancer incidence and mortality data from the Virginia Cancer Registry (2011–2020) were summarized for every county and health district, and stage-at-diagnosis patterns were incorporated to assess where late detection is most common. To understand why cancer risk varies across regions, key demographic and socioeconomic indicators—such as poverty levels, educational attainment, age structure, and racial composition—were obtained from U.S. Census datasets. Environmental exposure measures, including fine particulate matter (PM_{2.5}), nitrogen

dioxide (NO₂), and water quality indicators, were retrieved using Google Earth Engine. To analyze these multiple layers of information, the study applied Bayesian hierarchical spatial models, which allowed for more stable county-level estimates and provided relative risk predictions and exceedance probabilities. These results were visualized through interactive web-based mapping dashboards designed to help decision-makers explore regional patterns and identify areas of concern. Strong geographic disparities emerged across the state. Lung cancer incidence and mortality were highest in Southwest Virginia and Southside counties, where smoking prevalence, poverty rates, and PM2.5 exposure were also elevated. Colorectal cancer risk was greater in rural Southside health districts, which also experienced higher rates of late-stage diagnosis. Breast cancer incidence was greatest in urban and coastal areas, while prostate cancer incidence was significantly higher in predominantly African American communities in Southside and Hampton Roads. Environmental exposures remained significant predictors of cancer risk even after accounting for socioeconomic conditions. Overall, this project highlights how environmental and social factors interact to shape cancer disparities in Virginia and demonstrates how geospatial tools can support targeted cancer prevention and control efforts.

Zeina Rmaile

Discipline: Engineering

Authors:

#1 Lu Gan

Abstract Name: A Scalable, Modular UAV Platform for Autonomous Flight Research

This project explores the development of a modular, low-cost unmanned aerial vehicle (UAV) platform designed to enable scalable experimentation in autonomous flight and machine learning. The goal is to determine whether a fully open-source, reconfigurable drone system can achieve performance comparable to proprietary systems while remaining cost-effective and adaptable for diverse research applications. Current UAV research often depends on expensive, proprietary systems that limit adaptability and replication. Existing open-source UAV efforts have emphasized accessibility, but each design remains constrained to limited applications, sacrificing flexibility for cost. This work addresses that gap by developing a robust, open-source, customizable platform that supports diverse research tasks such as multi-agent perception and coordination. The methodology combines computer-aided design, iterative prototyping, and experimental validation. The UAV's carbon-fiber frame was enhanced with 3D-printed components including battery and sensor mounts, propeller guards, and landing gear, which allowed rapid modification and replacement. Finite Element Analysis (FEA) simulations in SolidWorks assessed structural durability under applied forces, while physical indoor and outdoor tests evaluated hover stability, vibration control, and sensor reliability in various environments. The final design achieved a total weight of 1.3 kg, 13-minute hover time, and an estimated total cost of \$2,000, including an onboard computer and electronics. This represents a significant reduction in material expenses while simultaneously optimizing functionality. Preliminary results demonstrate mechanical durability, flight stability, and adaptable sensor integration for various autonomous tasks. Future testing will extend to multi-drone coordination, perception, and heterogeneous collaboration. These results will be discussed in the context of advancing embodied AI experimentation, with emphasis on the platform's reproducibility, scalability, and ability to translate models from simulation to real-world deployment. By presenting a validated, affordable UAV platform optimized for autonomy research, this project contributes a practical and flexible hardware foundation for the next generation of machine learning and robotics studies.

Elena Robbins

Discipline: Art History

Authors:

Abstract Name: Alphonse Mucha: The Designer Creating Art in Every Corner of Life

Alphonse Mucha was an incredibly influential designer who is most well known for his iconic embellished style. His style represented the Art Nouveau movement of 1890 to 1914, and he is often thought of as one of the most important Art Nouveau designers. His Catholic upbringing was a major influence on his life, and it inspired him to create art for the purpose of enlightenment. After creating an influential poster in Paris, Mucha became extremely popular. While he is known for his posters depicting women and flowers, he created a broad range of designs in many different mediums. Mucha was so influential that his style was studied in both Europe and America. Furthermore, his designs incorporated his Catholic beliefs, along with the symbolism, mysticism, and Freemason ideals that he learned in Paris. When Mucha skillfully blended these ideals into his art, even simple furniture and advertisements felt alive. Additionally, Mucha was fiercely tied to his homeland and the culture of the Czech people. Not only did he work to inspire the Czech people, but he also encouraged their culture to endure. Mucha's belief that beauty could enlighten people led him to create visually stunning designs with the intention of brightening the world around him.

Branlyn Roberson

Discipline: Computer Science

Authors:

#1 Moritz Dannhauer

#2 Nasseh Tabrizi

Forrest Fishel

Abstract Name: When AI Asks Instead of Answers: Socratic LLM Tutoring with Adaptive Difficulty and Historical Pattern Recognition

Computer science theory courses, particularly automata theory, present significant pedagogical challenges due to their abstract nature and the difficulty students face in developing formal reasoning skills. Traditional teaching methods often fail to provide the individualized guidance necessary for students to master concepts like Deterministic Finite Automata (DFA). This research introduces TheoTeach, an intelligent tutoring system that combines large language models (LLMs) with Socratic pedagogy, adaptive difficulty scaling, and historical learning to create a personalized educational experience for automata theory students. TheoTeach employs a local LLM (Mistral via Ollama) configured with Socratic questioning principles to guide students through DFA concepts without directly providing answers. The system implements a novel multi-dimensional student modeling approach that tracks mastery levels across specific topics (DFA construction, minimization, product automata) on a 0-5 scale. Using this profile data, the system dynamically adjusts question difficulty and intervention strategies in real-time, ensuring students work within their zone of proximal development. A key innovation is the historical learning engine, which analyzes past test data, common student errors, and successful solution patterns to inform tutoring strategies. The system integrates automata-lib for automated answer verification, enabling a Socratic enforcement layer that ensures responses remain question-based while validating correctness. Additionally, JFLAP integration provides visual feedback for DFA construction exercises. Preliminary results demonstrate that personalized, adaptive tutoring significantly improves student engagement and conceptual understanding compared to static educational resources. This research contributes a scalable framework for LLM-based tutoring in formal computer science subjects, demonstrating how historical data can enhance AI-driven personalized education while maintaining pedagogically sound Socratic methodology.

Ryan Roberts

Discipline: Engineering

Authors:

Abstract Name: Cardiac Specific Delivery of VEGF-A to Improve Perfusion and Prevent Remodeling in Ischemic Heart Tissue

Myocardial infarction results in irreversible loss of cardiomyocytes, microvascular collapse, and gradual fibrotic remodeling, diminishing ventricular function. While reperfusion and pharmacological treatment enhance survival rates, they fail to rehabilitate injured myocardium or prevent the progression of long-term fibrosis. Prior regenerative approaches utilizing stem cells, recombinant growth factors, or early viral vectors have had variable results owing to restricted engraftment, brief protein half-lives, systemic exposure, and insufficient targeting of cardiomyocytes. To overcome these obstacles, we developed an endocardium-targeted gene therapy that administers VEGF-A directly to the viable myocardium in the infarct border zone. We seek to improve circulation, reduce fibrosis, and maintain ventricular architecture by designing an AAV9 vector that encodes VEGF-A regulated by the cardiac troponin T promoter. The therapy aims to restrict gene expression to endocardium while preventing unintended angiogenesis in other tissues. In vitro investigations will assess promoter specificity, transduction efficiency, VEGF-A production, and resistance to hypoxia-reoxygenation injury using primary neonatal rat cardiomyocytes. Supplementary tests employing human endothelial cells will evaluate angiogenic activity by tube formation, migration, and proliferation assessments. In vivo validation will be performed using a LAD ligation mouse model. Animals will have intramyocardial AAV9 injections followed by serial echocardiography to evaluate ejection fraction, wall motion, and ventricular dilatation. Histological evaluations encompassing Masson's trichrome, CD31, and TUNEL staining will measure fibrosis, microvascular density, and apoptosis. We anticipate that localized, sustained production of VEGF-A will enhance capillary development, diminish cardiomyocyte apoptosis, limit scar expansion, and improve ventricular function compared to untreated and vector-only controls. This study proposes that integrating cell-type-specific transcriptional regulation with the inherent cardiotropic properties of AAV9 is a viable approach for attaining safe, targeted, and long-lasting molecular repair following myocardial infarction. This strategy could enhance cardiac gene therapy by offering a locally accurate and therapeutically scalable technique for supporting tissue preservation after ischemic injury.

Mary Roberts

Discipline: Art History

Authors:

#1 Mary Roberts

Abstract Name: From Ritual to Relic: Jivaroan and Māori Head Shrinking Practices in Western Museums

This study discusses the ceremonial preservation of human heads by the Jivaroan peoples of the Amazon and the Māori of New Zealand as reflections of deeply rooted spiritual systems, cultural values, and demonstrations of social rank. As a comparative cultural analysis, these two Indigenous groups side by side highlight both the distinct meanings behind their respective traditions and the parallel ways in which Western colonial forces misrepresented, commodified, and ultimately dehumanized them. This research will also address the emergence of Western ethnographic collecting and the cultural violence that was inflicted on ancient Jivaroan and Māori traditions through these practices. To examine such practices in a contemporary context, I conducted firsthand observations at the Mabee-Gerrer Museum in Shawnee, Oklahoma. The museum displays two Jivaroan shrunken heads, offering a clear example of how colonial collecting practices continue to shape the presentation and interpretation of Indigenous artifacts within Western institutions. Furthermore this study incorporates supporting research from anthropological and historical context, ethnographic accounts, and postcolonial theory. Such an interdisciplinary approach allows for an examination

of Indigenous worldviews on their own terms, while simultaneously analyzing the invasive impact of European colonialism and ethnographic “collecting.” From the eighteenth to the twentieth century, the extraction of artifacts and cultural information was largely carried out by Western museums and private European collectors seeking objects that could be displayed as curiosities or exotic trophies. This research emphasizes how the appropriation and exhibition of preserved heads for spectacle and profit not only distorted and brutalized Indigenous practices but also reinforced harmful colonial narratives that depicted Indigenous peoples as violent, primitive, and inherently “other.” Ultimately, this research explores the mistreatment and neglect of these cultural traditions, highlighting how profoundly colonial trade networks and ethnographic collecting have dehumanized ancient Indigenous practices and shaped modern misunderstandings of these cultures.

Westley Roberts

Discipline: Engineering

Authors:

Abstract Name: SELECTION OF TACKIFIERS FOR ENGINEERING BIODEGRADABLE HYDROMULCH

Erosion control is a vital component of sustainable agriculture, helping to prevent soil loss, conserve water, and improve crop productivity. Currently, low-density polyethylene (LDPE) plastic mulch is the most widely used material for this purpose. However, its negative environmental impact and costly removal highlight the need for biodegradable alternatives. Hydromulches (HMs)—spray-applied mixtures of fibers, water, and tackifiers—offer a promising solution because they stabilize soil while naturally degrading over time. Recent studies suggest that biodegradable HMs can perform comparably to polyethylene mulch, though their success depends heavily on the choice of tackifier. This project explores environmentally friendly and cost-effective tackifiers for hydromulch development. Tackifiers act as the “glue” that binds fibers together, making their selection critical to mulch performance. Multiple formulations were prepared using uncoated paper and finely ground hemp hurds as fiber sources. These mixtures were combined with water at a 35:1 ratio (water weight to dry weight), blended into a slurry, and dried into square mulch samples. Mechanical and physical properties—including tensile strength, puncture resistance, water-holding capacity, and density—were measured to evaluate the effects of varying fiber and tackifier concentrations. Preliminary results show that xanthan gum provides the highest tensile strength and puncture resistance at higher concentrations (5%). Hemp hurds increased tensile strength in xanthan gum formulations but reduced puncture resistance. These findings were compared to a control of 100% paper with no tackifier or hemp hurds. Ongoing research will test starch-based tackifiers, with the expectation that starch will perform similarly or better than xanthan gum. It is anticipated that higher tackifier concentrations combined with lower hemp hurd percentages will continue to enhance mulch properties. This work advances the development of biodegradable hydromulches as sustainable, cost-effective alternatives to plastic mulch in agriculture.

Brock Robertson

Discipline: Anthropology and Archaeology

Authors:

Emili Bailey

Dave Collins

Abstract Name: Evaluating the Performance Characteristics of Sponge Spicule Tempered Pottery

How tempers affect performance characteristics in pottery is a popular topic in experimental archaeology literature. While archaeologists have examined the effects of many tempering agents, sponge spicules have received very little attention, even though they are found in archaeological samples across the globe. This research uses an experimental archaeology approach to examine the impact of sponge spicules on the performance characteristics of strength and toughness in pottery. An experimental assemblage of briquettes was created using a South Florida smectite clay and sponge spicules. The briquettes were uniformly cut to 100mm x 20mm x 11mm following standard protocols in archaeological testing and were fired to a temperature of 700°C to mimic the average temperature of open pit fires. After firing, the briquettes were subjected to a three-point bend test using a Mark-10 ESM303 single column motorized test stand in to test whether spicules increased or decreased the characteristics of strength and toughness relative to sand-tempered and untempered samples. The data from these tests was used to calculate the modulus of rupture and work of fracture for each briquette. These findings suggest that differences in peak compression and work of fracture between sand-tempered and spiculate-tempered test groups are statistically significant. Overall, the data collected suggests that sponge spicules increase the performance characteristic of toughness, potentially increasing vessel use-life following crack propagation.

Hailey Robins

Discipline: Health and Human Development

Authors:

#1 Matthew Nicholaou

#2 Gennie Parkman

Amy Bills

Jayden Jones

Abstract Name: Variations in T-lymphocyte and Natural Killer Cell Populations Between the Melanoma Microenvironment and Peripheral Blood

Melanoma is an aggressive disease due to its propensity to metastasize. The tumor also has the ability to alter the types of immune cells within the tumor microenvironment (TME). Immunotherapy is the gold standard for treating metastasized melanoma as it reactivates or stimulates the patient's own cells to help them fight the tumor, but it is inconsistent across populations and individuals. Evaluating immune cells in both the circulation and the tumor itself will help determine how local tumor-driven immune modulation reflects or diverges from systemic immune changes. To explore this, peripheral blood and tumor tissue samples from C57BL/6 mice subcutaneously injected with Yale University Mouse Melanoma cells as an established mouse model of melanoma will be collected to compare the populations of T-lymphocytes (T-cells) and natural killer cells (NK cells). In addition, as immunotherapy often utilizes the T-cells and NK cells to combat the tumor, PD-1 expression will also be assessed as melanoma may lead to an increase in PD-1 expression to suppress T-cell and NK cell activity. Samples will be analyzed using flow cytometry and compared using mean fluorescence and Chi-squared tests. This study will provide information regarding how the tumor changes the composition of immune cells from the blood to better evade defenses, giving a potential explanation for why certain patients respond poorly to immunotherapy and informing future strategies to enhance treatment efficacy.

Emma Robinson

Discipline: Gender, Ethnicity, Diversity, or Cultural Studies

Authors:
#1 Sharon Doetsch-Kidder
Isobela Kesler

Abstract Name: How the successes of queer people get undermined due to race, disabilities, or age.

This research focuses on subtle discrimination in interdisciplinary activism. Historically, activists would be outwardly discriminated against for their sexuality or gender. As of the past 15-20 years, the discrimination has since shifted towards associated identities such as race, age, or disability. This grouping focuses primarily on female & queer activists, as research on men of color in activism is limited. Several organizations that have made incredible progress in activism communities were started by powerful, young, disabled women of color that have since been forgotten due to the discriminatory shadow casted over their work. These results are significant because the work and experiences of these women would be monumentally beneficial to currently failing activism organizations. This lack of progress is causing the gap between minorities to grow even larger. After years of protesting, open and obvious discrimination against queer identities has become less normalized. However, the hate behind such discrimination did not go away. Instead, it was put towards other mechanisms of social ostracization. Data collected through a series of interviews with several different female activists of varying ages, races, and/or disabilities brings to light the fact that despite working with other queer people, women of color often will experience hate, harassment, or discrimination by older, white, able-bodied individuals. Our research covers not only the successes of these women that have since been subtracted from the public eye and the discrimination they've faced, but also their experiences in the 1990's DC intersectional activism community.

Elexia Robinson

Discipline: Economics

Authors:
#1 Anh Ngo
#2 Elexia Robinson

Abstract Name: Executive Compensation Structure and Earnings Management Around Equity Issuance

This study examines the relationship between executive compensation structure and earnings management over the last five years using a sample of more than 100 manufacturing firms in the S&P 500 from 2021-2025. The analysis provides evidence that executives engage in earnings management around firm-specific corporate events, particularly seasoned equity offerings. The results show that executives with a higher proportion of option-based or equity-based compensation are more likely to manage earnings prior to issuing equity compared with executives whose compensation is primarily cash-based. In addition, higher levels of firm-related executive wealth are associated with greater earnings management. Overall, the findings suggest that equity-linked compensation intensifies managerial incentives to influence reported earnings during key financing decisions.

Lafayette Robinson III

Discipline: Education

Authors:

#1 Ronald White
#2 Lafayette Robinson III

Abstract Name: High School Bridge to STEM Teacher Career Exploration Program Pre-Post Survey Results: Implications for Driving Interest in Teaching Mathematics

The Learning Policy Institute (2025) recently reported that teacher shortages were due to fewer interests in the teaching profession and increased rates of practicing professionals leaving the ranks. Furthermore, it was suggested that trends in high school students considering teaching and teacher education majors have been at an all time low. Grounded in vocation-fit theories, this study aimed to identify the factors and considerations that can be used as leverage to attract high school students. After pre-post data was subjected to a related samples Wilcoxon signed-rank test and the results revealed that Biology was more likely to be sought as a teaching discipline and jobs that require communication and collaboration with people of diverse backgrounds. Furthermore, four factors mirrored motivators typically ranked high by in-service teachers. Implications for how to attract talented math teachers are discussed.

Alex Robles

Discipline: Biochemistry

Authors:
#1 Katherine Bowman

Abstract Name: USP11 siRNA Knockdown Improves Efficacy of Chemotherapy in Hepatocellular Carcinoma

Hepatocellular carcinoma (HCC) is the most common form of primary liver cancer and the third leading cause of cancer-related deaths worldwide. Despite advances in surgery and systemic therapy, patient outcomes remain poor, and the current standard treatment (sorafenib) provides only modest survival benefits with significant side effects. This project investigates the therapeutic potential of small interfering RNA (siRNA) targeting Ubiquitin-Specific Protease 11 (USP11), a deubiquitinase that regulates the cell cycle, DNA repair, and oncogenic signaling. USP11 is upregulated in multiple HCC cell lines and contributes to tumor growth and metastasis; therefore, its silencing may enhance the response to chemotherapy. To evaluate this hypothesis, USP11-targeting siRNA was transfected into PLC/PRF/5 (PP5), Hep3B, and C3A HCC cell lines. Quantitative RT-PCR confirmed USP11 knockdown to less than 10% of untreated controls. MTS assays demonstrated that USP11 silencing lowered the IC₅₀ of sorafenib in both PP5 and Hep3B cells, indicating increased drug sensitivity. Most recently, GalNAc-conjugated USP11 siRNA achieved effective knockdown in PP5 cells without lipid-based transfection reagents, validating receptor-mediated delivery as a less cytotoxic and more consistent approach. Future work will expand GalNAc-siRNA testing to additional HCC cell lines and assess combination therapy with sorafenib. In collaboration with the Parkman Lab, in vivo studies will evaluate therapeutic efficacy in mouse xenograft models. Our research aims to establish USP11 as a viable therapeutic target and advance siRNA-based strategies toward safer, more effective treatments for liver cancer.

Rachel Rodgers

Discipline: Film/Photography Studies

Authors:

#1 Mark Allen
#2 Lilly James

Abstract Name: Drawn to Donate

This project explores how horror-themed, illustrated storytelling can transform the fear of giving blood into a communal, even playful Halloween experience, similar to the way haunted houses or trick-or-treating turn fear into fun. My central research question asks: How can the fear of giving blood be transformed into a fun, shared Halloween experience that encourages community participation in blood drives? The short film is fully illustrated in a dark, storybook aesthetic inspired by *The Babadook*, *Mother* LA's *Mother Book*, and the tradition of unsettling cautionary picture books. These influences shape a visual world filled with deep shadows, textured drawings, and childlike yet eerie compositions. By using genres that make fear theatrical and collective, the film reframes blood donation not as a medical ordeal but as part of a shared seasonal ritual, where bravery and community naturally intersect. Methodologically, the project uses sequential hand-drawn illustrations animated through storybook-style transitions. This tactile approach reinforces atmospheric horror without needing gore or graphic imagery. Throughout the film, real public-health information is incorporated, including statistics on the significant drop in blood donations during the holiday season and the high rates of needle-related anxiety among young adults. These facts serve as emotional anchors, highlighting that while needles may feel frightening, the far greater fear is needing blood when none is available. The project aims to evaluate how blending horror aesthetics with community-centered themes can make health communication more engaging, memorable, and actionable for college-aged viewers. By positioning blood donation as a collective Halloween challenge rather than a solitary medical task, the film seeks to shift perceptions and encourage participation. The conference presentation will discuss the film's development process, genre influences, and the potential for illustrated horror to function as effective public-service communication.

Senora Rodgers

Discipline: Psychology

Authors:

#1 Teaira Evans
#2 Ally Tindell
#3 George Griffin
#4 Niya Mogheeth
#5 Kayla Diaz

Abstract Name: Breaking the Silence: How Sociocultural Factors Influence Family Conversations About Reproductive Health Among College-Aged Women

Reproductive healthcare decisions among college aged women are influenced by various sociocultural factors such as race, economic status, and region origin. Prior studies have proven that these factors shape contraceptive use and sexual health behaviors. This study seeks to answer the question: How do sociocultural factors affect the rate at which college aged women talk to their families about their reproductive health choices? Through a mixed methods approach, data will be collected through surveys taken by LSU students. The surveys aim to assess demographic background, access to healthcare resources, economic status, and reproductive health choices. By analyzing the patterns found within the data, this study aims to highlight the disparities in reproductive healthcare choices, contributing to a broader understanding of the factors that influence college aged women in making these choices. Findings from this study may inform health education initiatives amongst a range of different college campuses, as well as aid campus resources in being more effective. Doing this will support diverse student populations in making informed reproductive health decisions.

Natalie Rodrigues

Discipline: Chemistry

Authors:

#1 Elmer Mojica

Abstract Name: Characterization and Differentiation of Commercial Honey Samples Using ATR-FTIR Spectroscopy and Multivariate Analysis

Honey is a natural sweetener valued for its taste and health benefits, making it a high-demand product worldwide. However, its commercial importance also makes it susceptible to adulteration, highlighting the need for reliable authentication methods. This study analyzed 68 honey samples from different floral and geographical origins using Attenuated Total Reflectance Fourier Transform Infrared (ATR-FTIR) spectroscopy and X-ray Fluorescence (XRF), supported by multivariate statistical tools such as Principal Component Analysis (PCA) and Hierarchical Cluster Analysis (HCA). ATR-FTIR spectra revealed characteristic absorption bands associated with sugars and moisture, particularly hydroxyl (-OH), aliphatic (-CH), and carbonyl (C=O) groups. Differences in peak positions and intensities suggested variations in sugar composition, floral source, and processing techniques. XRF detected elemental markers including aluminum (Al), silicon (Si), phosphorus (P), and magnesium (Mg), with distinct patterns linked to geography and brand. PCA and HCA provided clear clustering patterns, grouping honeys with similar chemical traits and revealing outliers. Together, ATR-FTIR and XRF demonstrate powerful complementary tools for honey classification, authentication, and traceability, highlighting the influence of geographical and botanical variation on honey composition.

Imani Rodriguez

Discipline: Gender, Ethnicity, Diversity, or Cultural Studies

Authors:

#1 Stephanie Wheeler

#2 Joel Schneier

Abstract Name: Creation and Representation: Rhetorical Effectiveness of Audience Construction within the Deaf Vlogging Community

Various types of minority groups use YouTube as a platform to share their stories, grow their brands, and develop communities online. While there has been previous research on Deaf-focused videos and their presence on the platform, the focus has been on the types of videos posted, the creator's purpose for video-making, and how that content engages with existing representation and stigma of the community (Hibbard & Fels, 2011; Li et al., 2022; Souza et al., 2023; Martzos et al., 2021; Oliveira et al., 2021; Parton, 2016). Additionally, for many minorities, there has been research on how online communities can provide spaces for open conversation that may not be possible due to location, disability, or censorship (Case, 2012). This research will focus on the Deaf vlogging community in the United States and how they reach their intended audiences to establish communities in online spaces on YouTube despite language and accessibility barriers. Creator demographic data will be collected through channel and video descriptions to understand identification with the Deaf, hard-of-hearing, and cochlear-implant user communities. This paper will also conduct content and genre analysis of 60 videos from 30 selected Deaf vlogging channels to analyze how creators use audiovisual cues and video editing to construct audiences and communicate with them. Lastly, the data from 100 comments will be pulled from each of the 60 comment sections using the YouTube Data Tools modules (Reider, 2015). This research argues that creators should consider their purpose for posting

content and their intended audience when making audiovisual cue editing decisions, as the accessibility of their videos may support or restrict audience interactions.

Sophia Rodriguez

Discipline: Biology

Authors:

#1 Jennifer T. Wolstenholme

#2 Alanna Morgan

Abstract Name: Investigation of chemogenetically-mediated PFC Activation to Rescue Adolescent Ethanol Induced Memory Deficits

The proposed study will demonstrate proof of concept that chemogenetic activation of neurons can increase myelin production by oligodendrocytes and improve memory in an object recognition task. This project is part of a larger study to investigate using chemogenetic Gq Designer Receptor Exclusively Activated by Designer Drugs (DREADD) activation of prefrontal cortex neurons following adolescent binge ethanol to assess whether activity-dependent myelination can promote oligodendrocyte maturation and the increase proliferation of myelin. A Gq DREADD virus will be injected into the medial PFC of 21 adult C57BL/6J mice. Three weeks after viral delivery, a Gq DREADD will be activated using DCZ or vehicle using two paradigms to induce activity-dependent myelination: Group 1 will receive vehicle (saline) for 15 days, Group 2 will receive DCZ for 15 days, and Group 3 will receive DCZ for 8 days. To evaluate memory, a novel object recognition test will be administered. After behavioral assessments, brain tissue will be collected, and immunohistochemistry will be run to identify changes in myelination and to ensure correct delivery of the viral injection. To visualize changes in myelination, dual staining for mCherry (for viral confirmation) and myelin basic protein will be conducted. A previous small pilot study (n=9) showed no significant differences between the vehicle and DCZ-treated groups, however a trend of increased immunofluorescence was noted in the 15-day treated group as compared to controls. Given the increased power of the current proposed study, we expect to observe a stronger increase in MBP immunofluorescence as well as improved performance on behavioral memory tasks.

Sierra Rodriguez

Discipline: Biology

Authors:

#1 Sierra Rodriguez

#2 Megan Morse

#3 Starr Davis

#4 Erika De La Rosa

#5 Xanthie Rodriguez

#6 Sushmita Sinha

Abstract Name: Signaling Pathways Driving BATF3 Expression in Human T cells.

Background: Basic leucine zipper transcriptional factor 3 (BATF3) is a part of the AP-1 family and has been linked to memory CD8 T cell development and recall responses in murine models. During infection, T cells multiply to achieve the numbers required to fight infection followed by contraction. A small portion of these T-cells are retained to make memory T-cells. In murine models, it was shown that when BATF3 is repressed, not as many cells make it out of the naive stage and into central memory. Cells expressing BATF3 live longer and proliferate more. BATF3 has been discovered in human T cells, however, the immunobiology of BATF3 in human T cells is unknown. We discovered that BATF3 is robustly upregulated in human CD4 and CD8 T-cells upon activation. Since the upstream cues governing this induction are unclear, we hypothesized that integrated TCR–CD28 signaling promote a memory-precursor program by upregulating BATF3. Method: To test this hypothesis, we isolated healthy donor T cells from peripheral blood mononuclear cells, and activated them with anti-CD3+CD28, in the presence of pathway-specific inhibitors (MAPK, PI3K-Akt, JAK-STAT and NF- κ B) and quantified BATF3 by flow cytometry. Results: Inhibition of MAPK or JAK–STAT, but not PI3K–AKT or NF- κ B, markedly attenuated BATF3 upregulation in both CD4⁺ and CD8⁺ T cells, indicating that MAPK and pro-inflammatory cytokine–STAT signaling converge to drive BATF3 expression in human T cells and potentially bias effector-to-memory fate.

Charlize Rodriguez

Discipline: Biology

Authors:

#1 Andrea Marroquin

#2 Oscar Valverde-Barrantes

Abstract Name: Exploring Plant Interactions Under Salt Stress: Above- and Below-Ground Effects

Increased salt in the soil, driven by climate change, poses a growing threat to agricultural productivity and ecological stability. This environmental stressor alters the production of plant specialized metabolites, which mediate communication with other organisms. Key interactions affected include herbivory dynamics and soil microbial symbioses. Although many studies have investigated plant-insect and plant-microbe interactions in isolation, few have examined how above- and below-ground relationships are impacted by salt stress within an integrated ecosystem context. This study aims to evaluate the role of symbiotic microbes in mediating plant responses to salt and herbivore stress, using species in the genera *Chamaecrista* and *Senna* of the Fabaceae family as model species. While both genera associate with arbuscular mycorrhizal fungi, only *Chamaecrista* forms symbioses with nitrogen-fixing *Rhizobia* bacteria. Seedlings will be grown under combinations of soil microbial presence/absence, moderate salt stress, and exposure to a generalist herbivore. Preliminary trials tested various seed scarification methods to improve germination rates, revealing higher

germination rate in *Senna* than in *Chamaecrista*. If *Chamaecrista* germination remains inconsistent, the study will expand to include other rhizobia-associated Fabaceae genera. By integrating above- and belowground interactions, this research aims to highlight how beneficial microbes enhance plant resilience to abiotic and biotic stressors. These findings will provide ecological insight while contributing to the development of agricultural strategies in combatting increasingly saline soils.

Xanthie Rodriguez

Discipline: Biology

Authors:

#1 Megan Morse

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#3 Sierra Rodriguez

#4 Shanil Juma

#5 Sushmita Sinha

Abstract Name: SIRP γ restricts human CD8 T-cells effector differentiation under suboptimal TCR-signaling

Signal regulatory protein gamma (SIRP γ) is a T-cell-restricted surface receptor that has been poorly understood in its vital role in human CD8 T cell differentiation. Individuals demonstrated a wide variety of SIRP γ expression, aligning with specific CD8 T cell differentiation states. Increased presence of CD27⁻CD45RO⁻ terminally differentiated CD8 T cells was observed in individuals with low SIRP γ levels. In contrast, high expressors primarily harbor central memory and naive cell populations. The examination of SIRP γ function was performed on human naïve CD8 T cells through siRNA-mediated knockdown. When TCR stimulation was suboptimal, SIRP γ knockdown induced strong effector-like differentiation characterized by increased CD45RO expression, elevated T-bet levels, and amplified production of TNF- α , IFN- γ , and Granzyme B. CD47 blockade did not reproduce the same effects, suggesting a CD47-independent mechanism. The collective findings institute SIRP γ as a negative regulator of CD8⁺ T cell effector programming under suboptimal conditions. Variability in individual SIRP γ expression has the potential to affect the immune homeostasis and immunopathology susceptibility. Potentially, SIRP γ can serve as a therapeutic target in environments relating to dysregulated T cell activity.

Jamie Rodriguez

Discipline: Chemistry

Authors:

#1 Jeremy Mallari

Giselle Chavarria

Abstract Name: Incorporating a Nucleophilic Heterocycle to Expand the Structural Diversity of an Antimalarial Protease Inhibitor Scaffold

Plasmodium falciparum is the causative agent of the most serious form of human malaria, a parasitic disease estimated to kill 500,000 people annually. We are studying falcilysin (FLN), a metalloprotease required for parasite survival in the human host. Previous work in our group on a piperazine-based hydroxamic acid scaffold identified a subset of inhibitors with promising activity against FLN and cultured *P. falciparum*. We previously found that installation of bulky aromatic substituents at the N4 position of the scaffold results in potent FLN inhibition. However, the low reactivity of these aromatic substituents limits our ability to make

structural changes and to further optimize this part of the scaffold. To address this limitation, we replaced a phenyl moiety with a 5-membered cyclic amine at the N4 position of the scaffold. This allowed for efficient functionalization of the amine by subsequent reaction with a structurally diverse set of commercially available electrophiles. We used this strategy to generate a series of 15 new inhibitors, and this approach was highly successful and identified our 2 most potent inhibitors to date. Our initial data suggests that electron withdrawing substituents at the meta and para position increase activity against FLN, and we also found that certain bulky substituents were well tolerated. In addition, we found that both amide and sulfonamide linkages to these substituents were productive. These studies expand on our previous work by further detailing the structure-activity relationships (SAR) at the N4 position of our scaffold, and these results will guide future optimization efforts.

Ethan Rodriguez

Discipline: Exercise Science and Nutrition

Authors:

#1 Audrey Harrington

#2 Andrew Moxley

#3 Austen Cave

#4 Kathryn DiMillo

#5 Sierra Kaluzienski

#6 Marissa Cossa

#7 Ashley Edds

#8 Scott Mazzetti

Abstract Name: Influence Of Partial Versus Exclusively Explosive Sets Of Upper- And Lower-Body Resistance Exercise On Metabolic Rate

Resistance exercise performed with exclusively explosive reps increases metabolic rate, but performing entire sets explosively can be exhausting/unfeasible. PURPOSE: We examined whether sets of squats and bench press using only partial explosive reps could increase metabolic rate similar to exclusive sets using all explosive. METHODS: 7 men (20 ± 0.9 yrs; 82 ± 12 kg; 181 ± 5 cm) performed 4 protocols of 4x8 reps of squat and bench press. Two of the protocols were work-matched using 50% of maximal strength (1-RM), with one of them using exclusively explosive reps (EXPL) and the other 3 explosive reps immediately followed by 5 recreational (Partial 3/5-50%). We also included an additional partial session using 3 explosive with 50% of 1-RM followed by 5 recreational with 61.2% (Partial 3/5-61%). This protocol was work-matched with a session of exclusively recreational reps using 57% of 1-RM (REC). Subjects' 1-RM was determined on a squat machine and barbell bench press, and peak power was determined using a weightlifting accelerometer. Repetition speed, ROM, and rest intervals were standardized among protocols. Total work (reps x sets x load) among the protocols was: (REC=3/5-61%) > (EXPL=3/5-50%). Expired air was collected 15min before, during, and 30min after using a metabolic cart. Data were analyzed using a 2-way repeated measures ANOVA with Tukey's HSD post hoc. We hypothesized that EXPL reps would increase metabolic rate: EXPL=3/5-61% > 3/5-50% = REC. RESULTS: Rates of oxygen consumption ($\text{ml} \cdot \text{kg}^{-1} \cdot \text{min}^{-1}$) were significantly greater ($p \leq 0.05$) during sets 1-4 of EXPL compared to Partial 3/5-50% and REC, and Partial 3/5-61% was greater compared to REC. When corresponding REC total liters consumed were subtracted, deltas were significantly greater: EXPL (1.9 ± 0.6 L) = 3/5-61% (1.8 ± 0.7 L) > 3/5-50% (0.6 ± 0.6 L). CONCLUSION: Partial sets of squats and bench press using only 3 explosive reps may be sufficient for enhancing metabolic rate, while improving workout feasibility.

Emily Rodriguez

Discipline: Social Work and Human Services

Authors:

#1 Markia Little

#2 Emily Rodriguez

Abstract Name: Language in Family Court

Perceptions of children, their potential, and their needs are shaped by the language we use about them, particularly in parenting and as seen in court proceedings. Two opposing frameworks that frequently surface in these conversations are the child-centered and deficit-based languages. This descriptive study focuses on the use of deficit-based language in family court proceedings and how it affects children's well-being. Student researchers test three research hypotheses regarding language and its perceived impact on the parents, children, and outcomes of the proceedings. Over 50 participants are identified who have been involved in a family court proceeding that involves children, such as social workers/custody evaluators, attorneys, judges, parents, family/friend(s) and individuals who were children at the time of a child custody case. The student researchers use exploratory design for this study to explore how communication in court-involved family cases shapes the experiences of families and the professionals who work with them. Because this topic has limited existing research and involves multiple viewpoints, an exploratory approach allows the researchers to identify patterns, relationships, and concerns that may not yet be well-documented. This study uses a non-probability sampling approach, relying mainly on purposive sampling to reach adults who experienced court involvement in their families, parents who participated in custody processes, and professionals working in the court system. The results of the study improve knowledge of the experiences of family court hearings involving deficit-based language in various contexts and the potential effects they may have on children and families. Professionals gain an understanding of the factors involved and make necessary adjustments to future child custody cases based on the feedback provided by the participants. Additionally, court staff is able to utilize the results as testimony and educate anyone who would be interested in this study about the value of utilizing child-centered language.

Elianis Rodriguez Arzola

Discipline: Biology

Authors:

Abstract Name: The Last of Us – The Sequel: The Quest for Uninfected Monarch Butterflies in Cuba

The monarch butterfly (*Danaus plexippus*) has become a model organism for studying host-parasite dynamics, particularly infections caused by *Ophryocystis elektroscirrha* (OE). In our previous research conducted in South Florida, we sampled monarchs from urban butterfly gardens in Miami and from natural habitats in the Everglades. Most monarchs collected from urban areas showed high OE infection levels, while monarchs from the Everglades showed no detectable spores (OE). To expand the geographical scope of this work, we conducted additional sampling in Cuba to determine whether OE is present in Caribbean monarch populations. Using standardized tape-sampling methods, we collected and screened monarchs from multiple Cuban locations. Although a few monarchs tested positive for OE, the majority showed no detectable infection. OE was present in Cuba but at a much lower frequency than in Miami's urban populations and closer to the patterns observed in the Everglades. This extended dataset allows for broader comparisons of OE prevalence across urban, natural, and international environments. By documenting infection levels in these distinct regions, this study provides updated insights into the distribution of OE in monarch populations across South Florida and Cuba.

Discipline: Biology

Authors:

#1 Subree Subramanian

#2 Travis Gates

Abstract Name: LAT1 Inhibition Impairs Metabolism and Proliferation in Colorectal Cancer

There is a critical unmet need to provide novel therapies for Colorectal Cancer (CRC) patients resistant to current treatment options. Immune checkpoint inhibitor (ICI) therapy is a novel modality for CRC treatment; however, most CRC patients (85%) have microsatellite stable (MSS) CRC, which makes them ineligible for current ICI treatments. Our lab has demonstrated that large amino acid transporter 1 (LAT1;SLC7A5) expression is enriched in CRC tumors compared to matched adjacent normal tissues. Furthermore, JPH203, a LAT1 inhibitor, was determined to reduce amino acid uptake, suppress cellular proliferation, slow tumor growth, and promote immunogenic tumor microenvironment formation in syngeneic in vivo tumor models. We wanted to functionally validate these observations by conducting knockdowns of LAT1 expression using a lentiviral vector to assess the role of LAT1 in CRC. Using LAT1 knockdown cell lines (shLAT1), we performed experiments to determine cellular proliferation, amino acid uptake, and metabolic energy phenotype in comparison to scramble control and wild-type cells. We found that shLAT1 significantly decreased cellular proliferation, reduced glycolytic energy potential, and reduced cellular amino acid uptake compared to scramble control and wild-type CRC cells. Future studies will assess how shLAT1 influences immune cell infiltrates in orthotopic in vivo animal models.

Alexandra Rodriguez Vega

Discipline: Biology

Authors:

#1 Addison Kanke

#2 Victoria Lemus

#3 Erika Camacho

Abstract Name: Impact of Age and Light Intensity on Blue-Light-Induced RGC Dysfunction

The increasing prevalence of artificial blue light (ABL) exposure from electronic devices and artificial lighting has raised concerns regarding its potential harm on the health and integrity of the eye. Chronic exposure to ABL has been found to negatively impact retinal health through mechanisms of oxidative stress, cellular apoptosis, and loss of function. Retinal Ganglion Cells (RGCs) combine signals from photoreceptors and excitatory/inhibitory signals generated through retinal processing to transmit both visual information to the brain, and modulate non-visual forming functions such as circadian rhythm, alertness, and mood-related behaviors. A subset of intrinsically photosensitive RGCs (ipRGCs), which express the photopigment of melanopsin, are particularly sensitive to blue-wavelength light and may exhibit early functional vulnerability with chronic exposure. The main goal of this study is to investigate how age at the time of exposure, light intensity, and duration of exposure influence susceptibility to blue-light-induced RGC dysfunction. C57BL/6J mice from two age groups, juvenile and adult, were exposed to either low intensity (600 lux) LED blue light for a short period of 3 consecutive days, or high intensity (1100 lux) LED blue light for a longer period of 7 consecutive days, with 12 hours of exposure per day. Functional changes were measured through Pattern Electroretinogram (PERG) recordings taken before and at multiple timepoints up to two months after exposure to measure the amplitudes of p1, n1, and n2, which represent the different response components from the inner RGC layer. Preliminary results suggest that the vulnerability of RGCs to high-intensity blue

light depends on age, with adults showing greater short-term functional depression and juveniles demonstrating increased resistance to blue light adverse effects. With continued data collection and analysis, I will discover if these patterns either persist or differ with the low intensity and long duration of exposure conditions.

Daryen Rodriguez-Saucedo

Discipline: Physics and Astronomy

Authors:

#1 Daryen Rodriguez-Saucedo

#2 Christopher Crawford

#3 Jamie Woodworth

Abstract Name: Mechanical Design of the Target Ladder for the BL3 Neutron Lifetime Experiment

The goal of the BL3 (Beam Lifetime 3) experiment is to resolve a longstanding discrepancy between measurements of the neutron lifetime using a beam versus trapped neutrons. Better determining the neutron lifetime will better refine our understanding of the fundamental laws of physics, explaining Big Bang Nucleosynthesis and the early evolution of the universe. A central component of the BL3 apparatus is the target ladder, which enables the precise positioning of multiple lithium-6 (Li-6) targets in the neutron beam within the vacuum chamber of the neutron detector. These deposits are crucial for measuring neutron beam intensity by capturing neutrons and producing charged particles that are detected downstream. To meet the necessary constraints we are constructing the target ladder from a combination of stainless steel and aluminum, materials selected for their mechanical strength, vacuum compatibility, and minimal activation under neutron exposure. As we highlight this design process which also includes detailed mechanical modeling, material selection based on thermal and structural properties, and careful consideration of vacuum constraints. The assembly incorporates features that aim to ensure accurate target placement, reduce thermal deformation, and allow consistent transitions between multiple target positions. As we are still in the assembly/testing phase of the parts, this current stage of the project focuses on finalizing mechanical assembly and preparing the ladder system for integration into the full setup that will be used. The work lays a foundation for reducing systematic errors and or uncertainty in neutron flux measurements, contributing to the broader experimental goal of improving neutron lifetime precision. Ultimately, this engineering effort supports advancements in both experimental techniques and the fundamental understanding of particle physics and cosmology. As it is crucial to have this deeper understanding in the project.

Kaitlyn Roers

Discipline: Biology

Authors:

#1 Rachel Olson

#2 Michaela Haas

#3 Brittany Brown

Jessica Korboi

Abstract Name: Isolating Environmental Phage Targeting E. coli

Course-based undergraduate research experiences (CUREs) play a critical role in addressing systemic inequalities in academia by providing research opportunities to students who might otherwise be excluded

from traditional, highly competitive, application-based programs. These experiences allow students to engage in authentic scientific inquiry, develop critical thinking skills, and gain hands-on experience that is often inaccessible in the conventional laboratory classroom setting. In this project, we aimed to establish a reliable method in which we can isolate K-12 *Escherichia coli* targeting bacteriophages from environmental and fecal samples. Rochester, MN has two lakes, two reservoirs, eight creeks and one river. Notably, Cascade lake, a popular local swimming site, is frequently closed due to elevated *E. coli* levels, highlighting the relevance of studying local environmental bacteriophages. We intend for phage isolation and extraction to serve as the foundation of a future CURE in which students will have autonomy in authentic scientific inquiry, including hypothesis formation, choosing sample sources, and interpreting results with unknown outcomes within the confines of the laboratory space and time. At UMR, however, faculty have been experiencing a consecutive seven-semester streak of failure with phage extraction following well-known protocols. In this project, we adapted and expanded a methodology developed by Dr. Sabrina Green, using a phage-specific buffer and filtration to separate phages from their host bacteria. We then performed a double agar assay to visualize resulting plaques. Using this filtration-based approach, we consistently succeeded in isolating and observing bacteriophages from soil and fecal samples. We also successfully recultivated and diluted emergent phages for continued use in future studies.

William Roehm

Discipline: Nursing and Public Health

Authors:

Abstract Name: Socioeconomic Inequality and Health Disparities among People Living with HIV/AIDS in China: Assessing the Impact of Urban-Rural Divides and Wealth Stratification on Clinical and Mental Health Outcomes

Socioeconomic inequality presents a barrier to robust HIV/AIDS treatment in China, particularly for individuals living in low income or rural regions. Prior research within this field suggests that distance from healthcare facilities, limited quantity of healthcare resources, and psychological distress can negatively impact engagement in HIV care. Within the field of Public Health, there has been a lack of an updated, concise review that explores how factors such as distance from healthcare facilities, limited healthcare facility resources, and psychological distress can affect clinical and mental health outcomes for people living with HIV (PLWH). I conducted a comprehensive literature review of antiretroviral treatment (ART) access, social determinants of health, and stigma among PLWH in China. Findings from these studies were used to understand the relationship of how urban-rural divides, poverty, food insecurity, and HIV related stigma can contribute to delayed ART initiation, reduced treatment adherence, and worsening mental health. Across multiple studies, PLWH in rural regions experienced significantly longer travel times to HIV healthcare facilities. These healthcare facilities had fewer resources, such as hospital beds, which contributed to lower treatment adherence and uptake. Income instability, such as poverty and unemployment, were strongly associated with a lower quality of life and poor treatment adherence. HIV stigma was also positively correlated with depressive symptoms and suicidal ideation potentially causing disengagement from care. Socioeconomic inequities significantly worsened HIV clinical and mental health outcomes among PLWH in China. Policies such as the Four Frees and One Care and National Free ART Program have expanded access to ART, however, there are still challenges in rural regions. Based on this review, new policies should prioritize convenient travel to rural HIV care clinics and reduce financial costs to improve treatment accessibility and overall well-being among PLWH in China.

Willa Rogers

WI - University of Wisconsin-Eau Claire

Discipline: Gender, Ethnicity, Diversity, or Cultural Studies

Authors:

Abstract Name: From Local Stages to Global Stories: A Cinematic Exploration of Music, Culture, and an Evolving Global Perspective

This project explores how cultural exchange through music fosters a sense of shared community, centering on my experiences in both local and international settings. Over multiple trips to Japan, I have documented how American music genres, like rock and blues, are embraced and reinterpreted within Japanese culture. By blending on-location research, collaborative filming, and personal reflection, this project highlights how music bridges cultures and expands our understanding of belonging. As I immersed myself in this ongoing journey, working with local musicians and capturing performances in various communities, each step not only contributed to the film but also reshaped my own global mindset. Every encounter revealed how music creates shared spaces of community, helping me grow in confidence and understanding. Ultimately, this project highlights how the experience of creating a cross-cultural film can illuminate the powerful role of music in building connections and transforming our understanding of both local and global communities. It dives into the evolving perspective of a researcher who, through each phase of the project, gains new insights into the universal language of music, the beauty of shared human connection, and the confidence that comes from stepping beyond one's comfort zone.

Nevaeh Rogers

Discipline: Social Work and Human Services

Authors:

#1 Grace O'Halloran

#2 Nevaeh Rogers

#3 J'Miah Carson

Abstract Name: The Impacts of Hygiene Disparities on 4-Year University Students

While food insecurity has been widely studied, hygiene poverty remains an overlooked issue. College students across the United States face growing challenges in meeting their basic needs, including access to food and hygiene products. The student researchers examine hygiene poverty at a rural four-year university in Texas, focusing on how limited access to hygiene items affects college students' well-being and success. The following research questions were developed: (1) "How does hygiene poverty impact four-year university students?" and (2) "Is there a distinction between traditional and non-traditional students as it pertains to hygiene?" This descriptive study explores this gap in available resources. Hygiene disparities on college campuses are relevant to the social work profession because it deals with basic needs, self-esteem, dignity, and academic performance. The targeted sample size is 75 traditional and non traditional students who are enrolled at a four year university. A non-probability, convenience, and purposive sampling approach is used to recruit participants in the examination of hygiene needs among university students. Participants are recruited from convenient locations such as the campus pantry, Greek life meetings, and existing campus tabling events. The survey includes 34 questions in total with three sections that include, demographics, hygiene access and affordability, and personal or sensitive experiences.. The feedback from the participants helps identify which hygiene products are most needed and how access to these items influences students' daily lives. The results help the university make improvements to the pantry and develop new hygiene drives and strengthen community partnerships to make sure that access to hygiene products stays consistent. Additionally, the knowledge gained from this study contributes to social work research by highlighting the importance of addressing hygiene poverty as a critical component of student support and overall success.

Richard Rogers

Discipline: Environmental Science and Sustainability

Authors:

#1 Lisa Rodrigues

Abstract Name: Microplastics in Philadelphia's Grey Squirrels (*Sciurus carolinensis*) and Canada Geese (*Branta canadensis*)

Microplastics (MPs, < 5 mm) are ubiquitous in the environment and bioaccumulate in organisms when unintentionally ingested or mistaken for food. To assess the pervasiveness of MPs in Philadelphia's wildlife, fecal samples were collected from grey squirrels (*Sciurus carolinensis*) and Canada geese (*Branta canadensis*) that were brought to the Wildlife Clinic at The Schuylkill Center for Environmental Education. The date and location where the individual was found and its approximate age were recorded with each sample. Fecal samples from sixteen squirrels and thirteen geese were collected by clinic staff. In the laboratory, samples were examined for MPs by sieving, density separation, and spectroscopy. We found an average of 27 MPs per squirrel and 117 MPs per goose, with average concentrations of 667 ± 648 and 603 ± 309 MPs per gram of feces, respectively. No correlations were found between MPs and age or location, suggesting an even distribution of MPs throughout Philadelphia. The overlap in concentrations of MPs between both species suggests they are being equally exposed to MPs, and that MPs are present in most places these animals inhabit. This is concerning because these species do not have similar diets and demonstrates that MPs are likely in several levels of the regional food web. As mammals, MPs in grey squirrels may indicate MPs found in humans, children, and/or pets that play outside. As a semi-aquatic migratory species, Canada geese may act as a vector of MPs among regions.

Lucas Rohl

Discipline: Physics and Astronomy

Authors:

#1 Michael Rutkowski

Abstract Name: Artificial Night and Effects on Ecosystems

Artificial light at night (ALAN) is a growing source of skyglow that degrades astronomical observations, and has significant broader impacts on public health and ecology around the area. This research measures the ALAN around the campus of Minnesota State University, Mankato and the observatories on campus. Across two nights of observation, we assessed ALAN on campus at around 90 unique locations; these data have been extended with additional measurements from introductory astronomy students. We used an Opble Light Master device to measure the illuminance (lux), the correlated color temperature (CCT), shielding quality, and flicker state of each light. We measured illuminance levels between 14-161 lux, CCT were consistently high, falling between 3570-4075 K, characteristics of cool-white LEDs known to contribute strongly to Rayleigh scattering and skyglow. Photometric flicker data showed mostly "no risk", but with intermittent high risk spikes concentrated near specific posts. This indicated inconsistent LED driver performance which can further produce migraines in people and negatively affect their sleep schedule. This data provides a quantitative baseline for understanding how campus lighting contributes to ALAN and supports future recommendations for adopting warmer-cooler, lower-intensity, and flicker stable lighting solutions to reduce environmental and astronomical impacts.

Discipline: Biology

Authors:

#1 Joshua Kramer
#2 Xiaosen Ouyang
#3 Adam Wende
#4 Martin Young
#5 Victor Darley-USmar
#6 Jianhua Zhang

Abstract Name: Investigating Cardiomyocyte Mitophagy Dynamics in the Left Ventricle of the Mouse Heart Following Transverse Aortic Constriction

Cardiovascular diseases are the leading cause of death globally, with mitochondrial dysfunction being a key feature of their pathogenesis. Mitochondria are vital for converting fuel (e.g. fatty acids and glucose) into ATP within the heart to support cellular function and blood flow to the body. When damaged, mitochondria undergo a lysosomal-mediated degradation process known as mitophagy to prevent further accumulation of reactive oxygen species which can further modify cellular proteins and lipids and exacerbate damage. Cardiomyocytes are primary cells of the heart that play an important role in cardiac contractile function. In this study, we used the mito-QC mouse model which expresses a dual fluorescent mitochondrial targeted fusion protein mCherry-GFP, which exhibits both green and red fluorescent signals in the mitochondria under basal conditions, but will fluoresce only red when undergoing mitophagy due to the acidic lysosomal environment. This allows us to visualize mitophagy under fluorescent microscopy. Using the desmin antibody which specifically stains cardiomyocytes, we investigated whether there are changes in mitophagy activity within cardiomyocytes in the left ventricle of the mouse heart following transverse aortic constriction (TAC) compared to sham-operated controls in both male and female mito-QC reporter mice. At 4 days post TAC, we found an increase in overall mitophagy activity, with males having higher levels of mitophagy activity compared to females, which are mostly attributed to an increase in mitophagy activity within cardiomyocytes of the left ventricle following TAC.

Alex Rojas

Discipline: Computer Science

Authors:

#1 Alex Rojas
#2 Sagar Patil
#3 Alayna Zafar
#4 Muhammad Imran
Sagar Patil
Alayna Zafar

Abstract Name: Beyond the Baseline: A Comparative Analysis of Vision-Language Models and ResNet50 for Few-Shot and Full-Data Cancer Classification

Accurate classification of medical images is a critical task in oncology, but it often relies on large, manually annotated datasets. While deep learning models like ResNet50 are the standard, they traditionally require this “big data.” This research investigates the performance of Vision-Language Models (VLMs) as a powerful alternative, particularly in data-scarce scenarios. We conducted a rigorous comparative study of a fine-tuned ResNet50 baseline against a VLM (CLIP) on two distinct medical imaging modalities: a binary breast cancer

histopathology dataset and the 7-class HAM10000 dermatoscopy (skin cancer) dataset. We evaluated both architectures across three paradigms: (1) zero-shot classification (VLM only), (2) 10-shot learning, and (3) full-dataset training, measuring accuracy, weighted F1-Score, and AUC-ROC. Our results reveal a nuanced performance landscape. In the zero-shot setting, the VLM's performance was modality-dependent: it failed on abstract histopathology images (0.41 AUC) but demonstrated baseline capability on photo-like skin lesions (0.62 AUC). The few-shot (10-shot) comparison yielded a critical finding: ResNet50 outperformed the VLM on the abstract histopathology data (0.706 vs. 0.648 F1-Score), while the VLM outperformed ResNet50 on the "real-world" photo dataset (0.558 vs. 0.518 F1-Score). Most significantly, in the full-data setting, a VLM linear probe (training only a final classifier head) consistently outperformed the fully fine-tuned ResNet50 on both datasets, achieving a higher AUC-ROC on both breast (0.940 vs. 0.931) and skin (0.944 vs. 0.917) cancer. This study demonstrates that the pre-trained feature space of VLMs is exceptionally robust, capable of outperforming traditional CNNs even with significantly less training. Furthermore, our findings suggest the optimal few-shot learner is data-dependent: ResNet50's ImageNet features may be superior for abstract patterns, while a VLM's web-scale features are more effective for photo-realistic medical images.

Angela Victoria Rojas Rivera

VA - George Mason University

Discipline: Biology

Authors:

#1 Marissa Howard

Abstract Name: Extracellular Vesicles Provide a Real-Time Recording of Intracellular Signaling: EGFR receptor presence and implications for personalized therapy

Breast cancer is a leading cause of cancer-related deaths worldwide. While current treatments target specific cell-surface receptors and improve outcomes, the disease's aggressiveness stems from abnormal signaling pathways that drive uncontrolled growth and survival. The epidermal growth factor receptor (EGFR) family, particularly EGFR and HER2, plays a critical role in cell signaling related to proliferation, survival, and progression of breast cancer. To better understand the causes of cancer aggressiveness, the extracellular signaling activity of EGFR was investigated in triple-negative breast cancer (TNBC) 4T1 cells, which, despite their classification, display wild-type EGFR and HER2 receptors similar to double-positive MDA-MB-361 cancer cells. Phosphorylation of cytoplasmic regions of EGFR and HER2 strongly correlate with patient susceptibility to anti-HER therapy. HER2 and EGFR signaling at the cell surface is followed by movement of the receptor complex into endosomes. It is unclear whether these endosomes become extracellular vesicles (EVs) that reflect the internal signaling events of the cells that release them. EVs may offer a way to eavesdrop on the ongoing internal signaling activity of the HER family receptors and could potentially be used to individualize therapy. 4T1 and MDA-MB-361 cells were treated with EGF, then EV isolation was performed through centrifugation, and remaining cells were lysed. EVs were purified using IZON columns before Western Blot analysis. Phosphorylation of EGFR (Y1068) and HER2 (Y877) was measured at different times after ligand stimulation and compared to the EVs released by the same cells. p-EGFR was clearly elevated in the EVs in a dose- and time-dependent manner. These results suggest that the phosphorylated state of HER family receptors in EVs can reflect internal signaling. This finding has clinical implications and may help guide future personalized therapies using EVs from tumor biopsies or blood samples

Nirmay Rokad

Discipline: Biology

Authors:
#1 Nirmay Rokad
Ohm Tripathi

Abstract Name: Evolving Trends in Organ Donation, Recovery, and Utilization in the United States: A Decade of Change and the Impact of COVID-19

Background: Over the past decade, organ donation and transplantation in the U.S. have undergone substantial changes, influenced by evolving donor practices and the COVID-19 pandemic. We examined national trends in donor types, organ recovery, utilization, and discard rates between 2012 and 2023. **Methods:** We analyzed SRTR/OPTN registry from 2012–2023, including total deaths, DBD (donation after brain death); DCD (donation after circulatory death); NRP (normothermic regional perfusion), organ authorization, recovery, transplantation, and discard rates. Pre-COVID (2016–2019) was compared with post-COVID (2020–2023). **Results:** A total of 259,544 deaths and 134,625 DD were analyzed. DD increased by 100.6% and DD per death by 52.7%. DBD remained predominant (76.5%), but DCD donors increased markedly—especially DCD with NRP (+1496.3%). Organ authorizations, recoveries, and transplants rose 106.3%, 97.4%, and 76.1%, respectively. Post-COVID, donations, recoveries, and transplants increased significantly, but organ recovery and transplant efficiency ratios declined. Kidneys and livers remained the most commonly recovered and transplanted organs. Average organs transplanted per donor declined post-COVID (2.75 vs. 3.05, $p=0.009$), with decreases across most organs, particularly pancreas, liver, heart, and lung. DCD with NRP donors showed increased yield, while DBD and DCD without NRP declined. Discard rates rose for most organs, with pancreas and kidney having the highest. **Conclusion:** Despite substantial increases in donor numbers and organ availability, organ utilization efficiency has declined post-COVID. The rapid growth of DCD, particularly with NRP, represents a critical opportunity for expanding the donor pool. Efforts to reduce discard rates and improve utilization efficiency will be essential to maximize transplant benefit in the coming decade.

Rishita Rokariya

Discipline: Biochemistry

Authors:
#1 Kirill Afonin

Abstract Name: Nucleic Acid Nanoparticles in Immunological Design and Therapeutic Development

Nucleic acids can be engineered to self-assemble into nucleic acid nanoparticles (NANPs), offering a programmable platform for immunomodulation, therapeutic delivery, and disease-relevant intervention. The Afonin Lab is actively developing NANPs with tunable biological behavior to address clinical challenges in infection, cancer, cardiovascular disease, and drug safety. Our ongoing work investigates how NANP sequence, architecture, and physicochemical properties shape immune recognition and cytokine output. Recent studies in the lab demonstrate that immune response can be predicted directly from NANP sequence using transformer-based deep-learning models capable of forecasting IFN- β and IL-6 levels with high accuracy. In parallel, we examine how composition and delivery vehicles, including PAMAM dendrimers and lipid carriers, influence cellular uptake and subsequent activation of immune signaling pathways such as RIG-I, IRF, NF- κ B, and cGAS-STING. Structural format is also a critical variable; DNA- and RNA-based fibers, cubes, and condensates display distinct immune profiles, and aptamer functionalization can suppress or enhance interferon responses depending on scaffold accessibility. Translational relevance is highlighted by current work showing that NANPs augment type-I interferon responses in *Staphylococcus aureus*-infected osteoblasts and osteoclasts, reducing bacterial survival and demonstrating potential as immunostimulatory adjuncts for persistent infections. Collectively, our research advances the design of nucleic acid nanostructures as customizable immunomodulatory tools. By controlling topology and sequence, we aim to

develop next-generation NANP-based platforms for therapeutic delivery, antimicrobial defense, and immune engineering. The purpose of this presentation is to synthesize current evidence on how NANPs interface with the immune system, with particular focus on the determinants of immune recognition, activation, and therapeutic modulation. By reviewing current studies in nucleic acid nanotechnology, including studies on AI-guided immune prediction, structural drivers of immunostimulation, backbone modifications, dendrimer delivery platforms, and biomedical applications, we aim to identify shared mechanisms, emerging strategies, and remaining knowledge gaps.

Mikhail Rolsen

Discipline: Biology

Authors:

#1 Mikhail Rolsen

#2 Justin Hales

#3 Nathan Cherry

#4 Rosario Marroquin-Flores

Abstract Name: Interventions and outcomes of service-learning in undergraduate STEM classrooms: a scoping review

Service-learning is a pedagogical practice that allows students to engage with outside communities while learning course content. Students in service-learning courses gain a better understanding of the material, develop problem-solving skills, and experience improved motivation. While there are several benefits of service-learning, there is a lack of literature to guide the development of STEM service-learning courses. We are using guidelines from the Joanna Briggs Institute and Prisma extension for scoping reviews to characterize STEM service-learning. The research is guided by the following questions: 1) How have instructors implemented service-learning in undergraduate STEM environments, and 2) What outcomes do students experience by participating? Primary research and review articles on service-learning in STEM undergraduate classrooms within U.S institutions were included in the review. Articles (n = 8,111) were identified from the PUBMED, SCOPUS, and EBSCO databases, and duplicates (n = 3,489) were removed. In the first-round screening, we analyzed titles, abstracts, and key words, and removed articles that did not fit our inclusion criteria (n = 4,208). We are currently doing a full-text screening of the remaining articles (n = 414). Approximately 50% of the remaining articles have been screened by at least one researcher. Engineering (22%), Biology (13%), and Environmental Science (9%) are best represented within the dataset. The next step of the research will involve qualitative coding to discover common themes among the articles. Results from this study will be used to describe best practices for STEM service-learning and to aid in the development of novel service-learning programs in STEM.

Joseph Romano

Discipline: Biology

Authors:

#1 Clesson Higashi

Abstract Name: Quantifying Banana bunchy top viral components to understand how Wolbachia endosymbiont impacts virus transmission

Banana bunchy top virus (BBTV), a multipartite single-stranded DNA virus, is a devastating pathogen of

bananas worldwide and is transmitted in a persistent, circulative, non-propagative manner by the aphid *Pentalonia nigronervosa*. The bacterial endosymbiont *Wolbachia pipientis* is known to reduce BBTv transmission in its aphid host, but the mechanism has remained unknown, particularly since the virus does not replicate in the vector. This study investigated the hypothesis that *Wolbachia* interferes with BBTv by altering the accumulation of its genomic components within the aphid. *Wolbachia*-positive and *Wolbachia*-negative aphids were allowed to acquire BBTv from infected plants over varying time periods. Quantitative PCR was used to measure the accumulation of all six BBTv genomic components (DNA-R, -S, -C, -N, -U3, -M). The results demonstrated that *Wolbachia* infection significantly modulates viral component accumulation. Notably, DNA-S, which encodes the viral capsid protein (CP), consistently accumulated to lower levels in *Wolbachia*-positive aphids. In contrast, the accumulation of other components, such as DNA-R and DNA-C, was often higher in the presence of *Wolbachia*. The specific suppression of the capsid protein component suggests a targeted interference mechanism, where a deficit in CP could compromise virion assembly and stability, thereby impeding the successful circulative transmission of BBTv. These findings reveal a novel function for *Wolbachia*, expanding its role beyond blocking replicative viruses to include disrupting non-propagative, circulative transmission, with significant implications for developing symbiont-based strategies for managing plant viral diseases.

Dylan Romero

Discipline: Physics and Astronomy

Authors:

#1 Clifton Murray

#2 Ean Elias

Ean Elias

Abstract Name: Discharging From a Distance with a Van de Graaf “antenna”.

While working with a Van de Graaf (VdG) generator, we observed a phenomenon not normally listed for electrostatic demonstrations: By using a simple “antenna” with the VdG, one can neutralize a charged object located two or more meters away, with no interconnecting conductor. We here report on (1) Distance-discharging both a charged pom-pom and another charged VdG; (2) Reversing the polarity of the VdG and charged object, and comparing time-to-neutralize for negative versus positive corona, and (3) using an electric field mill to detect the “ion wind” (a.k.a. “electric wind”) emitted by the antenna.

Maria Romero

Discipline: Physics and Astronomy

Authors:

Venus Ibarra

Abstract Name: Interplanetary drivers of major geomagnetic storms.

The importance of studying geomagnetic storms and their solar drivers has been recognized as a fundamental concern and a central part of geophysics for decades. In short, a geomagnetic storm is a major disturbance of Earth's magnetosphere and constitutes the most important component of space weather effects on Earth. It is widely accepted that the coupling dynamics between disturbances in the solar wind and the Earth's magnetosphere is the main cause of geomagnetic storms. Interplanetary coronal mass ejections (ICMEs) and high-speed solar wind streams (HSS) from corotating interaction regions (CIRs) are the main sources of such

disturbances in the solar wind. By a superposed epoch analysis, this work is focused on validating the coupling dynamics between the solar agent and the Earth's magnetosphere by characterizing the perturbation in the solar wind causing some major geomagnetic storms. The used index for selecting major geomagnetic storms was the well-known Dst index: all cases under this study were classified as severe or extreme geomagnetic storms with $Dst \leq -200$ nT. In the case of the solar wind, we used the magnetic field, ion temperature, the β -plasma, and the flow speed.

Devin Rondeau

Discipline: Political Science

Authors:

Abstract Name: Political, Economic, and Social Forces Behind the Post-2008 Rise of Populism and Its Influence on Democratic Governance

Since the 2008 global financial crisis, many developed countries have experienced a pronounced rise in populist and nationalist movements, yet the specific political, economic, and social dynamics driving this shift remain contested. This project investigates why these movements have gained traction across democracies and examines how they have subsequently shaped electoral outcomes and policy decisions. The research is motivated by the need to understand how long-term economic insecurity, political distrust, and social polarization interact to reshape democratic norms and political behavior. To address this question, the study draws on a mixed qualitative and historical methodology, combining surveys, interviews, and systematic analysis of political speeches with a comparative review of major political events since 2008. Surveys and interviews capture citizens' perceptions of economic inequality, cultural identity, and institutional legitimacy, while the textual analysis of speeches allows for identifying recurring rhetorical strategies, emotional appeals, and narratives used by populist leaders. Historical and comparative analysis provides a broader lens through which to track how crises, austerity measures, and shifting social conditions influenced the appeal of these movements over time. Preliminary findings suggest that economic displacement, perceived cultural threat, and declining trust in political institutions converge to create openings for populist actors who promise restoration, protection, or profound institutional change. These movements have influenced elections by mobilizing previously disengaged voters and reshaping party coalitions, while their policy effects include stricter immigration measures, challenges to international cooperation, and reforms aimed at centralizing executive power. Understanding these dynamics contributes to broader conversations about democratic resilience and offers insight into how governments, civil society, and voters might respond to continued populist influence in future political cycles.

Pascal Roney

Discipline: Physics and Astronomy

Authors:

#1 Tyler Luchko

Abstract Name: Using Machine Learning to Predict RISM 1D Equations

Our research aims to find a faster way to model liquids using the reference interaction site model (RISM) of molecular solvation. This application uses a statistical-mechanical method to compute different functions, such as the radial distribution function and the thermodynamics of a liquid, which uses hard to solve equations taking longer computation time. Our solution to this problem is to train a neural network to

approximate the outcomes for said RISM equations, providing better estimates for more complicated solutions. By collecting and storing data ran from RISM, the neural network uses it to train and predict solved equations of RISM, thus providing a faster way to calculate interactions between the solute and solvent within a solution. The neural network is then used to predict more complex solvents/cosolvents instead of water, like salts (sodium chloride) and ethanol at different densities and temperatures at which it uses the potential energy function to predict these RISM solutions. This may in turn help the time for computation of these equations and provide how different solvents and solutes interact, especially at higher concentrations giving better predictability in wet labs.

Alexander Roop

Discipline: Computer Science

Authors:

#1 Alexander Roop

#2 Aaron Frist

Aaron Frist

Abstract Name: ARISE: Real-Time Multi-Modal AI for Senior Wellness on Edge Devices

The global rise in the aging population presents growing challenges for maintaining physical activity, rehabilitation, and independent living. While digital exercise tools have emerged, many fail to balance performance, privacy, and accessibility—particularly for older adults using low-power devices. This paper introduces ARISE, a multi-modal, privacy-preserving AI system that integrates human pose estimation and conversational interaction to create an engaging at-home exercise experience. Implemented entirely on the network edge, ARISE leverages the Raspberry Pi 5 and Hailo-8 Neural Processing Unit (NPU) to achieve real-time, on-device computation without reliance on cloud services. The system combines a YOLOv8m-Pose model for body tracking with a voice-based conversational pipeline using Vosk (speech-to-text), LLaMA (language model), and Kokoro-TTS (speech synthesis) for natural feedback and guidance. Experimental results demonstrate significant reductions in inference latency with NPU acceleration and optimized conversational responsiveness through adaptive chunking and segmentation strategies.

Grace Roopcharan

Discipline: Psychology

Authors:

#1 Grace Roopcharan

#2 Laura Ramsey

#3 Teresa King

#4 Abigail Santos

#5 Regan Mullins

#6 Thuy Nguyen

#7 Hailey Barrett

Abstract Name: Empowerment Through Education: Developing an Accessible Sexual Health Curriculum

This project focuses on the development of a comprehensive and accessible sex education program tailored for college students with intellectual disabilities. The study aims to increase sexual health literacy, relationship skills, and self-advocacy in young adults with intellectual disabilities through a peer mentoring

model. The design reflects recent research using peer mentor approaches, and accessible education (McGrath et al., 2025; Nelson et al., 2025). Previous research suggests that people with intellectual disabilities benefit from sexual education that is relatable, empowering, and uses real experiences. Peer educators are helpful in reducing stigma, increasing engagement and information retention (James et al., 2022; Toman et al., 2024). In recognizing the limited availability of developmentally appropriate sexual health resources for this population, this project designed a comprehensive and accessible four-week curriculum using plain language, visual aids, interactive activities, and repetition to strengthen understanding and engagement. This project aims to design and test a curriculum that teaches sexual health and related topics in a relevant, respectful, and developmentally appropriate way for the community it serves. We plan analysis the curriculum using a mixed-methods approach with pre/post survey and interview data. Our population includes young adults over 18 enrolled in the EXCEL program at Bridgewater State University that present with approximately 70 or below IQ score and are eligible for special education in Massachusetts. Ultimately, our goal is to expand access to equitable sexual health education, promote healthier relationships, and support a more empowered and inclusive environment for adults with intellectual disabilities.

Meredith Root

Discipline: Psychology

Authors:

Lydia Calderwood

Abstract Name: Social Media Use, Perfectionism, and Gender as Predictors of Body Dissatisfaction

Body dissatisfaction is an increasingly prevalent concern among college students, and prior research has shown the devastating implications of body dissatisfaction, particularly its role in the development, maintenance, and relapse of eating disorders. These factors can lead to overall negative outcomes such as anorexia nervosa, low-self esteem, depression, or cosmetic surgery. Social media use, perfectionism, and gender have long been shown to correlate with body dissatisfaction and disordered eating. Gender, for instance, is a significant factor in the development of body dissatisfaction, eating disorders, and mental health issues, often due to societal pressure to conform to gendered expectations. Consequently, this study examined whether rigid, self-critical, and narcissistic perfectionism, as well as social media use and gender, would predict body appreciation, using a sample of 139 (85 females; 53 males; 1 “Other”) undergraduate students. Materials included the Big Three Perfectionism Scale-Short Form (BTPS-SF), the Social Media Use Scale (SMUS), and the Body Appreciation Scale-2 (BAS-2). To analyze the data, a multiple linear regression study was used to establish results. Results showed that many of the anticipated relationships were significant, including the following predictors of body appreciation: self-critical perfectionism, social media use, and gender. However, rigid and narcissistic perfectionism did not predict body appreciation. These findings suggest that external social pressures, personality traits, and gender are associated with body dissatisfaction and demonstrate the importance of utilizing multifaceted models of personality in the study of body image. Further implications of these findings are discussed and directions for future research are posited.

Ines Rosales

Discipline: Biology

Authors:

#1 Heather Judkins

Abstract Name: Effect of Ocean Acidification on Shell Dissolution of the Pteropod *Clio pyramidata* from the

Gulf of Mexico

Rising atmospheric carbon dioxide is reducing the pH and calcium carbonate concentrations in our oceans. The average ocean pH is currently ~ 8.01 and is estimated to drop to ~ 7.78 by the year 2100. Organisms that rely on calcium carbonate to build their shells or skeletons, such as corals, coccolithophores, and some sea snails, would be some of the first organisms affected by these shifts in ocean chemistry. Pteropods, an open water sea snail, are especially vulnerable since their shells are made from aragonite, which is more easily dissolved. This study aims to evaluate how the projected 2100 ocean conditions could affect the pteropod *Clio pyramidata* from the Gulf of Mexico. Shells from nonliving organisms will be exposed to low pH, and the level of shell dissolution will be quantified by measuring shell thickness and external corrosion of shells. Past studies have mostly focused on the Arctic species *Limacina helicina* and little is known about the effects of ocean acidification on other species. *Clio pyramidata* has a much thinner and elongated shell than *L. helicina* and the results from this study could help determine whether different species and shell morphologies are more vulnerable to ocean acidification.

Valeria Rosales

Discipline: Biochemistry

Authors:

#1 Alexis Holwerda

#2 Keith Keitz

Abstract Name: Cyclopropanation Catalysis Via *Shewanella oneidensis*

Cyclopropanes are integral to many pharmaceutical products, but due to their high ring strain, synthesis often requires dangerous conditions. *Shewanella oneidensis* is an electroactive facultative anaerobe with a metal respiratory pathway and the ability to facilitate synthetic transformations via extracellular electron transfer (EET), making it a potential biocatalyst for compounds like cyclopropanes. By investigating the biocatalytic abilities of *S. oneidensis*, we worked to determine if *S. oneidensis* could respire using cyclopropanation products and whether the concentration of these products affected cell survival. Using biological and chemical techniques, including cell culturing and colony counting, results showed an average increase of colony forming units (CFU) in wild-type *S. oneidensis* as cyclopropanation product concentration in growth media was raised and a decrease in CFU in mutant bacteria. Using whole cell biocatalysis, and analysis via gas chromatography-mass spectrometry, we investigated how cyclopropanation ability was affected by different EET genetic knockout strains of the bacteria. We observed significantly decreased cyclopropanation product yield in knockout strains as compared to the wild-type. These results suggest that *S. oneidensis* may depend on the metal respiratory pathway to utilize cyclopropanation products. There also may be some concentration dependence, as higher concentrations of these compounds are associated with higher cell survival in wild-type bacteria. EET knockout strains seem to also have lessened cyclopropanation ability. With further refinement of experimental procedure and larger sample sizes, the genes responsible for cyclopropanation could be further narrowed down and the rate of synthesis could be placed under genetic control for a broad range of biochemical applications.

Abigail Rosario

Discipline: Sociology

Authors:

Abstract Name: Generations Apart: The Impact of Puerto Rican Residency in the United States on Identity and Perceptions of Latinidad

Puerto Rico, home to some of the greatest talents in music and athletics, with its rich history, culture, and people. However, behind the beauty of the archipelago lies a story of displacement, resilience, and colonization. Puerto Rico remains a colony of the United States and the oldest colony in the world. This colonial status creates a unique relationship in terms of migration, as Puerto Ricans have been granted U.S. citizenship since the Jones-Shafroth Act of 1917. Over 5.9 million Puerto Ricans reside in the United States, while over 3.2 million people reside in Puerto Rico, thus making those in the diaspora outnumber those who remain in the archipelago. In my research, I ask how does the generational distance and displacement from Puerto Rico shape Puerto Rican self-identification and (pan)ethnic identity? Using a qualitative approach, I conducted one-to-two-hour long, one-on-one interviews, both in person and over Zoom. I interviewed over forty individuals who identify as Puerto Rican. Within this sample, I interviewed people who identify as currently living in the archipelago, those who are in transit and travel between the U.S. and Puerto Rico, first-generation Puerto Ricans in the United States, second-generation, and third-generation and beyond. Puerto Rican migration to the U.S reshapes Puerto Ricans' understanding of belonging, nationhood, and racial/ethnic identity. Through my research, I have discovered that leaving the archipelago, no matter what generation they have left, comes with uncertainty and internal/external measurement of authenticity to one's Puerto Rican identity. The displacement of the island has caused Puerto Ricans to question how Puerto Rican they are, which then in turn affects the actions taken towards strides to anticolonial practices, cultural maintenance, and political behavior. Puerto Rican identity has become multisite and negotiated, not limited to birthplace, thus contributing to a transnational Puerto Rican nationhood.

Jacob Rosario

Discipline: Biology

Authors:

Abstract Name: Title: Triptolide and Organelle Stress: Unlocking New Paths in Cancer Therapy

Background: Triple-negative breast cancer (TNBC) remains one of the most aggressive subtypes of breast cancer, lacking effective targeted therapies. Triptolide, a bioactive compound derived from *Tripterygium wilfordii*, exhibits potent anti-cancer properties in malignant cells. However, its impact on non-cancerous human mammary epithelial cells (HMECs) and the mechanisms underlying organelle-specific stress responses remain poorly understood. Objective: This project seeks to elucidate whether triptolide induces stress in critical organelles—nucleus, lysosomes, and mitochondria—in HMECs and to determine how these changes may activate cell death pathways. Understanding these mechanisms is essential for evaluating triptolide's therapeutic index and minimizing off-target toxicity. Methods: HMECs will be cultured and treated with graded concentrations of triptolide. Organelle integrity will be assessed using fluorescent markers: DAPI for nuclear morphology, LysoTracker Green for lysosomal activity, and Mitotracker Green for mitochondrial function. Fluorescence microscopy will be employed to visualize chromatin condensation, lysosomal membrane stability, and mitochondrial potential. Significance: By clarifying triptolide's effects on non-cancerous cells, this research contributes to the development of safer, lysosome-targeted cancer therapies and underscores the potential of natural compounds in overcoming chemotherapy resistance. Student Impact: Conducted by a Hispanic undergraduate at a Hispanic-Serving Institution, this project exemplifies inclusive research practices and mentorship that advance diversity in STEM and prepare students for graduate-level biomedical research.

Mia Rosati

Discipline: Biology

Authors:

#1 Mia Rosati

#2 Mya Abers

Abstract Name: Exploring Temperature Acclimation in Brook Trout White Muscle from qPCR Analysis

Climate change is steadily progressing, leading to elevated water temperatures in aquatic systems. Such thermal increases often result in biological stress as energy budgets are disrupted. Brook trout are predicted to experience a significant climate-driven decline in the upcoming decades as their habitats will continue to warm. Thermal acclimation is a key mechanism that may mitigate some of the impact a changing climate can have. Acclimation to warm water leads to a reduction in resting metabolic rate in brook trout. In this study, we examined how shifts in temperature influence gene expression in brook trout white muscle. Gene expression levels were quantified via qPCR for a selection of gene targets following reverse transcription of RNA extracted from the white muscle tissue. Our findings indicate that acclimation to elevated temperatures induces measurable changes in brook trout gene expression. Warmer conditions are associated with shifts in genes associated with metabolism and an overexpression of stress related genes. These results are consistent with an acclimation response that may mitigate some of the impact of climate change but also reflect an increase in biological stress when the fish encounter higher water temperatures.

Keilan Roseheart

Discipline: Biology

Authors:

#1 Keilan Roseheart

Abstract Name: Examining the role of MAP3K4 and HDAC6 on fetal and placental growth in the 129/SvEv background

Fetal growth restriction (FGR) affects up to 10% of human pregnancies worldwide. FGR is a risk factor for multiple disease states in adulthood, including cardiovascular disease and diabetes. Placental dysfunction is one of the principal causes of FGR. Recently, our lab demonstrated that an enzyme called mitogen-activated protein kinase kinase kinase 4 (MAP3K4) has a critical role in embryonic and placental growth in mice. MAP3K4 kinase inactive mice (Map3k4KI/KI) also have reduced survival at weaning age, representing 6% of the total population. The few Map3k4KI/K mice that survived were significantly smaller than wild-type mice, a hallmark of FGR. We also demonstrated that the enzyme histone deacetylase 6 (HDAC6) is hyperactive and overexpressed in Map3k4KI/KI trophoblast stem cells that differentiate into the major cell types of the placenta. However, a role for HDAC6 in normal placental development is unknown. The goal of this project was to test the hypothesis that hyperactive HDAC6 has a role in the lethality and growth restriction phenotype of Map3k4KI/KI mice. To test this hypothesis, we genetically deleted Hdac6 from Map3k4KI/KI mice through a breeding strategy with a commercially available Hdac6 knockout strain from Jackson Laboratory. Using the mice gained from this line, we then bred them and dissected each conceptus from pregnant mice 13.5 days post plug confirmation. These were then imaged, the placentas weighed, and the embryos were genotyped. Our results suggest that deletion of Hdac6 improved midgestational growth of Map3k4KI/KI embryos and placentas. Collectively, our findings demonstrate a previously unidentified role for HDAC6 in embryonic and placental growth in mice.

Mariajosé Roselló Báez

Discipline: Political Science

Authors:

#1 Mariajosé Roselló Báez

Abstract Name: Refusal and the Aesthetic Origins of Political Thought

Political thought rarely emerges from formal theory alone. Instead, political consciousness often arises from the images, emotions, and cultural encounters that make power visible before individuals ever engage with canonical texts. Traditional approaches tend to present political theory as something grounded in rational argument and normative principles, yet these frameworks overlook the experiential and imaginative beginnings of political understanding. Drawing on philosophy, political philosophy, and culture and media studies, this project examines how the idea of aesthetics, in the sense developed by Rancière and later taken up by Foucault, creates the conditions in which political thought becomes possible. Aesthetic and narrative experiences shape perception, reveal structures of domination, and prompt early recognition of injustice. These beginnings also resonate with Bonnie Honig's work in *A Feminist Theory of Refusal*, which argues that acts of withdrawal, disruption, and refusal open space for political awareness and challenge established power. The project uses these frameworks to explore the broader claim that political understanding is grounded in encounters that precede formal theory. By focusing on how individuals come to sense, interpret, and respond to power through aesthetic and affective experience, the project reframes the origins of political thought and highlights the importance of perception in the formation of political consciousness. This approach positions aesthetics not as an accessory to political theory but as one of its foundational conditions. By tracing these early pathways into political thinking, the project reevaluates what political theory is, how it forms, and why people continue to rebuild and reinterpret it. The aim is to imagine guidelines for political theory that encourage exploration rather than restriction and that recognize the diverse routes through which political consciousness develops.

Jordan Rosenberg

Discipline: History

Authors:

Abstract Name: Sisterhood Across Seas: Pan-Africanism and International Women's Anti-Apartheid Networks during the 1970s-1980s

In 1900, the first Pan-African Conference was held, marking the beginning of a new movement in support of a free Africa. Now the movement is worldwide, continuing the fight for a free Africa from colonizers and their impacts. Yet, scholarship underscores the prominent role of men like Henry Sylvester Williams and Kwame Nkrumah but tends to overlook women's contributions. This paper seeks to shed light on women's contributions to Pan-Africanism through the study of the international women's anti-apartheid campaign in the US and Europe. The research uses a qualitative analysis of primary sources from three key archives: Forward to Freedom (UK), African Activist Archive (US), and The Freedom Archives (US). These documents include conference minutes, mailings, leaflets, and programs from groups like the Anti-Apartheid Movement Women's Committee and the South African Women's Fund. These resistance groups employed strategies such as fundraising for aid, spreading awareness with talks from exiled South African women, and more. The actions of these groups are examples of Pan-Africanism in the fight within the international Anti-Apartheid movement in the 1970'-1980's. This paper thus demonstrates that these international solidarity networks in support of women in South Africa under Apartheid embodied Pan-African ideals despite the lack of scholarship on women in the Pan-Africanist movement. The women's international anti-apartheid movement of the 1970s-1980s embodied Pan-Africanist ideals and theory. The Pan-African ideal connected the struggle in South Africa with people of African descent worldwide, inspiring global solidarity movements. These

movements applied immense international pressure, leading to boycotts, sanctions, and divestment campaigns that were critical in dismantling apartheid-based laws. This connection transformed the anti-apartheid movement into a global struggle for liberation and self-determination for women everywhere.

Emma Rosenkoetter

Discipline: Biology

Authors:

Abstract Name: The absence of ETA on dendritic cells reduces immune activation and protects against obesity-induced kidney injury

Background: Endothelin-1 (ET-1) is a potent vasoactive peptide elevated in obesity that promotes inflammation via the ETA receptor. Immune cells from the innate and adaptive arms express receptors for ET-1; however, the role that the ET-1/ETA axis in dendritic cells (DCs) plays in obesity-induced kidney damage and metabolic dysfunction remains unclear. Hypotheses: We hypothesized that the absence of ETA on DCs reduces immune activation and improves metabolic function, thereby protecting against obesity-induced kidney inflammation and damage. Because important sex differences exist in the immune response to obesity, we also hypothesized that there will be a greater protection in males than females lacking DC ETA. Methods: DC-specific ETA knockout (DC ETA KO) and floxed ETA control mice were fed a high-fat diet (HFD, 45% Kcal) for 25 weeks. We assessed metabolic function (glucose and insulin tolerance tests), renal injury (proteinuria), kidney T cell infiltration, and physiological characteristics (QMR, water/urine output). Normal-fat diet (NFD, 10% Kcal) mice were used as controls. Results: In response to a HFD, male DC ETA KO showed significantly improved glucose tolerance and insulin sensitivity ($p < 0.001$, $p < 0.01$) demonstrating protection from cardiometabolic stress. Kidney CD3⁺ T cell infiltration was reduced in DC ETA KO mice ($p < 0.05$), consistent with lower immune activation. Female DC ETA KO had reduced proteinuria at early time points ($p < 0.05$), though differences were not sustained at 25 weeks. QMR, body weight, and fluid balance showed no genotype-dependent differences in neither sex. Conclusion/Broader Impact: These findings support a role for DC-specific ET-1/ETA signaling in obesity-driven kidney inflammation, with evidence of sex-related differences in metabolic and immune responses.

Elizabeth Ross

Discipline: Economics

Authors:

#1 Elizabeth Ross

Abstract Name: Measuring the Mandate: State Enforceability Index for Mandatory Arbitration of Employment Disputes

Mandatory arbitration is a legal term referring to a clause in a contract that requires the parties to resolve disputes through private arbitration rather than the public court system. These clauses have become increasingly common in employment agreements, but the current literature suggests that courts are the best option for employees by most metrics, including the likelihood of winning a dispute. However, if an employee has a mandatory arbitration agreement, how likely are they to be able to challenge that agreement and actually make it to court in different jurisdictions? In short, how likely are different states to enforce mandatory arbitration agreements? To answer this question, an index was created ranking each state from 1 to 7 based on the enforceability of mandatory arbitration agreements in that state, with 1 signifying very low

enforceability and 7 signifying very high enforceability. Higher enforceability meant less likelihood of employees successfully challenging the arbitration clause. To create this index, first, each state's relevant legislation was given a rank in the 1-7 system based on the text of the law itself, and then this number was modified based on relevant case law in the state and decisions and policy statements from relevant administrative agencies such as state labor boards or state boards of alternative dispute resolution. Specifically, case law and administrative policy were ranked between -1.5 and +1.5 depending on whether they moved the overall state legal landscape toward more or less enforceability. Then, the sum of the legislative, court, and administrative rankings was taken to determine the final state ranking. The final index provides insight into the differences between states' enforcement of mandatory arbitration and, hopefully, will provide background for future analysis of differences in state employee satisfaction rates and other economic factors.

Gordon Ross

Discipline: Nursing and Public Health

Authors:

#1 Gordon Ross

Abstract Name: Group A Streptococcus and Potential PANDAS Pathways in Children ages 4-12: Molecular Mimicry and Recurring Neuroinflammation

Pediatric Autoimmune Neuropsychiatric Disorders Associated with Streptococcal infections (PANDAS) have been observed in school-aged children following Group A Streptococcus (GAS) infection and may be associated with sudden-onset tic disorders and other neuropsychiatric symptoms. This literature review examined whether pathogenic mechanisms of GAS share possible consistencies with established meningeal pathogens, including *Streptococcus pneumoniae* and *Neisseria meningitidis*, in order to explore whether increased prevalence or recurrence of GAS infections may contribute to higher incidence of PANDAS. Evidence from immunological, microbiological, and neuroinflammatory studies suggested that GAS may trigger post-infectious autoimmune responses through molecular mimicry, in which M-protein and carbohydrate antigens potentially cross-react with neuronal targets such as tubulin and dopamine receptors. These autoimmune mechanisms appeared to parallel host-pathogen interactions reported in meningitis, including cytokine-associated blood-brain barrier (BBB) disruption mediated by $\text{TNF-}\alpha$ and IL-6. Comparative findings indicated that although GAS differs from meningitic bacteria in its lack of direct neuroinvasion, it may produce convergent outcomes: cytokine-driven BBB permeability, infiltration of cross-reactive antibodies into the basal ganglia, and subsequent neuroinflammation that may influence motor and behavioral regulation. Studies also suggested that recurrent GAS infections may amplify these immune cascades through repeated antigenic priming, sustaining autoantibody production even after bacterial clearance. Because standard antibiotic treatment may not fully interrupt these autoimmune pathways, the literature emphasized a need for pediatric public health strategies that include early biomarker-based diagnostics, long-term prophylaxis, and enhanced surveillance in at-risk children. Understanding the possible shared immunopathology between GAS and other neuroinflammatory pathogens may help improve diagnostic precision and support prevention efforts aimed at reducing the burden of PANDAS in school-aged populations.

Byron Ross

Discipline: Biology

Authors:

#1 Sue Fairbanks
#2 Mary Liz Jameson
#3 George Wang

Abstract Name: Survey of the Assemblage of Dung Beetles in Cimarron County, Oklahoma and the Efficacy of Two Dung Types as Bait

Dung beetles (Coleoptera: Scarabaeidae) are coprophagous insects that can be categorized into feeding guilds based on their feeding behavior, including rollers, tunnelers, and dwellers. They provide important ecosystem services to agroecosystems, yet native dung beetle populations are declining due to factors including habitat loss, shifts in food availability caused by domestic animals, and increased competition from introduced non-native dung beetles. Services provided by dung beetles include increased soil percolation and aeration, secondary seed dispersal, nutrient cycling, and pest control. Dung beetles can control pests such as the endoparasitic nematode *Haemonchus contortus*, an important parasite of pronghorn (*Antilocarpa americana*) transmitted by fecal material. Oklahoma's pronghorn population has also suffered declines in recent years. In this study, we sampled beetles in Cimarron County, Oklahoma to determine the species composition of dung beetles and their potential interactions with pronghorn in the Oklahoma Panhandle area. We also examined the potential differences between wildlife and domestic animal dungs in attracting different dung beetle feeding guilds and species. We set up two transects of pitfall traps ($n = 10$ each) and baited the traps with either pronghorn dung or cattle dung. We recorded the arthropods collected in the traps for two days. We compared the abundance and species richness of beetles in our samples using negative binomial generalized linear models. We also compared the species composition of dung beetles between the dung bait treatments. Pronghorn dung attracted a significantly higher abundance of dung beetles, but there was no difference in beetle species richness between the two types of bait. Our results suggest that dung beetles are attracted more to the dung of pronghorn than to the dung of domestic animals.

Erica Ross

Discipline: Art History

Authors:
#1 EJ Ross

Abstract Name: Investigation and Recreation of Nazca Pottery Through Coil Building a Tradition Pot

Pottery is one of the oldest artforms. It has been practiced worldwide throughout human history. One culture with particularly unique style and design is the historic Nazca culture from the southern coast of Peru. This era of pottery dates from 200 BCE and 600 CE. Their pottery is defined by its bold shapes, colors, abstracted stylization, and flat imagery. Nazca artwork typically depicted people, animals, and gods. The line work flowed as a constant thick black line. The pieces themselves were used for decoration, rituals, and grave offerings. The shapes of the pottery ranged from cylinders, spheres, and even humanoid figures. These vessels were created using the coil methods. This involved coiling a cylinder of clay around a base and then smoothing the inside and outside with a flat stone or by hand. The next step was to add slip, usually in a white or earthy tone for the base while maroons, light purples, and other bold hues were used for the details. The firing process would involve heating with actual fire. This was an oxidized atmosphere which reacted with the minerals in the pre-fire slip to create the bold colors. The clay type used in this pottery was a basic earthenware known as terracotta. A distinctive characteristic of the creatures portrayed are large staring eyes. The scleras are bright white and large with a small black pupil. Some scholars believe this represents a drug induced state. The pottery of this ancient culture has served as an important historical reference. After my research into this art history I recreated my interpretation of Nazca pottery. I did so by using the Nazca's coil method. I recreated shapes of Nazca pots. I then added decorative slip to the surface in their style with my own fictional gods.

Sylvie Rossman

Discipline: Chemistry

Authors:

#1 Leah Chase

#2 Gabriel Seaver

#3 Brent Krueger

Abstract Name: Identifying Cl⁻ binding sites on System xc⁻.

System xc⁻ is a membrane protein consisting of two subunits: 4F2HC and xCT. The system exchanges intracellular glutamate for extracellular cystine, which is converted to cysteine upon internalization. Within the cell, cysteine is used to synthesize glutathione, an important antioxidant needed to combat oxidative stress. System xc⁻ requires Cl⁻ ions to facilitate this exchange, but the exact role Cl⁻ plays in supporting cystine/glutamate exchange and its site of interaction within xCT are not yet known. The first question I sought to answer was whether Cl⁻ is transported by System xc⁻ into the cell or whether it only facilitates substrate binding. To address this question, I used a cell permeable chloride sensitive dye (diH-MEQ) to measure changes in intracellular Cl⁻ levels upon activation of the transporter. I observed that chloride appears to be imported upon addition of cystine to the extracellular compartment, but I also observed that in the absence of extracellular Cl⁻, System xc⁻ appears to facilitate the leakage of Cl⁻ from the cell. In addition, I have identified putative Cl⁻ binding sites within xCT. The xCT subunit is the only chloride-dependent transporter in the heterodimeric SLC7 family. Therefore, I identified non-conserved amino acid residues within the channel region of the transporter that could potentially interact with Cl⁻. I am currently using specific site-directed mutagenesis to determine whether these sites contribute to Cl⁻ binding. When completed, this project will provide important insight into the structure/function of System xc⁻, a transporter that plays an important role in cellular health.

Camryn Roth

Discipline: Political Science

Authors:

Abstract Name: Integration Without Accountability: Schengen Accession and Croatia's Pushback Policy toward Bosnia-Herzegovina

This research examines why Croatia's pursuit of Schengen membership between 2015 and 2023 intensified its use of illegal pushbacks of migrants against Bosnia-Herzegovina. While the European Union (EU) promotes integration through enhanced coordination and shared legal frameworks, this integration mechanism can paradoxically incentivize violence at the union's periphery. Croatia's actions represent a critical case: it faced institutional pressure to demonstrate reliable external border enforcement capabilities to satisfy the expectations of belonging to the Schengen zone, yet this pressure conflicted with international asylum law and humanitarian obligations. This study employs a mixed-methods approach, analyzing quantitative evidence of pushback incidents, testimonies from EU Commission staff and border enforcement agencies, and official Croatian policy documents. The research draws on neofunctionalist and intergovernmentalist European integration theories to explain how state sovereignty allows rational actors to prioritize membership credentials over human rights compliance. Findings reveal that Croatia implemented systematic pushback policies, producing 70% of documented Balkan pushbacks and conducting an estimated 22,500 expulsions to

Bosnia between May 2019 and October 2020, to prove the reliability of border security. The EU approved Croatia's Schengen accession in December 2021 despite violations just months earlier, suggesting that harsh enforcement facilitated rather than hindered integration. This research contributes to understanding the structural and normative tensions within EU border governance, revealing how supranational integration pressures can directly drive violence at member state borders while undermining the Union's own human rights commitments.

Tracey Rothbauer

Discipline: Political Science

Authors:

#1 Tracey Rothbauer

Abstract Name: Dual Engines of Conservative Policy: Heritage vs. Alec Shared Founders and Divergent Strategies

Since the early 1970s, the Heritage Foundation and the American Legislative Exchange Council (ALEC) have played pivotal roles in shaping public perception and implementing conservative policies across the United States. Founded in 1973 by Joseph Coors, Paul Wyrich, and Edwin Feulner, the Heritage Foundation established itself as a think tank that packages conservative policy ideas into actionable blueprints, such as the Mandate for Leadership, which served as a playbook for Ronald Reagan's presidency. ALEC, cofounded by Weyrich as well, operates by drafting state-level "model bills" in collaboration with corporate members and conservative lawmakers. This study explores how both organizations developed complementary strategies to push conservative agendas. Together, they created a two-tier pipeline that normalized tax cuts, deregulations, education reform, and socially conservative laws across America. Utilizing academic sources, organizational archives, and policy examples, this analysis examines the funding structures, legislative tactics, and ideological messaging that enabled Heritage and ALEC to institutionalize a pro-business, Christian nationalist vision. While effective, their influence raises concerns about the erasure of diverse cultural, sexual, and religious identities from national policymaking.

Julia Rotunda

Discipline: Linguistics and World Languages

Authors:

Abstract Name: Breaking Barriers: Expanding Bilingual and Culturally Competent SLP Services in South Carolina

Despite the growing Spanish-speaking population in the United States, access to equitable speech-language pathology (SLP) care remains limited due to workforce shortages and linguistic barriers. Recent studies (Gross et al., 2023; Rameau et al., 2023; Morton-Jones et al., 2022) highlight the nationwide lack of bilingual and culturally competent SLPs, with particularly limited availability across the southeastern states, including South Carolina. This project examines the shortage of bilingual and culturally competent SLPs and the resulting disparities in treatment for Spanish-speaking clients in South Carolina. Through a review of current research and interviews at local educational programs and community spaces such as Communication Cottage Therapy and local clinics, the study explores how linguistic and cultural mismatches contribute to misdiagnosis, treatment delays, and feelings of ostracization among the Spanish-speaking population. The findings highlight that the lack of bilingual professionals and accessible resources reinforces unequal access

to quality healthcare and distrust in clinical systems. This research aims to identify actionable strategies for expanding bilingual SLP training programs, promoting community outreach, and developing culturally responsive care models. By improving representation and accessibility within the SLP field, the project advocates for a more inclusive approach that recognizes language as a fundamental component of both identity and healthcare equity.

Molly Roush

Discipline: Biology

Authors:

#1 Molly Olsen Roush

#2 Diane Bimczok

#3 Michelle Cherne

Abstract Name: "Vibrioid" formation in *Vibrio cholerae*

Model pathogen and causative agent of the lethal disease cholera, *Vibrio cholerae* is one of the most infamous pathogens of all time. *V. cholerae* has acquired myriad adaptations—particularly related to biofilm behavior and virulence—to allow its survival and aggressive proliferation in the presence of antibiotics, environmental stressors, and host immune defense. A biofilm is a conglomeration of bacterial cells attached to a surface and encased in an extracellular matrix containing polysaccharides, genetic material, enzymes, and metabolites. Founder cells are typically immotile and directly attached to the surface, and “younger” cells are more motile and closer to the periphery of the biofilm. Biofilms are critical for bacterial survival: They confer protection from antimicrobials and environmental stressors, opportunities for horizontal gene transfer, and essentially an “external digestive system” in which cells can exchange metabolites. Biofilm association has also been shown to induce a hyperinfectious phenotype in *V. cholerae*. The Bimczok Lab has observed peculiar biofilm behavior in *V. cholerae*: in response to nitric oxide (an antimicrobial released by the human small intestine), and a host epithelial surface (modeled by Caco-2 line colorectal adenocarcinoma cells and mechanical agitation), the bacteria form unattached aggregates with immotile bacteria on the surface and motile bacteria within. We have termed these unprecedented inside-out biofilms “vibrioids”. We have discovered that vibrioid formation occurs in both wild-type and nitric oxide-sensor knockout strains, suggesting that factors beyond nitric oxide affect vibrioid formation. I am currently exploring the mechanisms of vibrioid formation and dispersal. Experimenting with fluorescent and non-fluorescent strains, I will observe whether vibrioids form via binary fission from a single parent cell, aggregation of existing cells, or a combination of the two. As a model organism, a better understanding of this phenomenon in *V. cholerae* will enhance our knowledge of bacterial proliferation and infectivity in general.

Katrina Rowe

Discipline: Dance

Authors:

Abstract Name: Body as Method: Choreographic Process and the Translation of Experience in the Works of Bill. T Jones, Rennie Harris, and Martha Graham

This research examines the question: How do different choreographic processes shape the translation of emotional experience to an audience? Is there a process that works best? By analyzing Rennie Harris’s *Exodus*, Bill T. Jones’s *Still/Here*, and Martha Graham’s *Lamentation*, the research explores how

choreographers construct emotional worlds through embodied experience and the development of movement vocabulary. I selected these works because each one uses the body as a primary method for communicating human experiences such as; grief, illness and cultural trauma, offering a valuable lens for understanding how process impacts audience interpretation. This project aims to open broader conversations within dance studies about the relationship between choreographic method and audience understanding. It also directly informs the development of my own choreography, in preparation for my Senior BFA work, which will draw from personal experiences with illness and healing. Studying these works allows me to investigate how choreographers translate memory, pain, and resilience into physical forms. Methodologically, this project uses analytical comparison of choreographic structure, rehearsal strategies, and movement choices surrounding each work. Harris builds movements rooted in Hip-Hop community practices and sociopolitical realities; Jones conducts survivor workshops, integrating gesture mirroring and multimedia testimony; Graham uses symbolic costuming and contraction-based movement to capture universal grief. These varied processes illuminate how choreographers use the body as research and communication. The study concludes that while each artist effectively conveys emotional depth and choreographic methods, pathways leading to universal audience comprehension may always be blurred. Experience is not universal. Viewers interpret movement through their own lived experiences and cultural backgrounds bringing a unique lens that shapes how they understand and connect with a work. These findings have significantly influenced my own creative process, prompting me to consider how embodied research and personal narrative can shape my choreography, while still leaving space for individual interpretation.

Brandon Rubio

Discipline: Biology

Authors:

#1 Gabriela Mercado

#2 Wanli Smith

Abstract Name: Urinary Tract Infections Alter Nrf2 Pathway in Brains of G2019S-LRRK2 Transgenic Mice

Parkinson's disease (PD) is one of the fastest-growing neurodegenerative disease, affecting over 11 million people globally. This rise persists even after adjusting for an aging population, suggesting that environmental factors may be significant contributors. Increased PD risk has been linked to exposure to environmental toxins, gut dysbiosis, and infections. Although PD pathogenesis is not fully understood, increasing evidence suggests that neuroinflammation has implications in PD onset and progression. Mutations in the Leucine-Rich Repeat Kinase 2 (LRRK2) protein contributes to both genetic and sporadic PD. LRRK2 is expressed in neurons and various immune cells (e.g., microglia, B cells), highlighting its role in neuroimmune reactions. In our studies, we found that urinary tract infections (UTIs) induced microglial activation in the brains of G2019S-LRRK2 transgenic mice. UTIs also appeared to elevate Nrf2 levels and promote its nuclear translocation, and an Nrf2 activator, Omaveloxone, significantly further increased Nrf2 levels and its nuclear translocation in brains of G2019S-LRRK2 mice. Omaveloxone also decreased the UTI/G2019S-LRRK2-induced 4-HNE levels, suggestion Omaveloxone's therapeutic potential in reducing and limiting oxidative stress. Together, these preliminary findings suggest that peripheral infections like UTIs can trigger neuroinflammatory responses and alter the Nrf2 pathway. In the future, we will further dissect the link between infections and PD pathology and explore Nrf2-targeted strategies as potential therapeutic interventions.

Nyela Rucker

Discipline: Gender, Ethnicity, Diversity, or Cultural Studies

Authors:

#1 Charnell Long

Abstract Name: Cyborg Roots: Rethinking George Washington Carver in the Context of Black Children's Literature

African American children's literature puts into words and pictures the stories that have been orally told for generations as new stories from the imagination. Nonfiction children's literature utilizes George Washington Carver's story to help students view science as a human endeavor. The relationships between facts and what many refer to as "the nature of science" attribute to the characterization of Carver and his importance to science. Through images, acknowledgements, and citations, the depictions establish authority over the facts of Carver's story. Little attention has been given to how authors imagine Black futures through their historical depictions of George Washington Carver. The author's choices to challenge authority invites readers to critically engage with the informational text through questioning. In this paper, we argue that George Washington Carver's initial emergence in children's literature symbolized the invention of a "Black Cyborg" in nonfiction children's literature. To investigate, a codebook was generated based on Sanders and Bishop, with sub-codes from Ford. The books were selected as narrative nonfiction and published before 1959 in accordance with Bishop's restrictions applied to develop the three categories for fiction. The books selected were George Washington Carver Scientist by Shirley Graham (1944); The Story of George Washington Carver by Arna Bontemps (1944); Carver's George by Florence Means (1952); and Boy scientist by Augusta Stevenson (1954). The diverse publication dates and authors encapsulate the change in the conceptualization of Carver's story. Our paper concludes that the construction of Carver's story should not be taken as fact, but rather it should be seen as a literature of questions. His story has always been used to advocate for the educational liberation of Black people, inspiring Black futures in science. The ways in which authors challenge authority affirm that his story is never objective.

Danielle Ruddy

Discipline: Communications

Authors:

#1 Annmarie Kent Willette

James Bourgeois

Emily Soud

Abstract Name: The Heart Behind the House

This creative work explores a semester collaboration at Jacksonville University with the Ronald McDonald House Charities. Working together, English, History, and Communication students took an interdisciplinary approach to a video documentary project: The Heart Behind the House: Ronald McDonald House Charities. This documentary style video project integrates effective communication strategies, utilizing video production, script writing, extensive interviews, and strategic social media initiatives to effectively communicate the mission and service of the Jacksonville location. Qualitative interviews with patients and families, community volunteers, and RHMC executives serve as the foundation for the video stories, skillfully crafted by undergraduate student journalists. The collection of video narratives features in-depth interviews, on-location b-roll and includes strategic social media content designed for public outreach. With on-camera interviews and the expertise of advanced communication students, this project highlights the

greater Northeast Florida community and the compassionate service and work of the RMHC in Jacksonville, Florida. The goal of this video is to elevate public understanding surrounding the local work of RMHC and inspire viewers to support the mission of the organization specializing in service to children and families in need of health care.

Sanika Rudraraju

Discipline: Biology

Authors:

#1 Karl X. Chai

#2 Li-Mei Chen

Abstract Name: Purification and Functional Analysis of Membrane Serine Proteases: The Prostasin-Matriptase Cascade

Matriptase and prostasin are membrane-anchored serine proteases that have opposing functions: matriptase is an oncoprotein and prostasin is a tumor suppressor. Both proteins are normally expressed only in epithelial cells, where they regulate each other to maintain epithelial homeostasis. Certain subtypes of B-cell lymphomas over-express matriptase in the absence of prostasin, which is thought to promote cancer progression. Genetically engineered prostasin expression in the matriptase-expressing B cells induced the proteolytic cleavage and shedding of matriptase from these cells, resulting in slower growth and increased cell death. In this study, we hypothesized that prostasin and matriptase directly interact and activate each other in a cascade facilitating matriptase cleavage/shedding. To test this hypothesis, stable cell lines expressing matriptase or prostasin were used to prepare cell lysates for protein isolation. Purified matriptase and prostasin were mixed, incubated for various time periods, and then analyzed by means of western blots. We observed a reduction in the total protein quantity of both matriptase and prostasin and the appearance of a small fragment of matriptase, presumably the cleaved product. The results suggested that prostasin and matriptase could activate each other, leading to the downregulation of matriptase and its oncogenic effects. Our work could be a foundation for future studies on the prostasin-matriptase proteolytic cascade and a possible therapeutic strategy for B-cell lymphoma.

Campbell Ruffhead

MD - Salisbury University

Discipline: Exercise Science and Nutrition

Authors:

#1 Campbell Ruffhead Ruffhead

Abstract Name: Frequency of Vascular Aging in Young Adults

Arterial stiffness is an early indicator of cardiovascular aging, yet its presence in young adults remains understudied despite rising reports of early cardiometabolic risk. Current research raising concerns about premature vascular issues in younger individuals inspired this study. This project investigates the vascular age of individuals 18–26 years old by examining acute changes in arterial stiffness post submaximal exercise. Our goal is to determine whether small changes in arterial health can be identified before more common cardiovascular risk factors appear. Using high-resolution vascular ultrasonography and applanation tonometry, diameters and pressures of the carotid and radial arteries will be measured to assess arterial elasticity. A cross-sectional protocol will be used in which participants complete baseline assessments of

anthropometry, blood pressure, body composition, and vascular function before performing a graded cycling test to 85% of age-predicted maximum heart rate. Arterial stiffness will then be measured 5 minutes post-exercise and again 90 minutes later to evaluate immediate and short-term vascular responses. Expected results include a detectable increase in arterial stiffness immediately following exercise. In healthy individuals, levels are expected to return to baseline after the 90-minute recovery period, depending on fitness level. Some participants may show atypical patterns, which could serve as an early indication of increased vascular risk. The statistical approach implemented in this study will be used to examine changes in arterial stiffness across time points and to assess whether the order of measurements influences the results. This experimental approach based on exercise physiology integrates practical tools from clinical vascular assessments. Results will help us understand whether acute exercise can expose early signs of vascular dysfunction in young adults. Overall, the goal is to improve early identification of cardiovascular risk and support heart health in young adult populations, while also guiding future research on factors that influence vascular aging.

Allyson Ruffino

Discipline: Biology

Authors:

#1 Allyson Ruffino

#2 Harleen Tewatia

#3 Alita Burmeister

Abstract Name: Mucoïd: A Potential Roadblock to Phage Therapy

Bacteriophages ('phages') are viruses that infect bacteria and are a potential alternative to antibiotics. Phage U136B is obligately lytic and infects *Escherichia coli* using antibiotic efflux pump, TolC. However, just as bacteria evolve resistance to antibiotics, they can do the same with phage. Understanding factors that drive resistance evolution is crucial to determine efficacy of potential phage therapy use. In previous work, *E. coli* K12 evolved resistance to phage U136B via tolC or LPS biosynthesis gene mutations. However, a lower proportion of phage-resistant isolates had a mucoïd phenotype. In additional testing, mucoïd isolates were found to be more resistant to clindamycin than wild type. We hypothesized that selecting with both phage U136B and clindamycin would increase the frequency of mucoïd mutants. To test this, we conducted a plate-based selection experiment with phage-clindamycin combination and quantified the frequency of mucoïd mutants. Mucoïd mutants appeared at high frequencies under these conditions. Whole genome sequencing revealed that mucoïd isolates had mutations in Rcs Phosphorelay genes, the pathway regulating synthesis of colanic acid and the mucoïd phenotype. In addition, we found a low frequency of clindamycin and phage-resistant non-mucoïd mutants. These mutants all had missense mutations in tolC, resulting in predicted changes to the extracellular region of TolC. We then performed a 5-day evolution experiment, selecting wild type bacteria with clindamycin and phage U136B. Once again, we saw mucoïd evolve after one day of selection with phage U136B and clindamycin. However, after five days, the mucoïd phenotype disappeared and was outcompeted by tolC missense mutations. Our work suggests that while mucoïd is a common adaptation under certain combinations of phage-antibiotic selection pressures, the phenotype is transient compared to longer-term receptor modifications. Overall, resistance evolution reveals the need to consider the entire genetic potential of hosts in treatments like phage therapy.

Danielle Rukezo

Discipline: Psychology

Authors:

Abstract Name: Navigating Undergraduate Research in the Digital Era: A Qualitative Analysis of Faculty Digital Practices and the Visibility of Undergraduate Research Opportunities

Participation in undergraduate research fosters intellectual curiosity and gives participants confidence in their respective disciplines. Despite the benefits of undergraduate research, there is little research as to how faculty communicate to prospective students about the availability of undergraduate research opportunities. Effective communication of undergraduate research opportunities, especially through digital channels, is essential to the overall accessibility of undergraduate research to students. To address this gap, this study aims to catalogue the way faculty at a public, R2 university communicate information about undergraduate research online. The webpages and department biographies of the undergraduate, full-time, tenure-track faculty at a large southeastern university will be examined; in its completion, data from over 1000 undergraduate faculty members will be included. Preliminary data from education, humanities, chemistry, and social sciences show that faculty frequently do not mention undergraduate research in their department's biography, faculty webpage, or linked external websites. We expect to find that STEM disciplines will be more likely to include mention of undergraduate researchers compared to other disciplines due to the strong emphasis on undergraduate research embedded within those disciplines. We also expect that assistant professors will be more likely than associate and full professors to include mention of undergraduate research on their sites as they are establishing their presence as professors. The results of this study will help improve the undergraduate researchers' experience due to the ability to better connect with faculty that align with their research interests and navigate the undergraduate research process.

Willa Rupp

Discipline: Interdisciplinary

Authors:

#1 Nichole Powell

Nathalia Acosta

Sophia Lim

Abstract Name: How Tobacco Companies Exploit Social Media to Target Teenagers

The tobacco industry invests heavily in marketing and is increasingly targeting young people on social media. Research shows that a substantial majority of teenagers report exposure to e-cigarette advertising through digital platforms. This follows a pattern Sam Kean describes in *The Icepick Surgeon*, in which medical professionals throughout history have obscured harm through the selective presentation of data. Tobacco companies use social media to manipulate young consumers through influencer marketing, algorithm-targeted content, and carefully curated brand narratives that minimize health risks. While researchers have studied traditional tobacco advertising, the billboards and TV commercials of the past, a systematic analysis of how companies exploit digital platform algorithms to normalize nicotine use among youth, particularly through influencer networks and co-opted social justice messaging, has not been comprehensively addressed. We discovered that companies use sophisticated strategies, including micro-influencer partnerships, that do not always clearly disclose paid promotional relationships. They design content to bypass platform advertising restrictions through algorithmic optimization. They associate vaping with social justice movements to make products seem progressive. These tactics work like the misdirection Kean describes, where harmful products are made to appear safe and socially conscious. By embedding advertisements within content that appears organic and authentic, companies achieve what Kean warns about: making harmful practices look beneficial. With limited public awareness of manipulation tactics, platforms struggle to regulate these evolving practices effectively, and rapidly evolving digital marketing techniques enable continued exploitation despite growing concerns. Our findings demonstrate how historical patterns of scientific deception translate into digital spaces. This research can help shape platform regulation policies and youth media literacy curricula.

David Russell

Discipline: Biology

Authors:

#1 Teagan Potter

#2 Madison Collins

Abstract Name: Characterizing neutrophil reactive oxygen species production during interaction with *S. aureus*

Staphylococcus aureus (*S. aureus*) is a typical commensal bacterium of human anterior nares that is estimated to permanently colonize ~30% of the population. *S. aureus* is also a predominant infectious pathogen that bears a considerable burden on the healthcare industry, carrying significant morbidity and mortality. Once largely restricted to hospital environments, multi-drug resistant strains of *S. aureus* are now commonplace in community settings. These strains have the ability to avoid normal immune cell killing and cause disease in healthy individuals. Despite decades of research committed to understanding *S. aureus* virulence, much is still unknown and mechanisms for how *S. aureus* can escape the defenses of the body are incompletely defined. The *SaeR/S* regulatory genes have been implicated in *S. aureus*' survival of the immune system's oxidative killing response utilized by neutrophils. Upstream genes within the operon of *saeR/S* – *saeP* and *saeQ* – are believed to play an additional role in *S. aureus*' survival of the immune system. We measured chemiluminescence-based production of two reactive oxygen species (ROS), O₂⁻ and H₂O₂, as a qualitative marker to explore the importance of *SaeP* and *SaeQ* in the bacteria's resistance to neutrophil-mediated degradation. A wild type of *S. aureus* has been shown to meter the neutrophil's initial burst release of ROS in contrast to the *saeR/S* deletion mutant. The resulting data suggests that *saeQ* plays a similarly important role in *S. aureus*' survival as *saeR/S*. This work will be expanded to include various immunomodulators (i.e., rapamycin, 3-MA) to understand how the functions critical to neutrophil killing are linked, and how *S. aureus* can survive them.

William J.A. Russell

Discipline: Biochemistry

Authors:

#1 William J.A. Russell

#2 Rocio L. Perez

Abstract Name: Development of Tunable Rose Bengal-Based nanoGUMBOS as Potential Selective Chemotherapeutic Agents

As cancer remains one of the greatest threats to the global population, the development of chemotherapeutic agents that are selective and tunable is of critical importance. Herein, a series of Rose Bengal (RB)-based GUMBOS, a group of uniform materials based on organic salts, were synthesized via counterion exchange between [Na]₂[RB] and three organic cations: tetrabutylphosphonium bromide [TBP][Br], tetraphenylphosphonium chloride [TPP][Cl], and 1-dodecyl-3-methylimidazolium chloride [C₁₂MIm][Cl]. The resulting GUMBOS were characterized through FT-IR, ESI-MS, NMR, and UV-Vis Spectroscopy. Partition coefficient studies indicated all GUMBOS exhibited hydrophobic physiochemical characteristics. These hydrophobic RB-based GUMBOS were formed into nanoparticles via reprecipitation method and exhibited average diameter sizes below 85 nm with moderately negative zeta potentials all below -30 mV.

Permeability through biological membranes was assessed by an in vitro PAMPA assay, revealing enhanced passive diffusion at 10 μ M solutions. The cytotoxic activity of the nanoparticles was assessed in A549 lung carcinoma cells as well as the noncancerous HEK239 human embryonic kidney cells. The A549 cell line exhibited mainly apoptotic characteristics, with a lower average cell viability of 22.6% from treatment with [C12MIm]₂[RB] nanoGUMBOS. Moreover, the HEK239 cells exhibited a higher viability of 47.1% with the same treatment. IC₅₀ of the [C12MIm]₂[RB] nanoGUMBOS treatment on cancerous cells was 2.16 μ M, with a selectivity index of 2.1. These findings demonstrate the novelty of RB-based nanoGUMBOS as tunable and selective chemotherapeutic agents.

Emily Russell

Discipline: English and Literature

Authors:

Abstract Name: *Æmilia Lanyer's Dedicatory Verses: The Construction of Meaning in Salve Deus Rex Judæorum*

Probably the first woman writing in English to produce a substantial volume of poetry designed to be printed and to attract patronage, the Renaissance poet *Æmilia Lanyer* created an essential contribution to the rich collection of early modern women's writing with her *Salve Deus Rex Judæorum*. Reintroduced to modern literary consciousness by historian and William Shakespeare biographer A. L. Rowse in his 1973 edition of her poetry, *The Poems of Shakespeare's Dark Lady*, Lanyer has not always received the critical attention she deserves. In his edition of Lanyer's poetry, Rowse argued that Lanyer was the "dark lady" of Shakespeare's final twenty-eight sonnets—a claim that drew far more attention to her biography than to her poetic achievement. Despite this, the work of scholars Barbara K. Lewalski and Elaine V. Beilin in the 1980s began the significant reappraisal of Lanyer's work, emphasizing the ways her poetry challenges Jacobean patriarchal discourses. Lanyer's volume includes nine dedicatory poems to noblewomen such as Queen Anne as part of her bid for patronage. While scholarship on these dedicatory verses exists, literary critics have largely read them through the lens of the early modern patronage system. Because dedicatory poems are often dismissed as mere flattery designed to solicit financial support, their literary and thematic significance has been undervalued. As a result, this presentation argues that Lanyer's dedicatory poems are integral to the structure and purpose of *Salve Deus Rex Judæorum*. This presentation is an analysis of these patronage poems as a deliberate literary strategy through which Lanyer constructs a community of virtuous women and establishes themes she later develops in the title poem "*Salve Deus Rex Judæorum*" and in "*The Description of Cooke-ham*."

Joshua Russell

Discipline: Engineering

Authors:

#1 Damian Stoddard

Abstract Name: Ballistic Testing on Additively Manufactured Flexible Bio-Inspired Armors

Current body armor, typically composed of Kevlar or composite ceramics, is often heavy, restricting the user's range of motion. Furthermore, rigid armors can cause projectile fragmentation upon impact, creating a risk of ricochet injury. Nature provides examples of highly efficient evolved defenses, such as the scales of gar fish or pangolins, which offer high mobility without sacrificing protection. This study aims to create and evaluate

the ballistic effectiveness of flexible, bio-inspired armor configurations using additive manufacturing. The research compares a control group of solid 3D-printed square profiles against four bio-inspired configurations: a fish scale pattern, layered hexagonal plates based on the honeycomb cowfish, layered circular plates based on trout and salmon, and a staggered spiked design inspired by pangolins. Samples are subjected to high-velocity ballistic firing and low-velocity impact testing using an Instron CEAST 9450 with custom indenter tips. High-speed cameras recording at high frame rates to capture the impact events, utilizing Digital Image Correlation (DIC) to analyze projectile velocity and kinetic energy changes. By calculating energy absorption, this project identifies which configurations provide superior strength relative to weight. The results intend to demonstrate that bio-inspired designs can reduce material requirements and enhance mobility while preventing projectile fragmentation, contributing valuable insights to materials science for military and civilian applications.

Amerah Rutherford

Discipline: Biology

Authors:

#1 Lalita Sabat

#2 Matthew Halquist

#3 Laxmikant Deshpande

#4 Kelly Gwathmey

#5 Gregory Walsh

Abstract Name: 2,5-ditert-butylhydroquinone (dtBHQ) exposure affects motor behavior and axonal organization in zebrafish

In partnership with the ALS Association, a study on the spatial distribution of ALS in Virginia was conducted. Our group identified geographic clustering or “hotspots” with increased risk of contracting ALS. An analysis of drinking water from the households of ALS patients revealed the presence of a novel toxicant dtBHQ (2,5-ditert-butyl-hydroquinone) at higher rates than control samples. dtBHQ is a specialized stabilizer and antioxidant used during the production of plastics, and has been shown to induce muscle weakness and disrupt motor endplates in rats, suggesting a potential role as an environmental toxin that contributes to sALS. However, few studies have examined the developmental neurotoxicity and the degenerative effects on mature axons by dtBHQ. In this study, zebrafish (*Danio rerio*) were waterborne exposed to dtBHQ (up to 3nM) starting at 24 hours post-fertilization (hpf). Motor behavior was assessed through touch evoked response (TER) and free-swimming assays at various developmental stages. Our data indicate that dtBHQ exposure significantly affected locomotor function, with decreased TER and free swimming distance and frequency. Consistent with these motor deficits, dtBHQ disrupted axon growth and branching of primary and secondary motor neurons during early developmental stages. The neurotoxic effect of dtBHQ on motor phenotype does not depend on neurodevelopmental timepoint of exposure, since exposure on day 3 leads to similar locomotion deficits and axonopathy. Taken together, our findings indicate that dtBHQ exposure-driven locomotion deficits are likely driven by the abnormalities in axonal growth and organization. Our goal is to characterize neuromuscular junction integrity following toxicant exposure and identify the molecular mechanism underlying dtbhq-mediated motor behavior deficits.

Victoria Rutland

Discipline: Biology

Authors:

#1 Kirsten Schoonover
#2 Charlene Farmer
#3 Cheyenne Griffin

Abstract Name: Quantitative Analysis of ZnT3 Expression in Postmortem Schizophrenia Dorsolateral Prefrontal Cortex Layer 3 Pyramidal Neurons

Background: Cognitive deficits are a core feature of schizophrenia (SZ) and are thought to arise from impaired neuronal signaling within the dorsolateral prefrontal cortex (DLPFC). We hypothesize that altered zinc transporter ZnT3 expression may contribute to reduced pyramidal neuron (PN) activity and cognitive deficits. This project aims to evaluate ZnT3 expression within layer 3 (L3PNs) of the DLPFC in SZ. Materials and Methods: Fresh-frozen human postmortem DLPFC tissue samples from four subject pairs of SZ and unaffected comparison (UC) subjects were labeled for genes SLC17A7 (VGLUT1) and SLC30A3 (ZnT3) via in situ hybridization and co-labeled with DAPI nuclear stain. DLPFC 3D images were analyzed using QuPath software. DLPFC L3 was delineated using DAPI, and L3PNs were identified using intensity-based VGLUT1 segmentation. Subcellular mRNA grain detection quantified L3PN VGLUT1, ZnT3, and nuclear size. VGLUT1+ cells were randomly sampled to yield 250 cells/subject. Results: Results have not been statistically assessed due to small N. ZnT3 and VGLUT1 mRNA grain counts were 14% higher and 7% lower in SZ (7.5 ± 5.0 ; 17.3 ± 7.9) than UCs (6.6 ± 4.9 ; 18.5 ± 8.3), respectively. Nucleus area was 7.2% larger in SZ (96.5 ± 35.5) than in UCs (90.0 ± 28.6). When accounting for nuclear area, the same pattern was revealed, where ZnT3 and VGLUT1 mRNA grain density/cell was 8% higher and 14% lower in SZ (0.08 ± 0.05 ; 0.18 ± 0.06) than UCs (0.07 ± 0.05 ; 0.21 ± 0.07), respectively. However, the data across both diagnostic groups were highly variable. Conclusion: These findings indicate small changes of ZnT3, VGLUT1, and nuclear area in SZ L3PNs, with the potential presence of distinct subgroups of L3PNs with differing ZnT3 expression.

Jessica Saad

Discipline: Health and Human Development

Authors:

Abstract Name: The Effects of Systematic Determinance on Oral Health Disparities: A Comprehensive Review of Cultural, Social, and Linguistic Barriers

Oral health disparities prevail as one of the most prominent health issues seen in our society today. However, it is often overlooked and viewed as a cosmetic aspect of healthcare rather than a vital component of an individual's health status. Due to the continuous dismissal and disregard of dental care as a critical component of healthcare, many underserved communities remain hindered. This comprehensive literature review explores how systemic exclusion, cultural incompetence, socioeconomic determinants, and linguistic barriers contribute to the unequal distribution of oral care seen in the United States. It becomes imperative to inquire how these specific health disparities affect oral health experiences for underserved communities, and further, what the broader implications of that relationship are for long-term care. This paper raises awareness for those underserved and provides valuable insights on dental disparities, approached through a cultural and social lens, further emphasizing the importance of broader implications for long-term care and the need for advocacy for marginalized communities. Prevalent counterarguments claim that dental education systems provide dental students with the necessary resources vital to their success in the dental workforce, ultimately arguing that dental schools successfully prepare students to provide equally accessible care to all patients, regardless of background. The evidence for this is acknowledged, yet it is deemed unstable due to the evident gaps presented in the literature. By engaging in scholarly research that discusses immigrant experiences, structural racism, and inequalities regarding access to preventative care, this paper underscores the need for proper structural and educational reforms in dental education systems, aiming to produce culturally competent dental professionals. Keywords: dental disparities, oral care, minorities, inequality, cultural competence, systematic exclusion

Arnav Sabbella

Discipline: Engineering

Authors:

#1 Arnav Sabbella

#2 Rohit Chadalavada

Rohit Chadalavada

Abstract Name: Characterizing the Effects of Rotor Separation and Blade Design on Thrust Measurements for a Small-Scale Conventional Drone

Evaluating drone blade performance is crucial for optimizing drone efficiency. Blade separation, and camber percent are some of the most important parameters that determine blade performance. This is determined by measuring thrust at various operating conditions for differing blade design parameters. One common problem in these tests relates to the thrust stand itself, as they are usually expensive, complex, and not practical. A thrust stand was designed to investigate the impact of blade design parameters on thrust generated at various operating conditions. This design involves a prototypical drone placed on an S-type 20kg load cell that's connected to a HX711 load amplifier. A power supply is used to control the drone rotors' rotational speed. A tachometer was used to measure rotational speed. Before the experiments, a calibration curve with predetermined weights was used to gauge the load cell's response. In a previous study of measuring thrust from a small dual-rotor helicopter, NACA Airfoils 0018, 2418, and 4418 were tested. It was found that increasing camber results in increased thrust, as NACA 4418 (4% Camber) had the largest overall thrust production. For this experiment, the same set of NACA airfoils were employed. Initial data indicates a strong relationship between camber percentage and thrust generated, supporting our hypothesis that camber percentage and separation are the most important factors when optimizing drone performance. The airfoils are mounted on four rotors of the custom-built drone, and are currently under investigation. Preliminary results still validate our previous study. Drone arms were built with the option of vertical adjustment between the pairs of rotors. Additional study incorporates the thrust measurements as a function of blade rotor vertical separation at fixed operating conditions (i.e. at fixed rpm). Comprehensive findings and the impact of other blade parameters will be presented at the forthcoming conference.

Suhaan Saeed

Discipline: Engineering

Authors:

#1 Suhaan Saeed

#2 Ayati Vyas

#3 Viswanath Aditham

Ayati Vyas

Viswanath Aditham

Abstract Name: Characterizing Recycled PET Fiber Extracted From Plastic Bottles With and Without PLA Inclusion

Single-use polyethylene terephthalate (PET) water bottle production and disposal on a global scale contributes to waste management systems and environmental sustainability. An SJSU created bottle to filament recycling system aims to assess real-world applications of PET recovery. This system creates a 3D-

printing filament from 2-liter discarded PET bottles. This is achieved through a slicing method (8-9 mm strips) and extrusion (235°C), one filament produced from one two-liter bottle. Mechanical testing occurs for various sizes of strips, various temperatures of extrusion, and various winding speeds. A tensile test was performed on the resulting filament using an Instron 1 kN frame for ultimate tensile strengths (0.4-0.8 N) to establish baseline mechanical properties of recycled filament. In parallel, shredded PET bottles are blended with commercial PLA fiber in a hybrid method to create blended PET-PLA filaments. This system utilizes a commercial Single Screw Filament Extruder by HQHAOTWU for its constant heating and screw-feed parameters to assess the possibility of hybridized outcomes for further recycling efforts. Pure filaments from each system at SJSU and commercial systems will be compared for consistency and mechanical properties by processes of formation. A tensile test will also be performed on the hybrid PET-PLA fibers to assess stress, strain, extensibility and ultimate tensile strength compared to pure PET to assess if the blended ratios impact printability and mechanical reliability of recycled PET filament. Thus, this project accounts for multiple avenues of successful recycling of plastic materials and determines systems/processing factors that may improve the application of recycled plastic fibers. The created low-tech, in-house application at SJSU with commercial availability shows that waste PET can become valuable materials for additive manufacturing without sacrificing other plastic waste goals of circular economy endeavors. Project details and PET and blended PET-PLA fibres characteristics will be presented in the conference.

Haruya Sakai

Discipline: Mathematics

Authors:

#1 Haruya Sakai

Abstract Name: Comparative analysis of Dementia Patients and Non-Dementia Patients Using Text Mining

This study presents a comparative quantitative analysis of spoken language between dementia patients and non-dementia individuals, utilizing text mining techniques to uncover diagnostic patterns. With the rapid aging of the global population, the early detection of and subsequent intervention for dementia have emerged as increasingly critical public health challenges. Conventional screening protocols, such as the Mini-Mental State Examination (MMSE), are resource-intensive, requiring administration by specialists, and often induce significant psychological stress in subjects. Consequently, there is an urgent demand for non-invasive, accessible detection methods that can be seamlessly applied within the context of daily life. This research aims to identify specific linguistic markers for early detection by quantitatively comparing speech data from patients with mild dementia against that of healthy controls. For the dataset, we analyzed 200 episodes from the "Narratives of Dementia" database representing patients, alongside control data derived from the "Corpus of Everyday Japanese Conversation." Following transcription, we performed morphological analysis to extract nouns, verbs, adjectives, and adverbs, followed by frequency and co-occurrence network analyses to examine vocabulary usage and structural patterns. Our analysis revealed clear quantitative and qualitative disparities. Dementia patients exhibited a significantly lower frequency of concrete nouns compared to controls, reflecting word-retrieval difficulties (anomia). Conversely, there was a marked prevalence of demonstrative pronouns (e.g., "that," "it") and verbs related to cognitive states (e.g., "forget," "do not know"). Furthermore, co-occurrence network analysis indicated that the speech networks of dementia patients were characterized by weak lexical associations and small, isolated clusters focused on specific anxieties or limited topics. These results suggest that the usage patterns of demonstratives and cognitive verbs, combined with fragmented network structures, indicate the potential for early identification. Ultimately, this study demonstrates that analyzing linguistic features in daily conversation serves as an effective, non-invasive biomarker for the early screening of cognitive decline.

Jenna Sakhleh

Discipline: Biology

Authors:

#1 Jenna Sakhleh

#2 Iman Hasan

Iman Hasan

Abstract Name: Outcomes of Orthopedic Surgeries in Patients on GLP-1 Agonists

Glucagon-like peptide-1 (GLP-1) receptor agonists are medications primarily used for Type II Diabetes Mellitus (T2DM) and more recently for obesity. GLP-1 agonist, such as semaglutide (Ozempic) and trizapatide (Mounajaro), have shown tremendous success for weight loss and glycemic control. GLP-1 is natural hormone produced in the body that is released after eating to maintains blood sugar and appetite. GLP-1 agonist are medications used to mimic these responses in the body. GLP-1 agonist has become increasingly widespread, likely due to rapid weight loss. However, new findings have shown that the use of these GLP-1 agonists have led to elevated risks of potential perioperative complications including bone weakness, reduced muscle function, etc. Comparatively, recent findings indicate the use of GLP-1 agonists preoperatively can lead to postoperative benefits such as decrease in mortality, increase in bone healing, potential in reducing infection and arthroplasty-related complications. To evaluate if GLP-1 agonist contributes a direct cause to these outcomes, researchers have gathered perioperative and postoperative data using statistical methods. Control groups in this situation are patients under standard care without any use of GLP-1 agonist. The independent group are patients who are taking GLP-1 agonist preoperatively for diabetic care, weight management, etc. Outcomes to be discussed are surgical complications, infections, injuries and any other procedure- specific complications. By comparing GLP-1 agonist users with non-users through logistic regression and more, these findings can allow us to gain a clearer understanding of association between GLP-1 agonist therapy and postoperative outcomes. With the findings from 6 medical journals via google scholars, we can access an overall conclusion to determine the outcomes in orthopedic cases due to the use of GLP- 1 agonist.

Omowunmi Salami

Discipline: Engineering

Authors:

#1 Dr. Mai Adhelhakim

Abstract Name: Laser-Induced Breakdown Spectroscopy (LIBS) for Counterfeit Integrated Circuit Detection: Surface and Depth Analysis

Counterfeit integrated circuits (ICs) pose a growing threat to reliability, safety, and security across industries including medical, aerospace, and defense systems. Counterfeiting practices such as blacktopping—where used chips are recoated and re-marked to appear new—compromise performance and can lead to catastrophic failures. This research investigates Laser-Induced Breakdown Spectroscopy (LIBS) as a minimally destructive method for detecting blacktopped counterfeit ICs through combined surface and depth-layer analysis. LIBS directs a focused laser pulse onto the chip surface, generating a plasma plume whose emitted light reveals elemental composition. By performing repeated measurements across surface and subsurface layers, the method identifies compositional variations that distinguish authentic packaging from counterfeit coatings. Detection methods commonly combine physical inspection, electrical testing, and comparison to reference samples (“golden samples”) to evaluate authenticity. This study explores LIBS as a complementary approach capable of providing direct compositional data from both surface and depth layers while involving only limited material removal. Authentic and blacktopped samples are analyzed across multiple surface zones—text, scratches, indentations, and plain regions—to capture emission spectra at varying depths. Preliminary

surface analysis has identified elemental trends indicating higher carbon and oxygen levels in counterfeit coatings and stronger silicon signals in authentic packaging. The project now advances to depth profiling to evaluate compositional transitions and coating thickness. This work seeks to demonstrate that LIBS can accurately identify blacktopped counterfeit ICs and operate without reliance on golden reference samples. The findings will contribute to validating LIBS as a practical analytical method for counterfeit detection and expanding understanding of material composition differences between authentic and falsified components.

Karla Salas

Discipline: Criminology/Criminal Justice

Authors:

#1 Maria De Los Angeles Reyes

Abstract Name: The Role of DNA, Fingerprints, and Digital Forensics in Proving Guilt or Innocence

In today's criminal justice system, the difference between freedom and wrongful conviction often depends on the proper use of forensic evidence. This study examined the role of DNA, fingerprint, and digital evidence in determining guilt or innocence in criminal investigations. The purpose was to evaluate the effectiveness, reliability, and limitations of these forensic methods and to understand how they collectively support fair trials and strengthen modern criminal justice. Secondary research was conducted using peer-reviewed articles, textbooks, and credible forensic science sources. Methods included reviewing studies on the collection, analysis, and interpretation of DNA, fingerprint, and digital evidence. Results indicated that DNA analysis, when properly collected, accurately linked or excluded suspects, as demonstrated in a simulated DNA fingerprinting exercise where only 1 of 5 suspect samples matched the crime scene. DNA showed medium reliability (36%) due to potential contamination or misinterpretation. Fingerprint analysis, with a higher reported reliability (54%), effectively identified suspects through ridge patterns, even distinguishing identical twins when DNA could not. Digital evidence was found to be the least reliable (25%) because data can be altered, deleted, or mishandled, but it remains critical for reconstructing timelines, communications, and locations. Combining multiple evidence types consistently improved investigative accuracy and reduced the risk of wrongful convictions. The discussion highlighted the importance of proper evidence collection, handling, and analysis, as errors in any step can compromise outcomes. Findings emphasized the need for improved forensic training, standardized procedures, and advanced technology, including enhanced DNA testing, machine-learning-assisted fingerprint analysis, and robust digital forensic tools. Overall, this study reinforces that DNA, fingerprint, and digital evidence are essential and complementary tools in criminal investigations. Continued investment in forensic science, improved protocols, and technological advancement are crucial for ensuring justice is delivered fairly, efficiently, and reliably.

Sara Saleh

Discipline: Chemistry

Authors:

#1 Patricia Wolfe

#2 Whitney Redman

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Abeera Chaudhri

Abstract Name: Effects of Biofilm Releasing Agents on the Viability of HEK-293 Cells

Biofilms are associated with 80% of bacterial infections; this is due to their ability to group together and form a sticky extracellular polymeric substance (EPS), which increases antimicrobial tolerance. The purpose of this research is to determine whether different biofilm-releasing cues affect the metabolic and proliferation rates of HEK-293 cells, a key factor in evaluating their therapeutic viability. XTT and scratch assays assessed how each treatment affected cell metabolism and proliferation, offering insight into mammalian responses to dispersing agents. These releasing agents were selected for their distinct mechanisms of releasing bacterial cells from a biofilm: fatty acid signaling molecule (cis-2-decenoic acid) (cis-DA), nutrient (glutamate), environmental toxin (sodium nitroprusside) (SNP), and a glycoside hydrolase (alpha-amylase), which serves as an EPS-degrading enzyme. Despite their ability to disperse bacterial cells, their potential clinical applications remain unknown because of a gap in research on their toxicity to mammalian cells. The XTT assay measured metabolism of cells after varying treatment exposures: 30 min, 90 min, 3 hrs, 24 hrs, and 48 hrs. The XTT indicated no significant differences between the metabolic activity of HEK-293 cells treated with releasing agents compared to the control. There were, however, a significant decrease in metabolism when comparing absorbance of the 30-minute time point to later exposure times for each treatment. Alpha-amylase and glutamate induced decreased mammalian cell metabolism at 48 hours. Scratch assays were performed wherein treated mammalian cells were monitored for wound closure over 3 days. Scratch assay results were more conclusive, showing no significant differences in wound closure among treatments. These results combined support the ability of these biofilm-releasing agents to safely disrupt biofilms surrounding bacteria in potential clinical applications. This will be explored through future proliferation assays to measure cell growth at longer time points of exposure and aid in understanding scratch assay findings.

Jannah Saleh

Discipline: Health and Human Development

Authors:

#1 Amelia Warden

Abstract Name: The Impact of Methamphetamine Usage on Working Memory In Rat Model

The rise in recreational methamphetamine use has contributed to significant neurological risks among adults. Methamphetamine usage imposes mental and physical effects on brain function, including impairments in decision making and working memory linked to overall decreased function in the prefrontal cortex. The dominant explanation for this trend is that methamphetamine is a highly addictive psychostimulant that affects the way our brain creates chemical dopamine. Methamphetamine increases the amount of natural dopamine in the brain, which is what makes users experience the elevated high and euphoric feeling, leading to more usage of the substance. We used data from the Institute of Molecular Biosciences at Mahidol University to extract the reaction times of methamphetamine in a rat model. Testing reaction times involved examination of rats response times to sudden stimuli. Working memory allows you to hold and manipulate important information while coordinating other tasks. We focus on models of data that have been extracted from rats because of the ability to understand biological complexities of methamphetamine. Utilizing a rat model, the data will share key biological genetic similarities including parallel functioning of the prefrontal cortex, which houses executive processes such as working memory, providing a justified model to explore prefrontal cortex mechanisms in this study. Contrary to findings regarding impairment of decision making with the usage of methamphetamine, this study examines how methamphetamine use specifically impairs working memory, measured by reaction time performance and how these reduced reaction times demonstrate reduced efficacy of the prefrontal cortex. This study's findings suggest that methamphetamine does decrease function in working memory of executive processes in the prefrontal cortex.

Discipline: Psychology

Authors:

#1 Nathan Anderson

#2 Natalie Bennings

#3 Christian Garcia

#4 Rose Marie Ward

Abstract Name: The Relationship Between Alcohol-induced Self-Inflation and One's Susceptibility to Illness Among College Students

Alcohol is woven throughout our culture, especially among college students. Despite more recent interventions and continuous research on the detrimental effects of drinking, alcohol-related consequences persist on college campuses. The Alcohol Myopia Theory may be one potential explanation for this. Alcohol myopia is the constraint of attention to solely the present moment due to the effects of acute alcohol use on attention processes. Alcohol Myopia Theory assesses different myopic outcomes: relief (anxiety reduction), excess (exaggerated behavior), and self-inflation (feelings of grandiosity). These effects may limit focus, leading to negative consequences. Perceived Susceptibility represents the belief of how vulnerable one is to infectious disease. Given alcohol's known myopic effects, there is a possibility that during drinking episodes, individuals may not attend to cues or perform behaviors that would limit exposure to illnesses. The focus of the current study is to examine the relationship between alcohol's myopic effects on self-inflation and perceived susceptibility to disease among college students. College students at the University of Cincinnati completed online surveys including both the Alcohol Myopia Scale and the Perceived Susceptibility to Illness Scale allowing us to examine their relationship. We hypothesized that greater self-inflation would predict lower perceived susceptibility. Self-inflation ($p=.750$)($r=-.015$), excess ($p=.079$)($r=.084$), and relief ($p=.083$)($r=-.083$) were all not significantly related to perceived vulnerability to disease. Self-inflation and relief showed a slight negative relationship, and excess showed a slight positive relationship. However, the total myopic effect ($p<.001$)($r=.178$) exhibited a slightly positive, significant relationship. This suggests that although the dimensions of alcohol myopia show no significant trends, there is an overall psychological trend that alcohol has on perceived vulnerability to illness. Taken together, these findings imply that the subscales of alcohol myopia operate collectively, rather than independently, to influence perceived vulnerability to illness.

Milagro Salinas

Discipline: Environmental Science and Sustainability

Authors:

Abstract Name: Evaluating the Impact of Dredging on PCB Pollutant Loads in the Hudson River Using Numerical Integration and Exponential Decay

To evaluate the impact of dredging as a remediation effort in the Hudson River, this study applies numerical integration techniques to estimate reductions in Polychlorinated Biphenyl (PCB) loads between the pre-dredging (2005–2008) and post-dredging (2018–2021) periods. PCB contamination in the Hudson River has been extensively documented through concentration monitoring, with studies noting its persistence in river sediments and long-term implications for human and aquatic ecosystem health. Existing research on the Hudson River highlights the Environmental Protection Agency's (EPA) PCB Dredging Project as a major remediation effort aimed at removing contaminated sediments that persist in the upper river. While previous studies provide monitoring data, this research examines the applicability of quantitative estimation techniques

for measuring changes in PCB loads. This investigation uses the Trapezoidal Rule on annual mean PCB concentrations and water flow rates from the pre-dredging and post-dredging periods to estimate the total PCB load reduction at the Waterford station, a key upper Hudson location for tracking downstream transport. Then, exponential decay is applied to predict the continued decline in PCB loads beyond 2021. Results reveal a 54.14% decrease in total PCB load, indicating that dredging significantly reduced contamination in the river. The exponential decay function predicts that an additional 443.54 kg of the pollutant will ultimately be removed from the Waterford station. These findings highlight the usefulness of quantitative estimation for analyzing long-term environmental recovery and informing future water quality management decisions. Further research could expand the dataset to capture additional monitoring data after 2021 and incorporate PCB measurements reported at more frequent intervals to account for seasonal variations in PCB transport.

Cameron Salisbury

Discipline: Computer Science

Authors:

#1 Mulham Fawakherji

Cherish Barnes

Justin Smith

Abstract Name: Tomato Leaf Anomaly Detection System

Early detection of crop diseases is essential for improving agricultural productivity, reducing labor demands, and preventing outbreak. This project presents a machine learning based anomaly detection system designed to identify tomato leaf diseases such as leaf blight, black spot, leaf mold, and bacterial spot. The system integrates real-time visual monitoring with trained deep learning models and is intended for deployment on a remote-controlled data-collection vehicle operating on the NCAT farm. Over the course of the semester, we developed and evaluated an end-to-end workflow encompassing data preparation, model training, testing, and performance analysis using a curated tomato leaf image dataset. We implemented three primary models YOLOv8, YOLOv11, and MobileNetV2 to compare classification and detection performance across different architectures. YOLO-based models leverage convolutional neural networks to localize diseased regions with bounding boxes, offering strong performance for real-time detection. MobileNetV2 served as a lightweight baseline for fast classification tasks. Through systematic training sessions, iterative tuning, and the integration of data augmentation techniques such as rotations, flips, and mosaic batching, the YOLOv11 model demonstrated the highest overall potential. Accuracy improved significantly throughout training, rising from 40% to approximately 72%, with final performance ranging between 70–75% on unseen validation samples. Our analysis highlighted key challenges including class imbalance, early accuracy plateaus, and the introduction of noise in real agricultural environments stemming from lighting variations, angles, and background clutter. Despite these constraints, YOLOv11 maintained reliable inference speed and strong detection capability suitable for embedded or mobile deployment. Future development will focus on expanding the dataset with images collected directly from the NCAT farm, deploying the trained model on edge devices with a user-friendly interface, integrating system compatibility with the RC vehicle, and extending the methodology to additional crop types. This work demonstrates the feasibility of a scalable and efficient vision-based tool for supporting modern precision agriculture.

David Salomon

VA - Christopher Newport University

Discipline:

Authors:

Kaitlyn Kinslow
Lizzie Childress

Abstract Name: Curate This! Teaching the Art and Ethics of Museum Exhibition at Christopher Newport University

This presentation explores innovative approaches to teaching curating to future museum professionals at Christopher Newport University, with an emphasis on balancing theory, practice, and professional readiness. Curating is more than arranging objects in a gallery—it involves interpretation, storytelling, ethics, and a responsibility to diverse audiences. Preparing students for this complex role requires a pedagogy that is both practical and reflective, grounded in case studies and experiential learning opportunities. The session highlights strategies for developing students' curatorial judgment, including project-based assignments where they design and execute small-scale exhibitions, opportunities for collaboration with local museums, and exercises that emphasize critical thinking about representation, accessibility, and cultural sensitivity. By learning to evaluate objects and narratives through multiple perspectives, students build essential skills in research, interpretation, and communication. Attendees will leave the session with practical strategies for designing courses and assignments that prepare students for the realities of the profession. They will know how to integrate theory and practice, feel inspired to experiment with new teaching methods, and be ready to build partnerships with museums and communities that enrich student learning. Ultimately, this presentation demonstrates that teaching curating is not only about training students to arrange exhibitions, but also about empowering them to shape museums as inclusive, innovative spaces that connect meaningfully with society.

Samuel Salvador

Discipline: Interdisciplinary

Authors:

Abstract Name: The Role of Balance in Novel Videogame Monetization

Take Tic-Tac-Toe and contrast it to 1972's Pong. One game is perfectly fair, but the other provides a massive advantage to the first player and is arguably more math equation than game. However, mindful of exponential growth in videogame complexity, I propose several alternative goals to fairness in game balancing, or varying ways to interpret fairness in an inherently competitive system. How these emerging philosophies are impacting the artistic vision and financialization of videogames is examined. Engagement-based, skill-based, and randomized matchmaking are explained. The implications contained in pay-to-win, 'hat-to-win', and grind-to-win digital economies are contextualized. Gaming has many parallels with college admissions; namely, social class, social justice-inspired, and stats-driven admissions plans are quite comparable to the aforementioned approaches to digital game economies. I posit several (often competing) goals that universities seek to achieve through the admissions process. Must there be winners and losers, and is it zero-sum when so? Must we keep score? Can the admissions process be balanced from a metagaming dimension? Ultimately, this former professional esports-competitor-turned-law-student-hopeful provides a plan of action for the players—that is, the students—to play to win.

Schalee Salvo

Discipline: Psychology

Authors:

#1 Rachel Navarro

Abstract Name: I Can't Put It Down!: Parent-Child Relationships and Attachment Styles as Predictors of Smartphone Overuse in College Students

Recent studies show that 48%-60% of college students report behaviors consistent with smartphone overuse or addiction, with many spending a minimum of 4-6 hours per day (Umarji and Patel, 2024). Cell phone overuse in college students has detrimental effects including increased anxiety, poor sleep quality, procrastination and avoidant emotional coping patterns. Researchers have created a term for "technology based interference" (or "technoference") which refers to the disruption that smartphones cause to in-person interactions that can result in reduced relationship satisfaction and feelings of neglect (McDaniel & Coyne, 2016). The current study further examines how parent-child relationships and attachment styles predict smartphone overuse. The data collection for this study will occur in January 2026. All university students at a small, private, university in the northeast United States will be invited to complete an online survey using Alchemer with an incentive to win a gift card. Survey measures will include the: (a) Helicopter Parenting Index (Odenweller et al., 2014), (b) Attachment Style Questionnaire-Short Form (Iwanaga et al., 2020), (c) Mobile Maintenance Expectations Scale (Hall & Baym, 2011), (d) Digital Entrapment Scale (Hall & Baym, 2011), and (e) Actual Cell Phone Usage Form created by the authors that asks participants to report the actual average and total phone use time over the past week based on statistics from their phone settings. We hypothesize that students reporting intrusive or overbearing parental relationships will demonstrate higher levels of phone use, greater digital availability toward parents, and stronger feelings of entrapment. Insecure-anxious attachment is predicted to correlate with increased phone use, higher digital availability, and stronger feelings of entrapment compared to avoidant and secure attachments. Results of this study can educate students about how their relationships with their parents correlate with their phone use, especially for students who feel emotionally dependent on their phone.

Diya Samal

Discipline: Engineering

Authors:

#1 Diya Samal

#2 Jay Sah

#3 Resantini Shanmugan

#4 Javier Dominguez De Leon

#5 Palaniappan Sethu

Abstract Name: The Effect of Pulsatility Loss on miRNA Expression in the Vascular Endothelium of Continuous Flow-Left Ventricular Assist Device (LVAD) Patients

Background: Continuous-flow Left Ventricular Assist Devices (CF-LVADs) are standard therapy for patients with end-stage heart failure. patients with end-stage heart failure. However, the absence of pulsatile blood flow imposes non-physiological stresses on the vascular endothelium, disrupting normal homeostasis and contributing to vascular dysfunction. MicroRNAs (miRNAs) are known to play an important role in endothelial function and disease progression and understanding their role in specific situations can potentially offer insights into endothelial responses to non-physiological conditions in CF-LVAD patients. **Aims:** This study aims to identify mechanosensitive miRNAs differentially expressed in vascular endothelial cells under CF-LVAD conditions using publicly available RNA sequencing dataset and validate their expression through in vitro analysis. **Methods:** In this study, we first performed a bioinformatic analysis of publicly available datasets to identify miRNAs differentially expressed in CF-LVAD patient conditions compared with the normal physiological state, using GEO2R software. The significantly altered miRNAs were then further validated experimentally by mimicking CF-LVAD continuous stretch in vitro using our well-established vascular pulse perfusion model (VPPM). Human umbilical vein endothelial cells (HUVECs) were exposed to

either cyclic stretch (physiological) or constant stretch (CF-LVAD), and transcriptional levels of the candidate miRNAs were quantified using TaqMan qRT-PCR. Results: Computational analysis revealed that non-physiological flow in CF-LVAD patients distinctly modulates the transcriptional expression of several miRNAs, including hsa-miR-93, hsa-miR-423, and hsa-miR-22. In contrast, our VPPM experiment showed that miR-93 was significantly down-regulated under constant stretch compared to cyclic stretch condition. Additionally, miR-423 and miR-22 showed no statistically significant changes in expression irrespective of the type of stretch. Conclusions: These findings demonstrate that miR-93 is a mechanosensitive regulator of vascular endothelial dysfunction in CF-LVAD patients and suggest that miR-93 could potentially be used as a biomarker and therapeutic target for managing vascular complications in these patients.

Arianna A. Samaroo

Discipline: Psychology

Authors:

#1 Damian A. Stanley

#2 Theo J. Andre

Abstract Name: Identifying Social Computational Phenotypes in Psychopathology

Learning about others and making adaptive social decisions is essential for healthy functioning, and impairments in these processes are symptomatic of many mental disorders. Despite this, research linking psychopathology to social learning and decision-making (LDM) remains sparse. Existing work is limited in scope, focusing on specific disorders and/or assessing only nonsocial LDM. Recently, clinical psychological research has shifted from traditional diagnostic frameworks with symptom overlap and high comorbidity toward dimensional models. The Hierarchical Taxonomy of Psychopathology (HiTOP) is one such framework that organizes symptoms along data-derived transdiagnostic spectra, offering a more flexible and comprehensive view of psychopathology. Here, we use model-based approaches to examine how variation in different aspects of social LDM maps onto HiTOP spectra. Online participants ($N = 1,000$; recruited via Prolific) will learn about the trustworthiness of social and nonsocial targets while completing a version of the Trust Game where they decide how many points to send to each target (20 rounds/target, 2 social and 2 nonsocial targets per block, randomly intermixed). Across blocks, learning will be guided by three feedback types (information-only, reward-based, and social). Targets will vary in their initial trustworthiness (share rates: 20%, 35%, 65%, 80%) and will shift their behavior around the midpoint of the block to a new valence and level of certainty (e.g., from 80% to 35%). Participants' initial trust estimates, learning rates, and updating biases will be estimated using a modified Rescorla–Wagner update rule. To isolate socially-specific LDM, nonsocial parameters will be regressed out of corresponding social parameters, and the resulting values will be regressed onto HiTOP spectra. The goal of this exploratory study is to identify Social Computational Phenotypes (SCPs)—specific configurations of social learning parameters that correspond to locations within the HiTOP framework. These insights may inform future confirmatory work and improve detection and intervention in psychopathology.

Saachi Samdani

Discipline: Economics

Authors:

#1 Luminita Stevens

Abstract Name: The Effect of Tightened Student Immigration Policy on Innovation Across Higher Education

Institutions in the United Kingdom

This project addresses how the United Kingdom's closure of the Post-Study Work visa (PSW) in 2012 and introduction of the Graduate visa in 2021 affected the number of international students in the country, as well as the contribution to innovation from higher education institutions (HEIs). Both the PSW and Graduate visa allow individuals holding a Student visa to remain in the UK for two years after graduation, without a work-sponsored visa. Ahmed and Davies (2025) discuss how reducing net inward migration to the UK was the motivation for the PSW closure. However, the economic impact on HEIs was not taken into consideration, and ultimately led to the introduction of the Graduate visa. Chellaraj et al. (2008) conclude that reducing the number of international graduate students in the United States through visa restrictions could significantly lessen innovation. My paper fills a gap in the literature by studying the immediate effects of the two policies, as well as the relationship between international students and innovation in the UK. I will be using a difference-in-differences approach for each policy. The control group is HEIs with a below median percentage of international students (during the base year). The treatment group is HEIs with an above median percentage of international students. The proxies for innovation are intellectual property revenue and number of patents granted by HEIs. Prior to studying innovation, the effect of both policies on the number of international students will also be observed. I expect to find that the closure of the PSW route decreased the number of international students across HEIs, and that this in turn decreased these institutions' contribution to innovation. The Graduate visa introduction, however, I expect to have increased the number of international students and the contribution to innovation from HEIs.

Eshal Sameer

Discipline: Biology

Authors:

Abstract Name: Role of the Long Non-Coding RNA (LncRNA) CASC15 in Vascular Senescence and Disease

Cancer survivors are at increased risk for chronic kidney disease (CKD) as cancer therapies can activate the Renin-angiotensin system (RAS) and lead to end-stage renal disease and vascular dysfunction. Previous research has demonstrated the importance of long non-coding RNAs (lncRNAs) in regulating vascular cell dysfunction and senescence. Our lab has identified the lncRNA, cancer susceptibility candidate 15 (CASC15), and its association with two components of RAS: Angiotensin II and Angiotensin 1-7. Our lab is interested in the unknown effects of Angiotensin 1-7 on CASC15 expression. This project investigates whether CASC15 loss induces senescence-associated secretory phenotype (SASP) protein marker expression in mouse and human vascular smooth muscle cells (MVSMC, HVSMC), and whether this expression is altered by using Angiotensin 1-7. It is hypothesized that CASC15 will induce MVSMC senescence; this expression will be reversed with Angiotensin 1-7 treatment, and that such results will be reproducible in HVSMC. Using a series of western blots, we will detect common SASP protein biomarkers in samples of control, CASC15 knockout, and CASC15 knockout with Angiotensin 1-7 treatment for MVSMC and HVSMC. Notable results include that the SASP proteins HMGB1, p16, and γ H2AX, were the only tested proteins that were expressed in our samples, with expression levels increasing slightly in response to CASC15 knockout compared to control samples. Understanding how CASC15, RAS, and vascular cell senescence and dysfunction intertwine is crucial in establishing CASC15 as a potential therapeutic target for future CKD therapies.

Fnu Samiya

Discipline: Economics

Authors:
#1 Fnu Samiya
#2 Joel Saucedo

Abstract Name: A Data-Driven Calibration and Visualization of the Quadratic Normal Volatility Model for EUR/USD

We propose a fully reproducible, data-driven calibration and visualization framework for the Quadratic Normal Volatility (QNV) model applied to the complete EUR/USD option surface. Motivated by decades-long empirical regularities—a persistent risk-reversal skew, short-term volatility turbulence, and a volatility minimum systematically displaced from the forward—the QNV model provides a fundamental specification using only three global parameters (quadratic curvature, base volatility, and minimum location). Leveraging the exact spectral characteristic function, we implement instantaneous pricing via the COS method and perform direct global least-squares calibration to a full volatility surface across strikes and tenors (quotes) with acquired Bloomberg data. Our core contribution is a visualization pipeline that integrates this calibration with high-resolution surface reconstruction and rich 3D visualizations of market vs. model smiles and residuals. This work visually tests whether a deterministic three-parameter model can match the fit quality of multi-factor stochastic models while offering transparency and computational speed for the world’s most liquid currency pair.

Dina Samson

Discipline: Education

Authors:

Abstract Name: Using Student Experience to Drive Course Co-design

How can courses be designed to best support the learning of every student? We addressed this question using Learning Experience Network Analysis (LENA) to analyze qualitative data from 84 student reflections of a co-design course. By mapping the co-occurrence of coded elements such as learner successes, struggles, and alignment with learning theories, this study was able to visualize these relationships and translate them into concrete course design changes. The analysis identified five different student learning profiles. For example, one group was motivated yet highly individualistic, so more formal project roles could be added to their course to reframe collaboration as an essential professional skill. Another group struggled with project pacing but excelled at engaging collaboratively, therefore adding more structure into the design process would be an apt design move. A third group felt less stress in the learning environment as they valued peer work, but struggled when dealing with irresponsible partners and team miscommunication. To support them, a “team charter” could be created to hold teammates accountable for team-set expectations regarding communication methods, meeting attendance, and division of labor. The final two profiles revealed students who struggled with procrastination and initial uncertainty, respectively. For them, design moves included introducing smaller, non-negotiable checkpoints and providing enhanced scaffolding materials to help them start. This cluster analysis and the design moves crafted from it showcase LENA’s strong application for developing learning environments that better honor student complexity.

Dan Samuel

Discipline: Health and Human Development

Authors:

#1 Dan Samuel

#2 Ashlee Hensley

#3 Tejal Katore

#4 Peter Keyel

Abstract Name: Resisting Toxins Made by Flesh-Eating Bacteria: Defining the Role of Annexin A2 Phosphorylation in Cellular Membrane Repair

Flesh-eating bacteria like *Streptococcus pyogenes* can destroy human tissue within hours, driven by toxins that puncture cell membranes. Failure to repair this damage causes cell death, tissue necrosis, and increased patient mortality. One strategy to reduce mortality is to improve tissue function by strengthening cellular membrane repair. The protein annexin A2 (A2) is a key mediator of this process, coordinating the rapid resealing of membranes after toxin attack. However, the molecular triggers that recruit A2 to sites of membrane damage remain poorly defined. In this study, we characterized A2's function in membrane repair after toxin exposure. We generated A2-knockout (KO) HeLa cell lines and challenged them with two cholesterol-dependent cytolysins: streptolysin O and perfringolysin O. Knockouts were validated by western blotting. Membrane damage was quantified by propidium iodide (PI) uptake and flow cytometry. Several independent A2-KO clones were tested. Clones displayed higher sensitivity to SLO and PFO exposure, with a significantly greater percentage of PI-positive cells than wild-type and other KO clones. These results indicate that, compared to the wild-type, the loss of A2 exacerbated toxin-induced membrane damage, suggesting A2 is critical for efficient resealing of membrane pores. This work highlights a key host-cell defense mechanism against bacterial virulence factors, bridging cell biology and infectious disease. By elucidating how annexin A2 helps protect cells from pore-forming toxins, our findings could inform strategies to mitigate tissue damage during bacterial infections. Ongoing experiments will examine whether reintroducing A2 (wild-type or phosphorylation-site mutants) can rescue the repair defect, to further dissect the molecular mechanism.

Erin Sanchez

Discipline: Anthropology and Archaeology

Authors:

#1 Erin Sanchez

Abstract Name: Cataloging and Analyzing the Rector Paleoecology Lab's Non-Human Skeletal Collection: A Resource for Research, Education, and Comparative Study

Non-human mammal skeletal collections play a vital role in Biological Anthropology laboratories, serving as essential resources for teaching, comparative analysis, and the identification of skeletal remains. These collections allow students and researchers to develop skills in osteological analysis, species identification, and trauma assessment. A well-organized collection enhances the efficiency of skeletal comparisons and strengthens the effectiveness of educational instruction. Additionally, these collections provide valuable examples of skeletal trauma, which can manifest differently in non-human mammals compared to humans. Understanding these variations is crucial for forensic anthropology, zooarchaeology, and comparative anatomy studies, as it aids in distinguishing natural bone alterations from human-inflicted trauma. VCU's Rector Paleoecology Lab non-human skeletal collection consists primarily of specimens donated by hunters, resulting in a diverse array of traumatic injuries. These include antemortem, perimortem, and postmortem trauma, as well as evidence of blunt force impact, high-velocity projectile injuries, and pathological conditions. The presence of these varied traumas provides an opportunity for further analysis of bone healing, fracture patterns, and the effects of different types of force on skeletal structures. This study aims to systematically catalog, photograph, organize, and analyze the lab's collection to improve its accessibility and

research potential. By developing both physical and digital directories, this project will facilitate comparative research, aid in skeletal identification, and enhance educational opportunities for students and researchers. The resulting database will serve as a comprehensive reference, increasing the collection's utility in anthropological and forensic studies while ensuring its long-term preservation and accessibility.

Alex Sanchez

Discipline: Computer Science

Authors:

#1 Alex Sanchez

#2 Yanzhao Wu

Abstract Name: Dynamic Role Evolution in Multi-Agent Systems

The recent development of large language models (LLMs), such as ChatGPT and Google Gemini, have revolutionized the field of artificial intelligence, prompting for innovative ways to reach more advanced forms of intelligence. One approach that has shown much promise has been the advancement of multi-agent systems, which utilize multiple LLMs in specialized roles to tackle complex tasks. These teams of AI agents can outperform single models in organized environments. However, current architectures require fixed roles to be pre-assigned to each agent, making them rigid and prone to failures when placed in complex and dynamic environments, where tasks can change unexpectedly. Alongside this, systems tend to fall into infinite error loops when unable to complete a task. This results in an extreme waste of computational resources, inefficiencies in complex problem-solving, and lack of adaptation. This project proposes a novel multi-agent approach in which agents evolve their roles and adapt their strategies based on their environment. By shifting the paradigm from agents asking “what should I do?” to a more reflective “who should I become?”, agents can dynamically optimize collaboration and resource usage. This approach is tested in a simulated software development environment. A control group uses standard static role assignments with code-writing or reviewing agents, while the experimental group prompts agents to evolve roles based on performance feedback. We measure three outcomes: accuracy in solving complex coding problems, convergence speed (turns required to reach solution), and precision of the evolution mechanism activating in response to detected infinite error loops. We hypothesize that evolving systems will significantly reduce computational inefficiencies from error loops and improve problem-solving abilities when compared to static systems. Our results will establish a foundational mechanism and principle for self-organizing multi-agent systems with capabilities to tackle diverse, unpredictable challenges.

Christian Sanchez Soria

Discipline: Social Work and Human Services

Authors:

#1 Reem Shawkat

#2 Hyojin Im

Lyric McCoy

Abstract Name: Beyond Coursework: A Qualitative Study on the Unseen Burdens of First-Generation Immigrant and Refugee College Students

First-generation immigrant and refugee students face compounded challenges in higher education, including financial precarity, acculturative stress, and transnational obligations. Mainstream student success

frameworks often overlook the invisible labor these students perform, such as sending remittances, cross-border caregiving, family advocacy, and translation/interpretation work. These responsibilities increase stress and burnout and elevate the risk of academic attrition, yet their impact remains understudied. There is an opportunity for research to examine better how migration histories, socioeconomic hardship, and institutional inclusion or exclusion come together to shape the educational experiences of this population. This study presents preliminary findings from the qualitative phase of a larger mixed-methods study investigating how first-generation immigrant and refugee students navigate academic and transnational responsibilities. Semi-structured interviews were conducted with six undergraduate participants to document how they balance invisible labor with the demands of higher education. Data were analyzed thematically to identify patterns in family expectations, transitional challenges, bureaucratic barriers, and social support networks. Thematic analysis identified four central patterns influencing their academic trajectories. First, family expectations placed pressure on students to either excel academically and/or to provide significant financial support, often amid parents' limited familiarity with higher education. Second, students described transitional challenges from high school to college, including gaps in time management, study skills, and academic preparedness. Third, participants encountered bureaucratic barriers, noting that accessing institutional resources required substantial self-advocacy and navigating overwhelming and unfamiliar systems. Finally, social support through friendships emerged as a key source of emotional and academic resilience, particularly when students hesitated to share personal hardship with family. These findings highlight how transnational responsibilities intersect with structural barriers to shape student engagement. Qualitative insights generated here will inform the design of the study's subsequent quantitative phase and support efforts to develop more equitable, culturally responsive support systems for first-generation immigrant and refugee students.

Dominic Sandell

Discipline: Health and Human Development

Authors:

- #1 Dominic Sandell
- #2 Jonah DeMatto
- #3 Legacy Wilson
- #4 Jasmine Rosales
- #5 Gianpiero Lara
- #6 Zachary Young
- #7 Alesha Fleming

Abstract Name: Relationship identification between triggers and electrophysiological changes in the brain and the overall human physiology during migraines

One of the most common neurological conditions in the world is migraines; nearly 1/4th of the working population suffers from this condition and exhibits a large variety of triggers. The current treatment method for migraine uses a few different medications for all migraines, regardless of triggers. Our hypothesis is that there is a specific relationship between the triggers of migraines and the electrical changes in the brain during migraines. The study incorporates two different data collection methods: electrophysiological tests (Electroencephalogram (EEG), Electrocardiogram (ECG), Galvanic Skin Response GSR, and a pulsometer) that record the unique electrical signals of the body and brain, and surveys that record daily exposures and experiences to extrapolate possible triggers. The participants will be 88 individuals from Embry-Riddle, comprising both men and women who experience migraines, with a ratio of men to women who experience migraines similar to the men-to-women ratio at ERAU. The large variety of data collected makes up for the low participant count and small population. Our preliminary results reveal a correlation between the triggers of "Allergies," "Anxiety/Stress," and "Dehydration" to the combined symptoms of "Aura and Minor Pain," "Aura," and "Aura, Major Pain, Fatigue, and Dizziness" respectively. The data also shows that generalized "Aura" is the most common symptom, and the most common trigger is "Allergies."

Matthew Sanders

Discipline: Biochemistry

Authors:

#1 Tianyan Gao

Abstract Name: Regulation of Wnt Signaling by Src-mediated Tyrosine Phosphorylation of LRP6 in Colorectal Cancer

Colorectal cancer (CRC) remains the second-leading cause of cancer-related deaths in the United States. A central driver of CRC initiation is dysregulation of the Wnt signaling pathway, often caused by mutations in the APC or β -catenin gene, resulting in constitutive signaling and uncontrolled cell proliferation. Proper pathway regulation depends on tightly coordinated phosphorylation events. Activation of the co-receptor LRP6 through serine phosphorylation is well characterized, yet the contribution of tyrosine phosphorylation remains unclear. Src, a non-receptor tyrosine kinase frequently overexpressed in CRC, has been implicated in modulating LRP6 activity, but its mechanistic role is unresolved. This study examines how Src-mediated tyrosine phosphorylation of LRP6 influences receptor function and downstream Wnt signaling. Tyrosine-to-phenylalanine LRP6 mutants were introduced into LRP5/6 double-knockout STF cells together with constitutively active or inactive Src variants, and subsequent receptor phosphorylation, endocytosis, and β -catenin activation were analyzed by western blotting, immunoprecipitation, and fluorescence microscopy. These findings define a Src-LRP6 signaling axis that couples tyrosine kinase activity to canonical Wnt activation, identifying a potential therapeutic target in colorectal cancer.

Renee Sandoval

Discipline: Biochemistry

Authors:

#1 Bridget McGivern

Abstract Name: Exploring the impact of two methane mitigation strategies on rumen microbiomes of grazing steers

Grazing steers partner with their rumen microbiomes to efficiently convert plant-derived carbohydrates into meat. Considering the socioeconomic importance of the beef industry, it is critical to develop strategies that maintain quality while lessening negative environmental impacts. Diet supplementation and hormonal implants have been shown to variably impact methane emissions and animal performance. A previous study looked at grazing steers across four treatment groups: diet supplemented, hormonal implanted, combined diet and implant, and no intervention. It found no significant impact of these treatments on methane emission nor animal performance over 90 days of grazing. However, the response of the rumen microbiome to such treatments remains relatively unknown. Here, we will analyze 16S and ITS rRNA gene amplicon sequencing from the same steers. We found that all treatments led to an increase in 16S and ITS alpha diversity over time, however, only the 16S diet group showed a significant increase in Shannon diversity. We did not see significant differences in the 16S or ITS composition of the rumen microbiome across treatments. However, there were significant alterations in both the 16S and ITS rumen microbiome composition over time. Future analyses will look deeper at individual microbial and fungal responses to diet and grazing time periods, as well as associations with methane and performance data. Ultimately, results from this study will provide insight into rumen microbiome dynamics during the life cycle of a grazing steer, further informing more sustainable management strategies.

Victor Sandoval Jr.

Discipline: Computer Science

Authors:

#1 Jennifer Breese

Jenna Moranelli

Christopher Fullard

Abstract Name: Enhancing Information Technology and Cybersecurity Student Communication Skills through Immersive AR/VR and AI-Driven Simulations Using VirtualSpeech

Advancements in immersive technology are creating new opportunities for improving communication skills in Information Technology and Cybersecurity education. This project explores the use of augmented and virtual reality (AR/VR) headsets combined with AI-driven simulations to help undergraduate students build confidence, reduce anxiety, and practice real-world communication skills. Using the VirtualSpeech platform, students were guided through scenarios where they presented security risk findings to an AI-driven avatar for realistic settings. These sessions were designed to replicate high-pressure professional environments, allowing students to practice quick thinking and technical communication in a safe and controlled setting. Fifty students from IT and Cybersecurity courses participated in the exercise, which includes Cyber 100, Security Risk and Analysis (SRA) 211, and Cyber 221. Before each simulation, students conducted a standard security risk analysis and prepared a brief presentation. They then entered an AR/VR environment where an AI avatar asked follow-up questions aligned with real Chief Information Officer expectations. Early findings suggest that students felt more confident speaking in stressful settings and found the immersive experience valuable for preparing for internships, presentations, and technical interviews. Many students also reported that AI-driven questioning helped them think more critically and communicate more clearly under pressure. Student researchers supported the design and delivery of these activities by managing the VirtualSpeech platform, uploading materials, and assisting participants throughout the simulations. While additional analysis is underway, initial feedback indicates that AR/VR technology and AI-generated interactions can play a meaningful role in communication training for technology-focused students. Future work will examine long-term skill development, expanded classroom use, and ways to increase accessibility for a broader range of learners can benefit from these immersive communication practices.

Yiming Sang

VA - University of Virginia

Discipline: Geography/Geology

Authors:

#1 Todd Lookingbill

#2 Stephanie Spera

Abstract Name: Integrating Community Data and Satellite Data to Assess Air Quality across Richmond, VA

Addressing the serious environmental health issues associated with urban air pollution is limited by the spatial and temporal resolution of air quality data. This study integrates community-deployed PurpleAir PM_{2.5} sensors with MODIS-based Aerosol Optical Depth (AOD) imagery to examine seasonal and regional variability in air quality for Richmond, VA. Daily AOD retrievals at 1-km resolution were compared to PM_{2.5} measurements from more than 50 PurpleAir sensors, calibrated using EPA-derived correction equations and interpolated to a 1-km resolution using Empirical Bayesian Kriging. After normalization, these datasets provided a comprehensive framework for comparing surface-level PM_{2.5} concentrations with satellite-

estimated aerosol loading to assess whether AOD can serve as a proxy for PM_{2.5}. Seasonal and short-term analyses revealed that correlations between PM_{2.5} and AOD were consistently highest during summer, when both pollutant levels and variability increased. Periods of elevated pollution—including the Canadian wildfire smoke in Summer 2023—exhibited the strongest alignment between the two measures, indicating that AOD performs best as a proxy under poor air quality conditions. Spatial patterns across the city showed strong agreement between the PM_{2.5} and AOD measures for most of the city, with the Southeast neighborhoods, long affected by systemic underinvestment, having the higher levels of both PM_{2.5} and AOD, compared to Northwest neighborhoods. In contrast, central Richmond displayed notable mismatches between the datasets, especially in areas with heterogeneous land cover such as the boundary between Hollywood Cemetery and the working-class Oregon Hill neighborhood. By integrating low-cost sensor networks with satellite products, this study demonstrates the utility of combining community science with remote sensing to improve air quality monitoring in data-limited areas. The findings highlight both the potential and the limitations of AOD as a predictor of neighborhood-scale pollution and underscore the need for expanded sensor coverage in environmentally vulnerable communities.

Saqib Sange

Discipline: Biology

Authors:

Abstract Name: Engineering Bacteria for a Sustained Release of Mycosporine-like Amino Acid – Shinorine for Gut and Neurodegenerative Disorders

Shinorine, a UV-absorbing mycosporine-like amino acid, serves as a promising candidate for antioxidant and photoprotective applications. However, scalable production and delivery methods remain limited. Our recent work focuses on engineering *Escherichia coli* strains for shinorine biosynthesis, with tunable controlled expression. Using HPLC, we confirmed differential production levels, offering a suitable system for downstream applications. To explore delivery mechanisms, we evaluated the incorporation of shinorine into outer membrane vesicles (OMVs). These vesicles may serve as vehicles for topical or oral administration, enabling targeted access to skin or gut tissues with the aim of harnessing shinorine's antioxidant properties. Notably, animal studies revealed that orally or systemically administered shinorine was detectable in serum, gut, and brain tissue suggesting blood–brain barrier permeability. Collectively, these findings highlight shinorine as a bioactive compound of interest for translational applications and the potential of engineered bacterial platforms and OMVs in developing next-generation therapeutics.

Margaret Sansoucy

Discipline: English and Literature

Authors:

Abstract Name: Female Agency in Works by Elizabeth Gaskell

In recent years Elizabeth Gaskell has become a more studied author for her depictions of class issues and female sexuality, especially by scholars such as Hilary Schor and Deirdre D'Albortis. These scholars look at Gaskell's works to find her transgressiveness, but female agency need not be limited to transgression. Within the context of Victorian Britain, Gaskell dared to write women as having independent control over their own lives in ways that strengthened their society as a whole for both women and men. In her novels *Mary Barton*,

Ruth, Sylvia's Lovers, and Wives and Daughters, Gaskell created heroines who are complex and are not fully obedient and selfless. Instead, her characters are empowered to make their own decisions and stand up for themselves and the people they care about. She offers a solution to the oppressive patriarchal systems of society in her texts in the form of communities of women, which allow for her heroines to become active agents and create a better society. Gaskell's depiction of agency is within the bounds of the private sphere, which saves her from accusations of political transgression, but even so her heroines make intentional choices to act. Her characters have agency in their own personal lives that come from the communities of women and from the lack of power the men have in the novels. Gaskell is giving her women agency so that they can cause a legacy of women who are able to have agency in reality. Gaskell is like her heroines, fighting through the conventions of women characters to give birth to new ideas surrounding gender and independence. Her works are embodiments of change and adding them to the canon of Victorian literature will allow for a more nuanced understanding of the past.

Jolcey Santana

Discipline: Biology

Authors:

#1 David Hall

#2 Ryan Smith

Abstract Name: Elucidating the Role of *Aedes albopictus* Hemocytes and Extracellular Vesicles in Dengue Virus Serotype 2 Dissemination and Amplification

Mosquito-borne viruses are a rapidly growing threat to public health, causing hundreds of millions of infections annually, with dengue virus (DENV) alone causing an estimated 100 million symptomatic cases and about 100,000 life-threatening cases yearly. With over half of the world's population now considered at risk, there is a need for new strategies to address the transmission of DENV. For DENV to be transmitted to a new host through the bite of a mosquito, DENV must disseminate from the initial site of infection in the gut to the mosquito's saliva, traversing physical barriers and evading the mosquito's immune responses. Currently, we lack an understanding of how DENV evades the mosquito's immune system and how it infects the salivary glands, events that are critical for viral replication and transmission. Preliminary studies suggest that mosquito immune cells, called hemocytes, are a key driver of viral dissemination through the production of extracellular vesicles. This project aims to assess DENV replication by mosquito hemocytes and the role of hemolymph extracellular vesicles (EVs) in DENV infection. Unraveling these objectives is key to understanding DENV dissemination after gut escape and is a necessary step in identifying targets to interrupt this process. In this study, we performed focus-forming assays on the supernatants of DENV-infected C6/36 cell lines that were exposed to varying concentrations of GW4869, an EV inhibitor, to quantify infectious viral particles. Additionally, we have conducted qPCR on the same supernatants to quantify the amount of viral genomes present. We expect to observe that the reduction in EV secretion of infected C6/36 cell lines will result in lower infectivity of virus secreted in the supernatant. Therefore, we expect the packaging into EVs to increase overall infectivity. These results would support that EVs may be a route of viral dissemination within mosquitoes.

Tary Santelises

Discipline: Anthropology and Archaeology

Authors:

#1 Tary Santelises

#2 Brenna McCaffrey

Abstract Name: “If We Don’t, Who Will”: The New York Abortion Access Fund as a Defender of Reproductive Justice Post-Dobbs

Since Dobbs v. Jackson Women’s Health Organization which overturned Roe v. Wade and Planned Parenthood v. Casey, both of which allowed abortion to be federally protected, there has been a disconcerting increase in a lack of access to abortion on all fronts. Due to the mobilization and ongoing work of anti abortion movements, abortion funds have stepped in to fill the gap and provide access—yet there are still tensions around how this work shows up. This paper argues that by doing the ground work to destabilize any progress of reproductive rights, anti abortion movements have created the need for abortion funds which are now defending reproductive justice in this post-Dobbs era. Drawing from ethnographic research in Dr. McCaffrey’s ongoing project, this paper uses interviews of volunteers from the New York Abortion Access Fund (NYAAF) to give a closer look into how an abortion fund is actively defending reproductive justice.

Radhika Santhosh

Discipline: Psychology

Authors:

#1 Radhika Santhosh

#2 Aaron Peter

#3 Karan Shah

Aaron Peter

Abstract Name: EEG Assessment of Varying Bilateral and Unilateral Musical Genre Stimulation on Human Neural Activity

Brain waves can be organized into frequency bands; Delta, Theta, Alpha, Beta, and Gamma, each stimulating different activity in the brain. Derivations in such electrophysiological activity can be measured non-invasively using electroencephalography (EEG) through sensors placed on the scalp. As auditory stimulus is altered, different neural regions are activated, influencing mood, performance, and perception. The previous study analyzed the effect of unilateral and bilateral WN on neural activity. Bilateral stimulation increased frontal lobe activity, demonstrating cognitive processing. Lateralized input showed frontal lobe activity and increased signals in parietal C3 and CZ EEG nodes, indicating restlessness. No stimulation showed restlessness and erratic frontal lobe activity. Based on the previous study with WN, further testing is in progress on different genres, which as literature shows, can prominently alter brain activity. The purpose is to determine the effect of different genres of bilateral and unilateral auditory input on brain activity. A 16-channel OpenBCI-EEG sensor is being used to collect data across a broad age range of participants experiencing controlled stimuli. A range of genres; particularly rock, Bollywood pop, classical, and ambient are being tested. It is worth noting that different genres generates unique stimulating factors for different people. As in the previous study, collected data is preprocessed using notch and bandpass filters to remove unwanted frequencies. Refined data is plotted through time series and Fast-Fourier Transforms, and compared in the form of topographical plots. These results are examined to determine whether auditory stimulation across genres is positioned as a prospective neuromodulatory tool. Full experimental results from the current study will be presented in the conference. Future investigation will generalize results and clarify whether variation in brain activity originates from genre or lateralization of input.

Saul Santiago

Discipline: Linguistics and World Languages

Authors:

Abstract Name: Analysis of Directionals in Verbal Phrases: San Sebastián Coatán Chuj

This study investigates the structure and semantic contribution of directionals in positional and locative constructions in the San Sebastián Coatán dialect of Chuj. Previous work by Elias (2019) provides an in-depth analysis of these constructions; her work focuses exclusively on the San Mateo Ixtatán dialect and identifies a system of ten directionals used across positional and locative predicates. Extending this line of research, the present study examines whether the same morphosyntactic patterns and semantic contrasts hold in a less-documented dialect. Over the past several months, we have developed a corpus comprising over 1,000 isolated words and complete sentences through sustained elicitation sessions with a single native-language consultant. Preliminary findings indicate that the San Sebastián Coatán variety employs a smaller, and in some cases distinct, set of directional markers, suggesting dialectal variation in both the inventory and distribution of these markers. Prior work has shown an agglutinative system of directionals for forming detailed singular-verb phrases; these types of constructions appear to be unconstructable or unpreferred within the San Sebastián Coatán dialect. By analyzing our newly collected corpus, this study evaluates whether the reduced directional system in San Sebastián Coatán maintains this semantic contrast, providing new cross-dialectal evidence for the role of directionals in marking stage-level predicates.

Iliana Santiago Galindo

Discipline: Engineering

Authors:

#1 Bryan Cobb

Abstract Name: Effect of Leg Length on Drop Jump Performance

Drop jumps are commonly used in performance assessments as they allow insight into an athlete's reactive strength. Reactive strength is the ability of muscles to efficiently absorb force and then produce force again very quickly. It is evaluated using ground contact time, which refers to how long the feet stay on the ground during landing. The simple test of having a subject stand on a box, step off with their hands on their hips, land on both feet, and immediately jump, provides a controlled method for evaluating reactive strength. However, biological factors influence drop jump results. The research question guiding this study was whether leg length affects the relationship between ground contact time and jump height. Participants (ages 18-22) were ten male and female college athletes from a division III institution, including track and volleyball athletes. They completed two sessions of drop jumps from a 30 cm platform onto a force plate (CC Athletics, Odense, Denmark). Subjects completed fifteen jumps with ground contact times ranging from 0.15 s to 0.30 s. Leg length was measured from the Anterior Superior Iliac Spine to the medial malleolus. The round contact time duration, defined as the duration between the initial ground contact and takeoff, was quantified using force plate data. A linear regression analysis was conducted to investigate the effect of leg length on the relationship between ground contact time and jump height using Excel. We expect to find athletes with longer legs to exhibit a more rapid drop in jump height as ground contact time decreases. The results may highlight the importance of anthropometric measurements when interpreting reactive strength results. This research contributes to an understanding of how an individual's anatomical measurements affect their athletic performance. This may help inform more personalized approaches to strength and conditioning practices in the future.

Emma Santillo

Discipline: Chemistry

Authors:

#1 Emma Santillo

#2 Todd Eckroat

Abstract Name: Derivatization of Alkyl-linked Isatin Dimers for Cholinesterase Inhibition

Acetylcholinesterase (AChE) and butyrylcholinesterase (BChE) are enzymes that serve as potential drug targets for the treatment of neurodegenerative diseases. Inhibition of these enzymes has been shown to improve symptoms of diseases such as Alzheimer's Disease. Isatin has shown activity as an inhibitor of both AChE and BChE. The purpose of this study was to synthesize alkyl-linked isatin dimers, which show potential as effective inhibitors for both enzymes, and further derivatize these compounds to explore a structure-activity relationship. Isatin dimers with alkyl linkers ranging from 2-8 carbons were successfully synthesized, purified, and characterized via NMR spectroscopy. Two derivatization reactions are being investigated: condensation with hydrazine hydrate under microwave conditions and thionation with Lawesson's reagent. Preliminary results show the condensation with hydrazine hydrate was successful, but the reproducibility of the reaction was problematic. Optimization of the microwave procedure is currently in progress. The thionation reaction has provided complex mixtures that have proven difficult to purify, but several strategies to potentially address this issue have been identified. The full results of these ongoing synthetic investigations will be presented, along with inhibition data for successfully prepared compounds.

Angelica Sanyal

Discipline: Engineering

Authors:

Abstract Name: Validating a Video-Based AI-Powered Early Autism Screening Web Application

Timely autism diagnosis remains a major public health challenge in the United States, where about one in 31 children is autistic and many are not identified until preschool or later. These delays are often linked to limited access to reliable screening tools and long-standing inequities that affect underserved and low-income families. To help address this gap, our work focuses on developing and validating iGAIT, a mobile-accessible screening application that uses computer vision and artificial intelligence to analyze gait patterns from short, parent-recorded videos for screening autism in children. Our validation process brings together several pieces: recruiting participants, supporting a fully remote video-submission workflow, and collecting detailed caregiver questionnaires that include demographic, behavioral, and medical information. To help more families participate, I created step-by-step video tutorials for completing the walking recording at home and designed recruitment materials that were shared across local community spaces. Another key part of this validation work involves comparing the AI-generated results with caregiver questionnaire scores. I automated the raw- and T-score calculations of the paper- and online- Social Responsiveness Scale (second edition) assessment by building a Python program that processes questionnaire data and produces standardized scores instantly, replacing the slow and error-prone manual method. This system allows us to check iGAIT's predictions more efficiently and with greater consistency. As we continue recruiting, we are actively testing both the AI model and the automated scoring workflow to understand how well the iGAIT application performs in real-world settings. Our goal is to fully validate this tool, so families have access to a fast, free, and more equitable option for early autism screening. By validating AI tools like iGAIT, this project helps promote earlier and more equitable autism detection.

Stefanie Sardina

Discipline: Business

Authors:

Abstract Name: Don't judge a drink by its cover?: The influence of packaging on consumer perceptions of energy drinks

There is no shortage of research corroborating the importance of packaging in brand recognition and product positioning (e.g., Ghorbani & Westermann 2024; Orth & Malkewitz 2008; Singh et al. 2025; Underwood 2003). In exceptional cases, it can even affect significantly the perceived value of the product within it to a consumer, as the high resale prices of empty blue Tiffany jewelry boxes and Lululemon shopping bags, for example, have shown. This study investigates the feelings, emotions, and brand perceptions consumers receive from different types of packaging, specifically, in the product context of energy drinks. Using a phenomenological research framework, qualitative data collection in the form of semi-structured interviews, and grounded theory analysis techniques, emergent themes of student perceptions on the design of popular brands of energy drink cans were explored. Initial results revealed negative or positive emotions based on the graphics, colors, and size specifications of the cans, including effects on purchase intentions. Specifically, five main attributes of the packaging of energy drinks emerged as key determinants of consumer perceptions of brand positioning and purchase intentions: graphics, logo, colors, flavor depiction, and can size. This research reports and discusses each of these results, including implications for business practice and suggestions for future research.

Emmalee Sargent

Discipline: Gender, Ethnicity, Diversity, or Cultural Studies

Authors:

Abstract Name: Movie-Star Miracle: Hedy Lamarr as a Hidden Figure in Science

Hedy Lamarr, heralded as one of the most beautiful women in the world, led a remarkable double life as a wartime inventor. Her life and legacy have touched the lives of everyone in the world today as her work became the basis for Bluetooth technologies. Despite her fame as an actress, knowledge about her technological contributions is lacking. This paper addresses the issue of female representation in science fields, and how a lack of knowledge about historical female inventors perpetuates prejudice against women in modern times. Bringing to light the worsening conditions faced by women entering scientific disciplines will put into perspective the injustice women face to this day. Using facts drawn from Hedy Lamarr's illustrious life as well as studies done on the workplace disparity between men and women, this paper aims to illustrate the importance of sharing the stories of women who have persevered in male-dominated fields. Hedy Lamarr remains a hidden figure in modern times, despite scientific genius. Her own face betrayed her as it overshadowed her technological achievements. This bias remains a problem in the scientific community and society of today.

MOHITH KUMAR SATHISH KUMAR

Discipline: Engineering

Authors:

#1 MOHITH KUMAR SATHISH KUMAR

Abstract Name: Fabrication and Surface Functionalization of AZ91D Gyroid Magnesium Scaffolds via Pressure Infiltration Casting for Enhanced Bone Regeneration

Magnesium alloys have gained increasing interest as biodegradable materials for orthopedic implants due to their bone-like mechanical properties and ability to resorb safely in the body. AZ91D, one of the most widely studied magnesium alloys, provides a balance of castability, biocompatibility, and corrosion behavior suitable for early-stage scaffold development. This project focuses on creating AZ91D gyroid-based tissue scaffolds using a novel mold-making approach that supports reliable casting of complex porous structures for bone regeneration. The fabrication process begins with 3D-printed molds designed to capture a gyroid architecture, chosen for its uniform stress distribution, interconnected porosity, and biomimetic stiffness. Initial molds printed with PLA and plaster-of-Paris negatives failed during sintering at 700 °C due to excessive thermal expansion, causing cracks and broken molds. To overcome this challenge, wax-enhanced PLA was introduced because of its negligible thermal expansion, enabling stable sintering and producing high-fidelity negatives. This improvement allowed successful pressure infiltration casting of AZ91D into intricate gyroid structures. Following casting, the scaffolds were characterized through SEM-EDS, XRD, and ICP-based chemical analysis to evaluate microstructure, phase distribution, and elemental stability. Biological testing included degradation studies and in-vitro assays such as MTT cell-proliferation, Live/Dead viability staining, and cell-attachment evaluation on the scaffold surfaces. Early results demonstrate consistent magnesium degradation profiles and promising cell adhesion on the fabricated AZ91D scaffolds, indicating their potential suitability for osteoconductive applications. This work establishes a practical and repeatable workflow for producing gyroid magnesium scaffolds using AZ91D through pressure infiltration casting and improved mold design. The findings contribute to the development of resorbable metallic implants that combine controlled degradation, structural integrity, and enhanced biological response for future orthopedic tissue-engineering applications.

Shivansh Sathya

Discipline: Engineering

Authors:

#1 Shivansh Sathya

#2 Siddarth Swaminathan

Siddarth Swaminathan

Abstract Name: Methodologies to Obtain IV Characteristics for Various Systems: Project for the Thermo-Fluids Lab at SJSU

Measuring IV characteristics in controlled environments is increasingly important as renewable energy systems become more prominent. To support the ME115 Thermofluid Laboratory at SJSU, three experimental rigs were developed to analyze the IV behavior of the systems. The first rig used a centrifugal fan to drive a closed wind tunnel with a 4-inch test section and a total length of 3 feet, generating a steady wind speed of 15.83 m/s. A three-bladed rotor was placed in the test section and tested across resistive loads ranging from 100 to 9900 Ω . Voltage and current were measured simultaneously, and output power was calculated. The turbine exhibited a clear power peak near 100 Ω , producing 6.83 V, 69 mA, and 0.471 W. The second rig evaluated the IV characteristics of an 8 W EPV solar panel. Multimeters and a variable resistor spanning 0–10 Ω in 0.1 Ω increments were employed. Voltage, current, and power curves were generated, confirming the nonlinear behavior of the panel and its deviation from Ohm's law. In addition, a dielectric barrier discharge

(DBD) plasma torch was designed for measuring plasma input power. DBD plasma is highly capacitive, making its IV and power measurements challenging. A custom electrical circuit was developed for this experiment. The torch was operated at 10–15 kV/20–50 kHz using argon gas. Two 100 kV Bellet resistors and dual 1000:1 high-voltage probes were connected to an oscilloscope to analyze signal amplitudes and phase shifts between signals. From $V_{\text{peak-to-peak}}$, $I_{\text{peak-to-peak}}$, and the phase shift, plasma power was measured between 15 to 40 mW at the operating conditions set for this experiment. Comparing these three systems highlights the diverse approaches required to accurately capture IV characteristics across mechanical, solar, and plasma-based technologies. Full experimental results will be presented at the conference.

Aisha Sattani

Discipline: Art History

Authors:

#1 Asiel Sepulveda

Abstract Name: The Sacred and the Spectacle: Islamic Architecture in the UAE Today

In the United Arab Emirates (UAE) sacred architecture rises within a landscape shaped by global capital. Mosques in Dubai and Abu Dhabi now bear the signs of Western architectural sophistication; modern square and rectangular buildings in monochrome, concerned with sustainability and energy efficiency, all while paying homage to the contemplative nature of old Islamic architecture. This project investigates how contemporary architects in the UAE navigate the tension between the visual language of global capitalism and the foundational principles of Islamic architecture. Even as major cities in the UAE including Dubai and Abu Dhabi expand through monumental icons and other aesthetic markers of global capital, their sacred buildings continue to draw upon Islamic principles grounded in geometry, proportion, and a transformative spiritual atmosphere. Together, these conditions raise questions about how spectacle-driven, internationally-oriented design and spiritually rooted architectural traditions coexist, collide, or quietly reshape one another within the UAE's rapidly developing urban environment. This project analyzes three recent religious sites: the Majid Al Futtaim Mosque and the Mosque of Light in Dubai, and the Abrahamic Family House in Abu Dhabi. These buildings offer distinct approaches to Islamic architectural identity, from minimalism and filtered light to pure geometric expression and interfaith spatial dialogue. Together, they reveal how Islamic sacred space in the UAE is no longer defined by ornamental motifs or historical replication but by conceptual reinterpretation and the negotiation of cultural meaning within a modern cityscape. The expected findings suggest that rather than being overshadowed by global capitalist aesthetics, Islamic architecture in the UAE is evolving through subtle spatial strategies that preserve spiritual essence while engaging with contemporary urban conditions. This project contributes to broader discussions on architectural identity and cultural expression in the 21st century, offering insight into how religious architecture adapts, and sometimes resists, within cities shaped by global ambition.

Christopher Saucedo

Discipline: Psychology

Authors:

#1 Christopher Saucedo

#2 Donald Lucas

Abstract Name: Prevalence of ADHD and Autism in Community Colleges

Although public awareness about Attention Deficit Hyperactivity Disorder (ADHD) and Autism Spectrum Disorder (ASD) is growing, research on the prevalence of ADHD and ASD at community colleges (CCs) is sparse. CCs serve diverse and often underserved students, many of whom may have undiagnosed ADHD or ASD due to financial barriers, cultural stigmas, or lack of early support. Traditional methods of estimating the prevalence of ADHD and ASD in CCs (e.g., using general population statistics or convenience sampling) likely misrepresent the true number of students with these conditions. This study scientifically assessed the prevalence of ADHD and ASD among CC students using validated screening methods. By improving screening methods of ADHD and ASD, CCs can better serve their diverse student populations. Because of limited access to healthcare, socioeconomic barriers, cultural stigmas, and masking behaviors—particularly among historically underrepresented and nontraditional student populations, we expect the prevalence of ADHD and ASD traits among CC students to be significantly higher than the prevalence of ADHD and ASD in the general population. Further, for the same stated reasons, we expect formal diagnoses of ADHD and ASD in CC students to be lower than those found in the general population.

Joel Saucedo

Discipline: Mathematics

Authors:

#1 Joel Saucedo

Abstract Name: Compactification and Quantum Mechanics of Quadratic Normal Volatility

This research establishes that the risk-neutral Quadratic Normal Volatility (QNV) model with a trigonometric discriminant is probabilistically and spectrally equivalent to free quantum mechanics on a compact one-dimensional Riemannian manifold of constant positive curvature. The arctan transformation compactifies the real price line onto an open interval, pulling back the volatility-induced metric to the round metric of curvature. The Lamperti transform followed by the exact ground-state similarity reduces the pricing operator to the free Laplacian up to a constant shift. Consequently, European option prices and the characteristic function of log-price admit explicit Fourier sine series on the circle, with eigenvalues and sub-exponential truncation error. The volatility smile arises purely from the positive curvature of the price manifold, with smile depth strictly increasing in our chosen parameter. The model is therefore the unique specification of local volatility with a transition mechanism that is exactly solvable free diffusion on a compact space of constant curvature.

Connor Sauers

Discipline: Engineering

Authors:

#1 Alan Bristow

Abstract Name: Differential Optical Absorption Spectrometer for Altitude-dependent Greenhouse Gas Concentration Characterization

Analyzing the changing chemical composition of the lower atmosphere is becoming increasingly pertinent to monitoring the health of the planet as the impact of climate change and global warming becomes progressively more drastic. Developing methods of characterizing greenhouse gas concentration is thus an important priority in atmospheric science. An effective technique for remotely measuring the concentration of a particular chemical in a gas sample is differential optical absorption spectroscopy (DOAS), which, in the

mid infrared portion of the electromagnetic spectrum, utilizes the absorption bands corresponding to a molecule's vibrational transition frequencies to distinguish it from the background. Carbon dioxide (CO₂) and methane (CH₄) are ubiquitous greenhouse gases with well-defined mid-infrared absorption wavelengths. Mid-infrared DOAS is performed for these molecules using a photodetector by comparing the incident light intensity at the absorption frequency to that of a non-absorptive reference frequency. Here, an instrument that utilizes mid-infrared DOAS to characterize CO₂ and CH₄ concentration in the lower atmosphere with respect to altitude is designed and constructed for integration onto a model sounding rocket. A pair of thermophile detectors are connected to a printed circuit board and a microcontroller; the assembly amplifies and interprets the electrical signal for analysis after flight, as well as records other data, such as temperature, barometric pressure, and humidity, that are important in calculating gas concentration. An initial prototype employs passive DOAS, which measures ambient atmospheric infrared transmission via a specialized ceramic glass nosecone tip. This novel methodology shows promise for generating gas concentration profiles up to 2 km.

Olivia Saunders

Discipline: Nursing and Public Health

Authors:

#1 Leann Laubach

Abstract Name: Preventing Rejection in Liver Transplant Recipients

Background: Over four million people are diagnosed with chronic liver disease in the US each year. This is a fatal diagnosis if a liver transplant is not performed. Transplantation is a procedure that has many risks associated. It requires immediate lifestyle changes and lifelong medication adherence. Transplant recipients may stop taking their medications for reasons such as unpleasant side effects or financial strain. They may also continue to drink alcohol after receiving their transplant due to untreated alcohol use disorder. Recipients who make poor health decisions due to lack of education or mental health treatment instead of following their required care plan can develop complications that lead to organ rejection and death. Aim: The aim of this study is to investigate nursing interventions to prevent liver transplant rejection. Method: The incorporation of psychosocial screening tools alongside addiction treatment for those on liver transplant waiting lists will be implemented to determine any significance in decreased rates of alcohol relapse. Conclusion: Providing comprehensive education on medication side effects will improve patient adherence to immunosuppressants. Obtaining access to healthcare resources and an adequate support system provides transplant recipients with the assistance needed to recover from their procedure at home. Those who accomplished a period of sobriety have been found to be less likely to return to drinking alcohol. Receiving a psychological evaluation is proven to predict rates of alcohol relapse in recovering addicts who receive a liver transplant. Receiving mental health and addiction treatment post-transplant also improved recovery rates. More research is needed to understand whether receiving both mental health and addiction services before transplantation will promote recovery and prevent alcohol relapses.

Maya Saunders

Discipline: Environmental Science and Sustainability

Authors:

#1 Julie Zinnert

#2 Anne Sciolino

Abstract Name: Effects of Multi-Species Plantings on Dune Grass Survivability and Growth

Coastal ecosystems protect natural and human infrastructure from environmental disturbances exacerbated by climate change and anthropogenic influences. Sand dunes play a critical role in these areas by reducing flooding, buffering wave energy, and preventing erosion. Unfortunately, these beneficial structures are being lost at an increasing rate due to development in coastal landscapes and more intense weather events. Restoration plantings are a solution to maintain our remaining dunes and facilitate the growth of new ones; however, a knowledge gap exists regarding how these plants interact with one another, posing a challenge for restoration efforts. Our objective for this study is to determine how multi-species plantings affect the survivability and growth of four common dune grasses found on the coast of the eastern U.S.: *Ammophila breviligulata*, *Panicum amarum*, *Spartina patens*, and *Uniola paniculata*. These grasses were grown in mono-, bi-, or tri-cultured pots, with six plants per pot and 60 pots in total in a mesocosm study. Grasses were grown at the Rice River Center for 12 weeks, with data collected at the beginning, middle, and end of the experiment. Analysis of the collected data on stem density, species survival, surface leaf area, leaf length, aboveground biomass, and plant height is ongoing and will be used to draw conclusions about growth based on treatment. These conclusions will better inform management and restoration efforts.

Kaitlyn Savoie

Discipline: Biology

Authors:

#1 Chloe La Prairie

#2 Shahid Riaz

#3 Ping Zhang

Abstract Name: Histopathologic Impact of a Periodontal pathogen on Colorectal Cancer

Emerging evidence links chronic periodontal infection to systemic diseases, including colorectal carcinoma (CRC). The keystone periodontal pathogen, *Porphyromonas gingivalis* (Pg), has been detected inside colorectal tumors, but its mechanistic role in cancer progression remains unclear. This study established a novel orthotopic CRC mouse model with systemic Pg infection to evaluate tumor histopathologic changes. To examine the effects in vivo, C57BL/6 mice were orthotopically injected in the rectum with MC38 CRC cells and subsequently infected intravenously with Pg (1×10^7 CFU) or PBS control three times post-tumor implantation. Tumor growth was monitored by serial computed tomography (CT) scans. Tumor sections were analyzed histologically to assess Pg-induced changes in tissue architecture. In mice, repeated Pg exposure led to accelerated and larger tumor growth compared to tumor-only controls. Histological analysis indicated altered tumor structure in Pg-infected groups. The Pg-infected groups showed increased necrosis compared to the non-infected groups. The Pg-infected groups exhibited lymphovascular invasion (LVI), potentially suggesting lymph node metastasis indicating CRC systemic invasion and spread. Furthermore, although typical CRC adenocarcinomas are epithelial cells, the Pg-infected groups showed presence of spindle-like cells, possibly suggesting sarcoma development. The results also showed evidence of tumor migration up into the colon despite being originally injected into the anal canal. Our findings demonstrate that chronic Pg infection enhances colorectal tumor growth. The presence of LVI and possible lymph node metastasis could signify a more advanced stage and worse prognosis of CRC. These results suggest that Pg plays a critical role in colorectal cancer progression and may represent a potential microbial target for prevention and therapy.

Soumaila Sawadogo

Discipline: Engineering

Authors:

#1 Jian Zhang
Tobu Mone

Abstract Name: Evaluating Hybrid Photovoltaic-Thermal Systems: The Impact of Dual Energy Harvesting on Renewable System Efficiency

Reliable and sustainable energy access remains a global challenge, especially in underserved regions where infrastructure is limited and dependence on fossil fuels persists. This project investigates a hybrid photovoltaic-thermal (PV/T) system designed to simultaneously generate electricity and recover thermal energy from solar radiation. The central research question explores how integrated energy harvesting can improve overall system efficiency, reliability, and sustainability compared to conventional photovoltaic modules. To address this, a prototype PV/T system was constructed using embedded sensors to monitor electrical output, panel temperature, solar irradiance, and heat recovery. Experiments were conducted under varying environmental conditions to evaluate the impact of cooling methods, material selection, and system configuration on performance. The thermal integration component included a copper coil and circulating water loop to extract excess heat from the panel surface. Data analysis revealed that this thermal regulation stabilized panel temperature, preserved voltage levels, and enabled dual energy harvesting, resulting in improved energy utilization. The results demonstrate that hybrid PV/T systems can significantly enhance energy output while reducing greenhouse gas emissions and minimizing wasted thermal energy. This approach is particularly beneficial for Sub-Saharan communities, where reliable energy access can support water purification, healthcare delivery, and educational infrastructure. By linking technical innovation with environmental stewardship and social responsibility, this research contributes to the development of resilient and sustainable energy solutions tailored to real-world conditions. Ultimately, the findings serve as a foundation for future system improvements and highlight the potential of hybrid renewable technologies to address global energy challenges through localized, efficient, and scalable solutions.

Batoul Sawas

Discipline: Psychology

Authors:

#1 Batoul Sawas
#2 Megan Zeringue
#3 Ciera Schoonover
#4 John Vile

Abstract Name: Beneath The Surface: Exploring the Interplay of Parent-Child Relationships, The Big Five Personality Traits, and Self-Esteem in Young Adults

Introduction: Research on the interplay between parenting, personality, and self-esteem in young adults is scarce. Thus, this study assessed whether supportive parenting characterized by warmth, structure (e.g., clear expectations), and autonomy support would be positively correlated with self-esteem (e.g., self-evaluation) and Big Five Personality Traits, including extraversion (e.g., sociability), conscientiousness (e.g., goal-orientation), agreeableness (e.g., kindness), openness, and emotional stability. Personality traits were expected to positively correlate with self-esteem. Additionally, parent-child relationships were expected to predict self-esteem when controlling for personality. Methods: Participants were recruited via Middle Tennessee State University's Psychology Research Pool, Honors College, and the Undergraduate Research Center. A questionnaire was administered, including the Rosenberg Self-Esteem Scale, Big Five Personality Trait Test, Network of Relationships Inventory, and Parents As Social Context Questionnaire (to assess parenting). Results: 311 participants were recruited, primarily female (76.3%) and 18-25 years old (97.4%). Parental warmth ($r = .15$) and autonomy support ($r = .24$) were found to be significantly positively correlated with extraversion. Parental warmth ($r = .20$), structure ($r = .21$), and autonomy support ($r = .29$) were correlated with emotional stability. Warmth ($r = .34$), autonomy support ($r = .40$), and structure ($r = .31$) were

positively correlated with self-esteem. Parental support in parent-child interaction was linked to agreeableness ($r = .20$), extraversion ($r = .19$), and self-esteem ($r = .29$). Personality traits, including extraversion ($r = .53$), conscientiousness ($r = .25$), and emotional stability ($r = .54$), were correlated with self-esteem. Emotional stability ($\beta = .37$), conscientiousness ($\beta = .20$), and extraversion ($\beta = .39$) significantly predicted self-esteem. Conclusion: As expected, parental support, warmth, structure, and autonomy support were positively correlated with self-esteem. Positive parenting and parental support were correlated with the Big Five Personality Traits. In the regression model, extraversion, conscientiousness, and emotional stability predicted higher self-esteem. Unexpectedly, parent-child relationships did not predict self-esteem when controlling for personality traits.

Quinn Sawyer

Discipline: Computer Science

Authors:

#1 Kehan Gao

#2 Sarah Tasneem

Abstract Name: AI-Driven Analysis of Diversely Sized Martian Geological Features with Deep Learning

The MRO HiRISE (Mars Reconnaissance Orbiter – High Resolution Imaging Science Experiment) instrument provides some of the most detailed images ever captured of the Martian surface, making them ideal candidates for advanced image-recognition AI. However, their high resolution and wide variation in feature scale pose major obstacles. Standard preprocessing techniques, such as padding or rescaling, either erase fine details or make images too large to process efficiently. This research directly addresses these challenges by developing an effective method for detecting specific Martian geological features within HiRISE imagery. I implemented a tiling workflow paired with YOLO-based object detection models, enabling the system to locate targeted features that would otherwise be missed using conventional approaches. A significant challenge arose in evaluating the detections. Existing ground-truth labels capture only a fraction of the actual features, and the model's bounding boxes often vary in size and overlap extensively, especially when features do not fit cleanly within a single box. As a result, traditional metrics like Mean Average Precision proved insufficient for characterizing model performance. To overcome this, I introduced a secondary validation process using deep learning-based image classification models to assess detections beyond what conventional metrics can measure. This dual-layer evaluation framework provides a more meaningful and accurate picture of the model's capabilities. Together, these contributions support more reliable, scalable analysis of planetary surfaces and open new pathways for future AI-driven exploration.

Raquel Sayer

Discipline: Chemistry

Authors:

Abstract Name: Dissolved Oxygen and Chlorophyll-a: An analysis of water quality in the Snohomish River located near a local farming complex

Dissolved oxygen and Chlorophyll are two important parameters used in measuring water quality in aquatic habitats. Numerous factors can influence water quality. Nutrient runoff from farming communities can play an important role in a body of waters' quality. Excess nutrient runoff such as phosphorus and nitrogen can increase decomposition within the water, increasing algae blooms, and excess algae decomposition can in

turn increase bacterial growth. Both algae and bacteria consume surrounding dissolved oxygen and influence the balance of the ecosystem's life sustaining oxygen levels. We conducted a point-in-time analysis of both the dissolved oxygen levels and chlorophyll-A for a comparison of a backwater runoff near a farming complex, an upstream analysis to evaluate the river's levels before the farming complex, and samples to analyze to see if there was an impact downstream. We identified no statistically significant differences between sample locations. An average of the samples taken at our three locations showed well above desired dissolved oxygen levels within each sample location having a mean > 10 ppm and Chlorophyll-A levels at each site at ~ 3 ppb indicating an mesotrophic river, and an overall healthy aquatic environment.

Elias Saylor

Discipline: English and Literature

Authors:

Abstract Name: The Compendium of Castbelow Aberrations: Magical Qualities of the Multiplicitous Real

Fantasy is seductive. It writhes like the ever-shifting castle chambers of a person's perception and identity; given that perception is reality, in its deviation from what is "real," fantasy nonetheless subsumes the real. Realistic modes of storytelling, on the other hand (nonfiction, realist fiction, news, etc.), often assign artificial structure to events without taking the influence of imagination on experience into account. Scholars have wondered at the mystical quality of imagination extensively. The Compendium of Castbelow Aberrations, a multimodal hybrid of art and literature made physical, investigates the power of fantastical modes in this tradition, informed by concepts such as: the object's activation of critical thinking (Kristeva); magical Umwelten (Uexkull); the suspension of disbelief (Coleridge); and the deviations between person, player, and persona (Waskul and Lust). This presentation will cover how the Compendium's very narrative reflects its inspirations; the narrator embarks on a reality-bending journey through a ruinous desert to discover how and why the destructive Flare occurred, and what horror it has done to the magical atmosphere. His investigation into the now-unfamiliar magics of his homeland recontextualizes the typicalities he understood before, allowing him to become a better spellcaster at an unknown expense; he is changed by a new, impossible circumstance that doesn't adhere to the rules he knows. Furthermore, his story has been woven collaboratively through TTRPG (Tabletop Roleplaying Game), not in a vacuum; his environment history, relationships, and discoveries have been and will be shaped further by fellow participants - fellow castles of perception - in an ever-murmuring tale that mirrors and informs the contours of reality itself.

Elias Saylor

Discipline: English and Literature

Authors:

Abstract Name: The Timeless Economy: Beyond-Era Exchange Between Actor and Audience

Informed by the general economy of Georges Bataille, Kathleen McCormick's work on reader reception, and Martha Nussbaum's perceived "humanistic aspects of science," this essay argues that, by recognizing econoliterary parallels theorists might be able to glean new insights from stories that hugely predate the modern reader, providing a foundation by which to make them relevant without relying on often flatulent reinterpretations. Literature and economic theory share a tendency to generalize in order to pursue themes or ideals. In other words, both simplify variables in order to support postulations about the supposed universal tendencies of the macrocosmic order (that is: all that subsumes the social, environmental, natural micro

orders, etc.). Because of their shared normative inclinations, both disciplines mirror each other. They can, therefore, interloquite - share syntax. Through what I call a lens of current-cy," literary analysis becomes timeless; literature remains relevant. Informed by the 2035 iteration of the Stratford Theatre Festival, hosted in Stratford, Ontario, which was very liberal in its reiterations of classic tales, this presentation magnifies Anne of Green Gables, written by L. L. Montgomery and adapted by Kat Sandler; and The Winter's Tale, written by William Shakespeare and directed by Antoni Cimolino in particular, which take very different interpretive approaches. However, these differences are not to their detriment; they allow me to describe what makes an effective reinterpretation under the disciplinary mode of economic theory. Together, reinterpretation and theories of exchange can coexist and enhance each other, if only they might glance in the mirror.

Safiye Sayma

Discipline: Nursing and Public Health

Authors:

#1 Safiye Sayma

#2 Elif Isik

#3 Brittany Haynes

#4 Melanie Morton

#5 Nina M. Fredland

#6 Jean-Marie Bruzzese

Abstract Name: Developing an Instrument to Assess Adolescent Autonomy in Asthma Self-Management Behaviors

Introduction: Asthma is a significant public health problem, with a prevalence of 8.4% among adolescents. Adolescents' cognitive and developmental characteristics differ from children and adults, yet few self-reported asthma measures exist for this group. A recent systematic review found reliable questionnaires for asthma knowledge, self-efficacy, control, and quality of life, but none focused on adolescent asthma self-management. Purpose: The aim of this study is to develop and validate an asthma self-management instrument for adolescents (12–21 years) using systematic, seven-step published guidelines. Objective: The objective is to develop and validate an instrument to assess adolescent asthma self-management behaviors, including item development, evaluation of content and face validity, and testing of psychometric properties. Method: A community-based participatory research approach was used to ensure survey items were clear, relevant, and meaningful. Initial collaboration involved three adolescents who co-developed content with investigators. Feedback from ten additional adolescents (mean age 16.8) informed revisions. Content validity was reviewed by 17 content experts in allergy, pulmonology, behavioral science, nursing, and school health. Psychometric testing of the tool is ongoing. Results: Forty-one items were developed from literature and prior qualitative findings on adolescents' self-management. Domains included symptom prevention, acute management, communication, and goal setting. Expert review led to three deletions, three revisions, and high ratings for clarity (mean = 8.5) and relevance (mean = 8.7). Conclusion: This is the first validated self-report instrument addressing adolescents' autonomy in asthma self-management. By clarifying age-relevant responsibilities, it enables tailored strategies to support autonomy and long-term control. The instrument will address a critical gap and guide nurses and researchers in designing interventions, tracking behaviors, and improving outcomes, as well as reinforcing nursing's role in promoting autonomy and developmental care.

Sam Scamardo

Discipline: Interdisciplinary

Authors:

Abstract Name: Reclaiming the Political Future of the Sahel Through the Rejection of French Influence

Beginning in 2021, three Sahelian states—Mali, Burkina Faso, and Niger—staged three successive military coups in an attempt to move towards self-determination. As a result of French exploitation and continued neo-colonial influence, these nations seek to redefine their political trajectory for true independence through the newly formed Alliance of the Sahel States (AES). This study investigates the motivations behind the rejection of French interventionism and the conditions that led to the creation of the AES. Drawing on close reading of recent literature by leading scholars and political analyses, I synthesize critical findings to illustrate the historical and geopolitical context in which the AES arose. Preliminary results reveal that France's continued and persistent presence in post-independent Africa is widely regarded as a continuation of exploitation and unequal power dynamics. As a result, these Sahelian states have rejected French influence under their new military regimes by promoting their native languages, initiating and enacting the withdrawal of French military troops from Sahelian soil, and installing governments with explicitly anti-France agendas. Collectively, these developments illustrate a broader effort to establish genuine self-governance rooted in local values, languages, and economic autonomy. This research study offers a deeper critical analysis and understanding of contemporary French neo-colonialism, interventionism, and exploitation within the context of geopolitical realignments in former African colonies.

Dominick Scatena

Discipline: Psychology

Authors:

#1 Catherine Reich

Abstract Name: Do Temporary Mood States Influence the Alliance Ratings Made by Clients with Depression?

Working alliance—the relationship between client and therapist—has a bidirectional positive correlation with client outcomes. A previous study failed to detect an impact of mood on alliance ratings but suggested the need for further research with depression, given the relevance of mood for depression. The purpose of this study was to test whether mood states of depressed clients contribute their alliance perceptions. The study employed an experimental manipulation of mood prior to measuring alliance. It was hypothesized that participants in the positive mood condition would rate the therapeutic alliance with their therapist higher relative to participants in the negative mood condition. Participants were randomly assigned to view a brief movie clip in either the positive mood condition or negative mood condition, then completed a mood state measure, followed by an alliance questionnaire about their current therapist, demographics and therapy characteristic questions, and a depression questionnaire. A series of independent samples t-test revealed successful manipulation of negative mood; however, positive mood ratings did not significantly differ between conditions. There was also no statistically significant difference for the alliance total or subscale scores between conditions. A Pearson's correlation revealed a statistically significant negative correlation between the total depression scores and alliance scores. Alliance scores did not appear to differ between conditions for clients who had clinically significant depression scores. Clients with sub-threshold depression had higher alliance scores in the positive condition compared to the negative condition with a small effect which did not reach statistical significance. One explanation for the findings is that alliance ratings are not biased by temporary mood states in depressed clients, perhaps suggesting clinicians can be confident in alliance ratings in depressed clients. Alternatively, the results may be affected by a small sample size. Future research might consider changes to stimulus materials and inclusion criteria around suicidality.

Alex Schaffer

Discipline: Biology

Authors:

#1 Alex Schaffer

#2 Emilia Lefevre

#3 Kayla Johnson

Abstract Name: Investigating gene expression changes in the brain reward circuitry following fentanyl self-administration in mice.

Opioid addiction is a rampant issue in the United States with millions of people misusing opioids every year. More than 70 thousand people each year are victims of fatal opioid-related overdoses and synthetic opioids, predominantly fentanyl, are responsible for roughly 80% of those deaths. Assessing gene expression changes helps to uncover biological mechanisms that outline addiction. However, transcriptional research has been studied in opioid addiction but primarily in the context of morphine. Prior research in the Lefevre lab has shown that non-contingent morphine administration increases gene expression of heat shock proteins within the brain reward circuitry, specifically the nucleus accumbens and dorsal striatum. Here, I tested the hypothesis that contingent self-administration of fentanyl would evoke similar changes in the nucleus accumbens and cerebellum. The mice received a jugular catheter implant, then the mice went through the self-administration paradigm designed by the Lefevre Lab. Brain samples were collected 24 hours after self-administration was finished. RT-qPCR was then carried out to measure gene expression of Hspa5 and Hspb1. Mice that underwent fentanyl self-administration successfully distinguished between active and inactive levers across the 10 day paradigm ($p < 0.05$). Hspa5 gene expression was found to be downregulated in both the nucleus accumbens and the cerebellum ($p < 0.05$), while Hspb1 was downregulated in the nucleus accumbens ($p < 0.05$) but not in the cerebellum. These preliminary results of heat shock protein expression following fentanyl self-administration in the nucleus accumbens and cerebellum show opposite regulation patterns compared to non-contingent morphine administration.

Tessa Schauer

Discipline: English and Literature

Authors:

Abstract Name: "The Half-Heathen State to Which I See so Many Irish Girls Reduced Here": The Irish American Girl in Post-Famine American Print

1845 marked the first year of the Irish Potato Famine, plaguing the island with severe economic, personal, and physical loss. The Famine persisted for eight years, trademarked by failing potato crops combined with a distinct lack of aid, empathy, and action from the English government. In the immediate years following the Famine, the United States of America experienced a large influx of Irish American immigrants looking for refuge from these failing crops and English interventions; specifically, young, unmarried, and relatively poor Irish women. Because of the large influx of Irish immigrants, stereotypes regarding Irish Catholicism, work ethic, and education began to spread through the 19th century American social fabric. My research analyzes the literary trends and rhetoric of 19th century American print in relation to Irish and Irish American women and girls. Sentiments like "no Irish need apply" were open and accepted viewpoints held by multi-generational Americans. Irish American women were not immune to stereotypical labeling; in fact, because of their disproportionately high immigration rates, they suffered equally, if not more, the same fates as Irish American men. With the analysis of multiple genres of post-Famine American literature, such as news reports from the Brother Jonathan magazine, articles explaining Irish intellectual capabilities in The Ladies'

Keepsake, and Home Library, and the novel Bessy Conway; or, The Irish girl In America by Mrs. J. Sadlier, I conclude that anti-Irish stereotypes and ideas, specifically regarding Irish American women and girls, were created and perpetuated through 19th century American print culture.

Tessa Schauer

Discipline: History

Authors:

Abstract Name: Let's Talk About Sex: The Intimate Relationships Between Women Religious and Christ in Medieval Europe

Throughout medieval Europe, there were no shortages of women religious. From English anchoresses such as Julian of Norwich to Italian Dominicans like St. Catherine of Siena, holy Christian women – such as abbesses, anchoresses, nuns, and devoted lay women– were scattered throughout and beyond the continent. My research, interdisciplinary in nature, analyzes the trends, themes, and imagery found in the Vitas (written works detailing a saint's life), writings, and personal works of medieval women religious. Specifically, I aim to highlight the abundant instances of sexual, intimate, and transcendent relationships between medieval women religious and Christ within their unique historical context. While my research is ongoing, the early analysis of primary sources from (or relating to) St. Catherine of Siena, St. Ida of Ireland, Julian of Norwich, and Margery Kempe has indicated that the complex and common occurrences of intimacy with Christ (in relation to women religious) reflect and adhere to the teachings found in St. Augustine of Hippo's *The Excellence of Marriage and Holy Virginit*y. In these texts, St. Augustine outlines different purposes for sex within married couples, as well as defining the different nature between every human's physical and spiritual purity. Ultimately, medieval women religious were spiritually authorized to have metaphysical relationships with Christ because of church teachings on sex within marriage and their physical choice of religious devotion.

Meredith Scheiner

Discipline: Philosophy, Ethics, and Religious Studies

Authors:

#1 Meredith Scheiner

Abstract Name: The Megachurch as an Idol

Megachurches in the United States draw massive crowds, bring in swaths of wealth, and are the locations of many controversies within and outside of the Christian faith. As demonstrated by two theologically divergent megachurches, Lakewood Church run by the Osteen family and First Baptist Church of Dallas lead by Robert Jeffress, the growth and current state of these megachurches is preeminently built upon the marriage of the American Dream and Christianity: resulting in overt or subtextual prosperity theology elements. The rise in Christian book and music industries, and advertising/marketing of products within the church are examples of these elements. Overt or not, both Lakewood Church, with outright prosperity gospel teachings, and First Baptist Church of Dallas, with intense Christian nationalism, lead their followers through flawed ideologies and monetized spiritual practices that promote and constitute idolatry.

Discipline: Engineering

Authors:

#1 Ping Zhao

Tristan Knight

Abstract Name: Design, Fabrication, and Raindrop-Induced Characterization of PVDF Films and Custom 3D-Printed PZT Composite Piezoelectric Materials

Environmentally driven energy harvesting offers a way to develop self-powered sensors and low power electronics that can be utilized in remote or hard to maintain environments. Rainfall is an underdeveloped energy source that produces frequent and low energy output. The purpose of this project is to evaluate if additively manufactured PZT composites can serve as effective piezoelectric materials for harvesting energy from raindrop excitation as few studies have directly analyzed this. This project evaluates the electrical response of PVDF films and custom SLA 3D-printed PZT composite samples subjected to controlled droplets. To compare the materials and evaluate droplet efficiency, a complete droplet impact testing system was designed and fabricated. The apparatus consists of a 5' adjustable 80/20 aluminum extrusion with modular 3D-printed mounts and a laboratory burette to produce identical droplets. Force and voltage data was collected using a NI-9234 data acquisition module connected to LabVIEW 2025, which allows the ability to record each impact event and export as a CSV to be further processed in MATLAB. 3D-printed PZT composites were fabricated, wired, and along with a PVDF sample, mounted onto the apparatus and tested at multiple heights. Early findings show that both force and voltage output increase with droplet height for all materials. The additively manufactured PZT composites exhibit a high potential for electrical output which is influenced by the percent volume of PZT added to the photopolymer and variable geometry. Their performance suggests that additive manufacturing may serve as a viable route for tuning material composition and geometry for unique energy harvesting needs. Overall, this project establishes a highly repeatable droplet excitation and measurement system and provides initial comparisons between various custom 3D-printed PZT composites. It further identifies the potential use for highly customizable 3D-printed piezoelectric composites to be used in low energy sensor and monitoring environments.

Ashleigh Scheuerle

Discipline: Nursing and Public Health

Authors:

#1 Katherine Newnam

Abstract Name: Impact of Parental Presence on the Quality and Quantity of Language Exposure on Preterm infants in the NICU

Each day a fetus remains in utero is beneficial for growth and neurodevelopment, reducing the risk of medical complications. However, preterm birth may be medically necessary or occur without warning, requiring specialized care in the Neonatal Intensive Care Unit (NICU). Preterm birth has been correlated with poorer neurodevelopmental outcomes when compared to term infants. We understand cognitive development and language acquisition begins well before birth and continues through adolescence. This study explores the impact of parental presence on the quantity and quality of language exposure that preterm infants receive in the NICU, based on visitation patterns and speech type directed to the infant. It is necessary to quantify how much language preterm infants receive to better understand how speech impacts the developing neonatal brain compared with those infants born at term gestation. This information can guide developmental support for these at-risk infants. It will also allow us to identify infants at increased risk for language deprivation due

to lack of visitation. Using 16-hour audio recordings during NICU hospitalization, we will compare the amount of speech or adult word count (AWC) preterm infants receive when visitors are present or absent. During periods of higher AWC we will analyze speech type (infant-directed or parent-directed), who is speaking (parent or health caregiver), and whether the speech is in response to the infant (child's cries, alarms, etc.). It is expected that infants with parental visitation will be exposed to a greater amount of speech, but it is unknown whether health caregivers adjust their speech based on family presence. Parental speech and interaction have been linked with early bonding and better cognitive outcomes. By understanding the best auditory environment for preterm infants, we can better guide parents and medical staff about family involvement, auditory stimulation, and speech exposure for NICU infants.

Mary-Claire Schmidt

Discipline: Biochemistry

Authors:

#1 Carrie Johnson
#2 Katharina Kohler
#3 Madeline Angel
#4 Malayna Pope
#5 Savannah Turton
#6 Samantha Padgett
#7 Teresa Macheda
#8 Heather Spearman
#9 Adam Bachstetter
#10 M. Paul Murphy
#11 M. Paul Murphy

Abstract Name: Exploring Sex and Age Related Amyloid Beta Accumulation in Sleep-Regulated Areas in an Alzheimer's Disease APPxPS1 Knock-In Mouse Model

Alzheimer's disease (AD) is a neurodegenerative disease that affects more than 7 million Americans. However, Alzheimer's disease impacts more than twice as many women than men. This disease is pathologically characterized by the formation of amyloid-beta plaques (A β) and neurofibrillary tangles in certain areas of the brain. Additionally, sleep disruptions and circadian rhythm fragmentation often precede AD onset and both are well-known AD risk factors. Disrupted sleep has been shown to increase A β production, decrease A β clearance, and increase cognitive decline. Interestingly, women experience more sleep problems throughout the lifespan, including a dramatic increase into middle-age and beyond. Correspondingly, women in middle-age and beyond accumulate A β pathology at a higher rate than age matched men. It is unknown why women experience increased rates of sleep disruptions and A β build-up with age. Using an AD mouse model, we aim to investigate the levels of A β in sleep-influencing regions of the brain in male and female mice throughout the lifespan. We hypothesize that females will have more A β pathology than males overall, that females will have more A β in sleep related areas than males, and that old females will have the most A β in sleep related areas of any subgroup. To test this, A β in males and females will be measured at two time points (~6mo and ~19mo) in sleep-influencing regions of the hypothalamus and brainstem by way of immunohistochemistry.

Isabella Schmidt

Discipline: Engineering

Authors:

#1 John Grace
#2 Bahman Adlou
#3 Julian Gilstrap
#4 Chris Wilburn
#5 Wendi Weimar
#6 Brooke Odle

Abstract Name: How Do Compression Shorts Influence Lower Extremity Kinematics and Kinetics During a Countermovement Jump?

Femoroacetabular impingement (FAI) is a pathomechanical condition in which abnormal contact occurs between the femoral head and acetabulum, limiting hip motion, resulting in pain and restricting dynamic tasks such as jumping. Compression shorts engineered to facilitate hip external rotation may mitigate FAI-associated movement patterns by modifying lower-extremity alignment. This study examines the biomechanical effects of external-rotation compression shorts on lower extremity kinematics and kinetics during a countermovement jump (CMJ) performance. Twelve healthy adults completed five CMJs wearing standard athletic shorts and five CMJs wearing external-rotation compression shorts. Three-dimensional kinematics were captured using an 8-camera motion capture system sampling at 100 Hz, with 35 retro-reflective markers positioned on lower extremity landmarks. Concurrent ground reaction forces were collected with a 1000 Hz sampling rate. Sagittal and frontal plane hip, knee, and ankle angles were extracted to evaluate differences in peak joint motion between conditions. Experimental data were processed through an OpenSim pipeline to create participant-specific musculoskeletal models, perform inverse kinematics, run dynamic simulations, and conduct static optimizations to assess joint kinetics, muscle forces, and muscle activation patterns. The compression intervention is hypothesized to attenuate peak hip adduction and internal rotation, particularly during maximal depth and initial ground contact. Additionally, enhanced hip and knee joint stability is anticipated, decreasing medial knee collapse and modifying frontal-plane loading patterns. These changes may alter hip joint moments and shift muscle loading toward the gluteal and external rotator groups while reducing reliance on motion patterns associated with impingement. Overall, CMJ performance metrics, such as jump height and peak propulsive force, are expected to remain similar between conditions, indicating that movement strategies can be modified without compromising force production.

Terese Schmidt

Discipline: Political Science

Authors:

#1 Terese Schmidt

Abstract Name: Weathering the Next Crisis: The Future of NATO's Nuclear Umbrella in Uncertain Times

Russia's growing willingness to challenge long-standing nuclear norms, through escalatory rhetoric, the integration of Belarus into its nuclear posture, and lessons learned from its war in Ukraine, has raised concerns about the future credibility and stability of NATO's nuclear umbrella. As Moscow faces internal instability and the limits of its conventional forces, the risk of nuclear coercion or early nuclear use in a conflict may grow. In this context, the United States and NATO must evaluate whether new nuclear capabilities are necessary to strengthen extended deterrence and reassure allies. To do this, this research will specifically examine what nuclear changes the US and NATO could adopt to strengthen deterrence against Russia and the implications. It analyzes four potential U.S.-NATO nuclear options: nuclear sea-launched cruise missiles (SLCM-N), stand-off air-launched system (ALCM), ground-launched cruise missiles (GLCM), and expansion of the dual-capable aircraft (DCA) program. Each system is assessed using a decision matrix based on credibility, capability, communication to allies, communication to adversaries, financial cost, and effects on crisis and strategic stability. Because quantitative data on proposed systems is limited, the research relies on theoretical frameworks, historical analogies, and expert assessments of

deterrence, nuclear posture, and the strategic cultures of allies and Russia. Ultimately, this research aims to equip decision-makers with a framework to determine how their priorities compare and to identify the nuclear option that best fits their goals. By extending the current literature beyond capability-focused assessments, this research provides a more comprehensive analysis of the necessary factors to guide future nuclear policy.

Logan Schmitt

Discipline: Biology

Authors:

Abstract Name: Psilocybin: Schedule One to Treatment One

Psilocybin, a bioactive compound found in certain types of mushrooms, has been used by a variety of cultures for thousands of years. Recent studies have highlighted the use of psilocybin as a potential treatment for psychiatric and neurological disorders such as anxiety and migraines, while ultimately limiting mortality rates connected to substance abuse and major depressive disorder. Psilocybin works as a serotonin receptor agonist, specifically targeting the 5-HT_{2A} receptor in the brain, which impacts physiological processes such as cognitive function and mood regulation. A key distinction of psilocybin is its ability to cause long-term changes without long-term treatment. While psilocybin has shown many benefits for mental health disorders, it does come with risks, such as tachycardia, emotional instability, and anxiety. Additional factors impeding clinical usage include the high cost of synthetic psilocybin production, current Schedule I classification, and ethical considerations of using a known hallucinogen with limited longitudinal research. This project examines the therapeutic effects, safety, and efficacy of psilocybin by analyzing a combination of peer-reviewed clinical studies and scientific articles dating back to 1959. Findings suggest that psilocybin demonstrates significant potential in treating anxiety, migraines, major depressive disorder, and substance abuse.

Rachel Schnatterly

Discipline: Psychology

Authors:

#1 Joy Drinnon

Abstract Name: Health and Homelessness: The Relationship Between Homelessness and Presence of a Health Condition

The purpose of this project was to evaluate the relationship between presence of a health problem and variables of homelessness. I assessed whether there is a statistically significant relationship between factors of homelessness, such as length of time homeless and being unsheltered, and the presence of a physical or mental health condition. Existing literature on the topic found statistically significant relationships between these factors, and also established that health conditions, and specifically chronic health conditions, can contribute to homelessness, as workers with chronic health conditions are paid less than their healthy coworkers, chronic health conditions are costly to manage, and presence of any medical debt is associated with an additional two years of homelessness. The aim of my study was to support the existing literature by evaluating ten years worth of Point-in-Time (PIT) Count data. The PIT is an annual federally mandated census of the homeless that involves the collection of mostly standardized information, such as age, gender, race, as well as information necessary to determine subpopulation categories like chronic homelessness or veteran status. The annual survey also includes questions about health and chronic health conditions. My data

was collected in 8 counties making up district 1 of Tennessee. I compiled this data into a large data set, creating a sample totaling 3,116 people. Preliminary statistical analysis indicates that there is a statistically significant relationship between presence of conditions such as physical disability, substance use disorders, and psychiatric conditions, and length of homelessness and chronic homelessness. These preliminary findings contribute to the growing academic consensus that the crisis of homelessness and the crisis of health are related.

Jerry Schnepf

Discipline:

Authors:

#1 Jerry Schnepf

Abstract Name: Exploring AI-Enhanced Learning with Vibe Coding: A Computer Science Micro-Internship Project

This presentation highlights a two-week micro-internship designed to immerse first- and second-year undergraduates at Roosevelt University in authentic research practices alongside a faculty researcher. For this project, students developed an AI-enabled system that generates personalized learning experiences for individual students, informed by both pedagogical research and direct student input. The project addresses a growing need in higher education to create adaptable, student-centered learning pathways that respond to diverse learner objectives. Five undergraduate participants were paired with a faculty mentor and guided through the research process from start to finish. Students completed human subjects training, learned and applied qualitative research methods by conducting peer interviews, transcribing the data, and preparing these transcripts as training inputs for an AI model. They further contributed by testing the system's ability to incorporate parameters such as learning goals and time limitations into a user-friendly web interface designed for instructors. Unique to this project, the team worked exclusively within the Vibe coding environment, gaining exposure to a streamlined development tool that supported their technical contributions while keeping the focus on research design and interpretation. Preliminary outcomes suggest that the student-built system successfully generates bespoke learning experiences, demonstrating the promise of combining learner insights with AI-driven pedagogy. Beyond technical accomplishments, the micro-internship fostered student confidence in conducting research, strengthened their collaborative skills, and provided a tangible example of how undergraduates can meaningfully contribute to faculty research. In this session, I will share insights into the mentorship process, the challenges and successes of the project, and the broader implications for cultivating research engagement early in students' academic careers.

Corinne Schob

Discipline: Visual Arts

Authors:

#1 Corinne Schob

Abstract Name: Double Spouted Nazca Based Vessel

This vessel is based on Nazca pottery featuring literal imagery in a cartoonish approach while utilizing earth toned underglaze for a painterly effect with wide and flat walls to properly display the image. The Nazca people took creative inspiration from the Paracas who utilized complex tiles as well as similarly styled and decorated ceramic pieces. They typically lived on the southern coasts of Peru in river valleys of the Rio

Grande de Nazca and Ica Valley though they did live a nomadic lifestyle giving us the Nazca or Inca lines while they travelled. Though the Nazca culture was prevalent from 100 BCE to 800 AD, their ceramic vessels became a large part of their culture from 200 BCE to 600 CE as they would use these as decoration, to depict certain imagery, as an offering or ceremonial piece, or to be used as a simple vessel. These artworks were made from rich and earthy clay found in riverbeds and wet plains. These pieces would be patently built with a coiling technique building up the sides and smoothing as you go. They applied mineral based colored slip to the outside of the vessel and placed it in a fire pit or open kilns that were heated to a temperature around 600-900° to preserve the color. This specific culture is significant because they have created an abundance of earthworks and artwork to show the cultural and spiritual importance of what they believe in and how they chose to express those beliefs, as well as the efforts put in to preserve and utilize the Earth given to them. Their additions to the pottery world have significance due to the use of multiple colors and the specific styles on the surface, really pushing the illustration and exaggerated features that make the designs pop.

Hailey Schock

Discipline: Gender, Ethnicity, Diversity, or Cultural Studies

Authors:

#1 Jessica Stovall

Abstract Name: Centering Black Voices: Culture, Excellence, and Community Visions for the Center for Black Excellence and Culture in Madison, Wisconsin

Dane County home to the Wisconsin state capital, Madison, ranks among the worst in the nation for the prevalence of racial disparities for Black residents in carceral, educational, socioeconomic, physical and mental health outcomes. Black residents make up only 5.3% of the county population yet 56.4% of Dane County jails are made up of Black inmates (Austin & Oeker, 2023; Census, 2020). According to Kids Forward (2023), there is an income gap of \$42,248 between white and Black residents and an unemployment rate 2.8 times higher for Black residents compared to white residents. Additionally, disparity is prevalent in education as Black fourth graders in Dane County schools average in the 12.5 percentile for English Language Arts (ELA) and 6.4 percentile for math proficiency compared to their white peers averaging 58.7 percentile in ELA and 46.9 percentile for math. This study aims to address the persistent racial inequality within Dane County by centering the hopes and addressing the needs these disparities create for Black residents in the development of the upcoming Center for Black Culture and Excellence, opening in Winter 2026. ("The Center"). The Center hopes to be the heart of Black life in the predominantly white city of Madison, Wisconsin. Grounded in the theory of McKittricks (2016) Black geographies, this study examines the provisions and atmosphere Black Madison residents hope for The Center through in-depth interviews with 42 residents. This qualitative inquiry centers Black voices by illuminating the needs and desires of residents to ensure The Center adequately supports the Black Madison community. Using collaborative thematic analysis, this study found that residents hope for The Center to provide culturally responsive resources and serve as a safe and inclusive atmosphere that affirms all identities belonging within the Black Madison community.

Lillian Schoen

Discipline: Interdisciplinary

Authors:

Abstract Name: Engaging Communities outside the Classroom: Challenging Knowledge Formation and

Expected Processes in the Urban Studies Field

Students are expected to be able to follow the process of an assignment laid out by professors. Following this process successfully and creating the desired outcome earns the student a satisfactory grade. But projects in the real world, especially community-engaged urban projects, do not follow laid-out guidelines. This presentation seeks to answer the question: how does practical community engagement experience through immersive projects give students new perspectives that challenge traditional research processes and knowledge production? The presentation addresses this question through comparative case studies of personal experiences in a UW-Milwaukee undergraduate research project in the Midtown neighborhood and a Public Service Enterprise Group Institute for Sustainability Studies (PSEG-ISS) research project in Newark, New Jersey. The site field work, community engagement, interviews, and deliverables completed within these projects expand students' understanding of the complexities of community-engaged projects and their effect on how knowledge is and should be produced. In the Midtown neighborhood project, residents were engaged through the creation of visual designs and facilitation of public meetings. In the Newark project, stakeholders such as the city's sustainability office were contacted through the lens of a professional internship. In this study, it is found that through stakeholder interactions and collaborative design and planning processes, students gain a first-hand understanding of complicated urban problems. Studies outside of the classroom challenge students to collaborate with stakeholders and engage these issues, rather than simply read about them. The experience of producing research outcomes like maps and design plans allows students to see unimagined or hard to understand outcomes of urban projects as the community engages with the formation of public spaces.

Brooklyn Schofield

Discipline: Psychology

Authors:

Abstract Name: Combat Veterans and Comorbid Illness: Treatment of Traumatic Brain Injury (TBI) and Post Traumatic Stress Disorder (PTSD)-associated Symptoms through Transcranial Magnetic Stimulation

This review examined transcranial magnetic stimulation (TMS) and its use to combat the treatment complications that are caused by comorbid and triple comorbid PTSD, depression, and anxiety in United States combat veterans with and without Traumatic Brain Injuries (TBI). As comorbid depression and comorbid PTSD rates of United States veterans rise, veterans struggle to contribute to the nation both economically, and physically, due to mental and social impacts of comorbid PTSD and depression. An analysis of literature comparing TMS with PTSD and comorbid PTSD, showed that TMS is an effective treatment option for veterans with comorbid PTSD, when examining outcomes of patients with and without TMS treatment both over time, and for short term use. For patients with triple-comorbid PTSD, usage of first line treatments, such as SSRI medications, may not offer full remission or reduction from PTSD and depression symptoms, as the combination of anxiety with comorbid depression and/or PTSD becomes resistant or may decrease effectiveness of treatment. TMS treatment on US veterans is not affected for patients with TBI compared to without, but TBI does have an effect on the likelihood of comorbid illness development, which decreases the efficacy of TMS treatment, as well as first line treatment options. Overall, TMS can be used as a resource to treat comorbid depression and PTSD symptoms in combat veterans, in addition to combined therapy such as SSRI medication, cognitive processing therapy (CPT), and psychotherapy, but more research is needed for TMS treatment for patients with TBI and comorbid PTSD, depression, and anxiety, due to the longitudinal effects that accompany patients treatment courses.

Joseph Schofield

Discipline: Nursing and Public Health

Authors:

#1 Natalia Pinell
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#7 Khalid Khan

Abstract Name: Metal Exposure, HbA1c, Protein Biomarkers and Cognitive Function in Older Adults: A Pilot Study in Laredo, Texas

Sources of metal contamination from both industrial and natural sources may be disproportionately affecting disadvantaged border communities in Laredo, Texas. Chronic metal exposure has been linked to accelerated cognitive decline in older adults. At the same time, poor glycemic control—assessed via hemoglobin A1c (HbA1c)—is highly prevalent in this area, which may pose a risk of neurotoxicity. Little is known regarding the impact of metal exposure, diabetes severity, and neurotrophic or neuroprotective protein biomarkers such as sirtuins (SIRTs), vascular endothelial growth factor (VEGF), and nerve growth factor (NGF) on cognitive aging and Alzheimer's disease and related dementias (AD/ADRD). A pilot study will examine these potential relationships among older adults over the age of 65, who are residing in Laredo. Blood samples will be collected from 60 participants to measure metals such as arsenic (As), lead (Pb), and cadmium (Cd), HbA1c, and protein biomarkers including SIRTs, VEGF, and NGF in blood samples. Cognitive function will be assessed using NeuroUX, a computerized tool evaluating memory, attention, processing speed, and executive function. Multivariable regression models will examine associations between metals, HbA1c, protein biomarkers profiles, and neurocognitive outcomes, adjusting for key demographic and health characteristics. An inverse association between historical metal exposure and cognitive function scores is expected. Additional analyses will determine whether higher HbA1c levels are independently associated with poorer cognitive performance and whether diabetes severity modifies associations among metal exposure, circulating biomarkers, and specific cognitive domains. Lower levels of neuroprotective biomarkers (SIRTs, VEGF, NGF) are also expected to correspond with lower cognitive performance. Findings from this pilot study will inform future research on early detection strategies and environmental and metabolic risk mitigation for AD/ADRD, particularly among older adults in Laredo and similar communities.

Bailey Schottelkotte

Discipline: Psychology

Authors:

#1 Nipun Chopra
#2 Amity Reading
#3 Gwynne Davis

Abstract Name: The Worst of Both Worlds? The Practical Neuroscience of AuDHD

Autism spectrum disorder (ASD) and attention-deficit/hyperactivity disorder (ADHD) share several core symptoms, such as executive dysfunction and emotional dysregulation. However, though these symptoms may appear similar between disorders, they often arise from different cognitive and neurological mechanisms. When these mechanisms overlap, they result in more severe symptoms than those from either disorder alone, making their significant rate of comorbidity a salient concern. Therefore, proper treatment of comorbid ASD and ADHD requires understanding how each disorder contributes to its presentation. The objective of this project is to provide a synthesis of the current literature on co-occurring ASD and ADHD (often colloquially

referred to as ‘AuDHD’), and, using the conclusions drawn, form strategies for individuals to manage the day-to-day occurrence of symptoms.

Samantha Schow

Discipline: Health and Human Development

Authors:

#1 Esperanza Salazar

#2 Hope Fiveash

Abstract Name: The Effects of Magnesium Supplementation on Muscle Degradation and Renal Function in Endurance Athletes

Magnesium is an essential mineral. It helps with muscle contraction, energy production, and cell recovery. High-endurance athletes have been shown to be prone to magnesium deficiency due to greater metabolic demands and loss through sweat. This may lead to muscle damage and poor recovery. This study will examine whether daily magnesium supplements affect muscle breakdown and kidney function in long-distance runners over six weeks. The expectation is that steady magnesium intake will lower serum biomarkers of muscle damage and keep kidney function normal. A pre–post intervention design will be used with trained endurance runners. Participants will take a standardized magnesium supplement daily for six weeks. Blood samples will be taken before and after supplementation. Serum will be kept at –80°C until analysis. Myoglobin, creatine kinase, and interleukin-6 will be measured with ELISAs to assess muscle breakdown. Kidney function will be tested using a renal function panel. Paired t-tests and an ANOVA will compare mean pre- and post-supplementation results for all analytes to find significant changes. It is expected that magnesium supplementation will result in decreased serum concentrations of muscle damage biomarkers without adversely affecting kidney function. The findings of this study aim to clarify magnesium’s influence on muscle integrity and renal regulation during prolonged endurance activity and may support the development of nutritional strategies to enhance athletic performance and recovery.

Ava Schrag

Discipline: Visual Arts

Authors:

#1 Ava Schrag

Abstract Name: Make Food with Love: Exploring the relationships between food production, tradition, and identity through documentary photography

Due to the industrialization of food systems, a lack of access to green space in urban areas, and a lack of knowledge of our native ecosystems, there is an increasingly significant disconnect between our meals and the people and places that produce them. "Make Food with Love" merges the cookbook with the artist book in a documentary photography recipe book that seeks to answer the following questions: How are culture and tradition held in food production and consumption, and how do different methods of food production provide a connection or disconnection from what we consume? With this project, I aim to make the viewer question their relationship with their food, the natural environment, and those who produce the food they consume. The work argues for a reconsideration of our relationship to the environment and a conscious way of consuming. This research sits at the intersection of art, ecology, and social justice. Gathering inspiration from books such as *Omnivore’s Dilemma* and *Braiding Sweetgrass* and photographers such as Lucas Foglia, Laura

McPhee, and Michael Schmidt, this work explores how these disciplines interact and can inform each other. For this project, I visit and work with people involved in diverse forms of alternative food production, from small-scale regenerative farming to backyard gardens to urban foraging. Photographing in my own kitchen and those of the ones I love, I make images that display the power of food to create community and carry tradition. From these experiences, I learn about sustainable practices, gather recipes, and collect photos of people, land, and food. The conclusion of this research is a collection of photographs as prints and in the final artist recipe book, which is to be reproduced and shared with those involved in the project.

Payton Schreiber-Pan

Discipline: Film/Photography Studies

Authors:

Abstract Name: Nature as Healer: Documenting Cross-Cultural Applications of Nature-Informed Therapy in Ukraine and the United States

This documentary examines how nature-informed therapy (NIT) is being introduced, adapted, and implemented across cultural and geopolitical contexts by following a focused segment of the partnership between Ukrainian mental health practitioners and the U.S.-based Center for Nature Informed Therapy (CNIT). The film uses audiovisual recording as both a research method and a mode of dissemination. Primary filming took place in April 2025 during a training event in Hungary, where nearly 30 Ukrainian therapists and community leaders received instruction from a U.S. psychologist specializing in NIT. This initial fieldwork captured workshop content, participant reflections, and observational footage illustrating how trauma-affected communities engage with natural environments for emotional regulation and recovery. Throughout the summer, the documentary followed the U.S. facilitator's clinical work at CNIT, providing contextual grounding for how NIT's established applications. In fall 2025, two Ukrainian trainees attended CNIT's official training program in Maryland. Their follow-up interviews, recorded on-site, offer insight into the implementation of NIT practices in Ukraine amidst ongoing war, displacement, and community anxiety. The film places particular emphasis on the practical adaptations emerging in Ukraine, such as the use of botanical gardens and accessible green spaces to reduce stigma around formal therapy. These recorded accounts provide evidence of how nature-based modalities can expand treatment access in areas where conventional therapy faces structural or cultural barriers. This project also demonstrates how film can function as a tool for expanding public awareness of emerging mental health modalities. By circulating these narratives beyond academic and clinical settings, the film supports broader engagement among the very communities that stand to benefit most—particularly those underserved by traditional clinical systems. These are also the groups that will likely be engaged with in the feature-length expansion of this project, including Indigenous reservation-based health systems and incarceration re-entry support workers.

Samantha Schroeder

Discipline: Economics

Authors:

#1 Kristine West

Abstract Name: Written onto the Land: The Legacy of Racial Covenants in Minnesota Housing

Racially restrictive covenants in housing deeds were a common legal tool in the early 1900s used to maintain racial exclusion and create all-white neighborhoods. In Minnesota we observe covenants starting in 1910 and

persisting even after they became unenforceable following the *Shelley v. Kraemer* (1948) Supreme Court ruling. Covenants operated alongside racial hierarchy norms, intimidation and violence, and later discriminatory lending and redlining beginning in the 1930s. Understanding the historical mechanisms of segregation can clarify the roots of present-day racial disparities in housing and neighborhood composition across Minneapolis and St. Paul. We hypothesized that the presence of racial covenants would statistically predict residential segregation metrics, such as the prevalence of all-white neighborhoods and racial residential evenness as measured by the dissimilarity index. Using data from the Mapping Prejudice Project (MPP) and Integrated Public Use Microdata Series (IPUMS) USA Full Count Census, we employ regression analysis to analyze how racially restrictive covenants shaped patterns of residential segregation in Minneapolis and St. Paul from 1910 to 1940. Regression results show that while covenants indicate a statistically significant relationship with segregation in 1940, they do not consistently predict the persistence of all-white neighborhoods or high dissimilarity across 1910-1940. These findings suggest that racial covenants may have reinforced rather than independently caused segregation, indicating that non-covenant mechanisms, such as violence, intimidation, and later discriminatory lending, played equally substantial roles.

Susanne Schroll

Discipline: Psychology

Authors:

Daniella Embu

Naiya Patel

Abstract Name: Unveiling the Marital Paradigm Beliefs of Emerging Adults

Throughout the past decades marital trends have changed drastically within the United States. While the legalization of same-sex marriage allowed for more people within the United States to get married, marriage rates continue to decline and young adults are marrying later in life. To better understand how emerging adults conceptualize marriage, a phenomenological study was conducted and included people of color, heterosexual and queer individuals from the Midwest. Semi-structured interviews were used to examine participants' thoughts, beliefs, and experiences related to marriage itself and their preferences regarding marriage. Results showed that several factors impact the way participants view marriage or value its importance, such as priorities for education and career advancement in regards to achieving financial security; how marriage was modeled to them, especially by parents, peers, and modern media; and individual identity, including race/ethnicity, religion, gender, and sexuality. Results from this study have both clinical and policy implications.

Margaret Schuler

Discipline: Biology

Authors:

#1 Aime Johnson

#2 Arthur Zimmerman

Abstract Name: Evaluation of reproductive hormones and gonadal tissues from feline offspring from AAV-GnRH treated cats

Overpopulation of stray cats presents a significant challenge to both animal welfare and public health. Although surgical sterilization remains the primary method of population control, it is resource-intensive,

requires trained veterinary personnel, and can impose physical and psychological stress on animals. A non-surgical alternative could reduce these barriers and support large-scale population management. This study evaluates adeno-associated virus-mediated delivery of gonadotropin-releasing hormone (AAV-GnRH) as a potential non-surgical sterilization strategy for domestic cats. AAV is a nonenveloped viral vector capable of targeted DNA delivery and long-term gene expression, making it a promising platform for reproductive hormone modulation. Although adult cats treated with AAV-GnRH remained fertile, their offspring exhibited altered luteinizing hormone (LH) concentrations during the first eight weeks of life. These findings prompted investigation into whether the viral vector or associated immune responses may be transferred vertically from treated parents to their kittens. The current project aims to assess the presence of AAV-GnRH in neonatal tissues and to characterize additional hormone profiles that may be influenced by treatment. Ongoing analyses include qPCR-based detection of AAV antibodies in tissues collected from treated adults and their offspring. Preliminary data from three kittens born to a treated mother showed no detectable differences in heart or liver tissues compared with untreated controls, though additional sampling is still underway. The gonads of treated cats were also tested alongside those of a negative control. A slight increase in AAV-associated antibodies was observed in treated adults; however, the difference was minimal and not statistically significant. This is important because there is no significant immune response suggesting the AAV treatment was tolerated and likely sustainable long term. Continuing work will clarify the potential for vector transfer to offspring, characterize hormonal changes in neonatal kittens, and provide essential safety and efficacy data for the development of AAV-based, non-surgical sterilization methods.

Allison Schultz

Discipline: Psychology

Authors:

#1 Allison Schultz

#2 Sara Festini, Ph.D.

Abstract Name: High competitiveness enhances both speed and accuracy of working memory on a value-directed remembering task

Competitiveness is defined as an individual's drive to outperform others and to achieve high success. While prior research has explored the effects of competitiveness on various cognitive domains, limited work has examined its influence on laboratory-based memory processes. We predicted that high competitiveness would help support working memory (WM) and mental control processes. This study tested whether people's self-reported competitiveness played a role in how well participants performed on a value-based working memory (WM) task and on a later unexpected long-term memory (LTM) test. Participants studied sets of words that appeared on the left and right sides of a computer screen. Later, these words were assigned either positive or negative point values based on the side they appeared on. After a short delay, a single word appeared, and participants indicated whether it had been a positive-value word from that same trial. Incorrectly endorsing a negative-value word resulted in point loss. Occasionally, a word from the previous round was shown to induce proactive interference, meaning that older information interfered with one's ability to focus on current information. Participants completed 60 of these WM trials, followed by a surprise LTM test and a 9-item questionnaire measuring competitiveness. Results showed that participants were less confused by negative-value words from previous trials, suggesting they successfully removed unimportant information from their memory. Analyses also showed that people who scored higher in competitiveness responded more quickly to high-value words and were more accurate overall in the WM task. However, competitiveness did not influence LTM, likely because participants were not expecting a later test. Overall, findings suggest that competitiveness enhances WM by improving both speed and accuracy of memory recognition through more efficient cognitive processes.

Kajsa Schultz-Bakke

Discipline: Biology

Authors:

#1 Katie Polik

#2 Paula Furey

Abstract Name: Algal blooms in urban Minnesota lakes: Does effectiveness of aluminum sulfate (alum) change over time?

Water pollution, an excess of nutrients (eutrophication) like nitrogen (N) and phosphorus (P), can cause algal blooms, some of which are harmful. To manage blooms, the chemical aluminum sulfate (alum) is added to lakes, binding bioavailable P and settling it to the sediment. However, alum effectiveness depends on water pH, sediment resuspension, and organic matter. Its effectiveness may change with time, leading to nutrient shifts as less phosphorus stays bound, especially if nutrient inputs continue. The ratio of total N to total P (TN:TP) influences which algal species are present and their competitive interactions and thus, can determine the presence of algal blooms. This study examined the relationship between time since alum treatment and algal assemblages in three urban Minnesota lakes: Lake Holiday (1 year), Bur Oaks (3 years), and North Lake (5 years). As low TN:TP is associated with increased toxic cyanobacterial blooms, and alum treatment reduces P, water bodies with more recent alum treatment should have lower numbers of cyanobacteria. Integrated phytoplankton samples were pulled from surface waters 1-1.5 meters in depth during 2024 and 2025 summers. Samples were analysed with a FlowCam 5000® (fluid imaging particle analyzer) and sorted into major groups (cyanobacteria, diatoms, green algae, dinoflagellates, cryptophytes, and euglenoids) and toxin-producing ability. Holiday remained dominated by cyanobacteria, but *Microcystis* (a toxin-producing cyanobacteria) and cyanobacterial filaments increased, while green desmids and cryptophytes decreased, suggesting a shift in nutrient ratios. Bur Oaks shifted from cryptophyte to diatom dominated. North Lake remained dominated by cyanobacteria, but toxic, N₂-fixing genera increased. The increase in cyanobacteria over time suggests the need for follow-up alum treatments to control harmful algal blooms. High cyanobacteria levels in Lake Holiday indicate that alum and algal assemblage dynamics require more research. The effectiveness of alum may be sensitive to initial nutrient conditions.

Alyson Schulze

Discipline: Biology

Authors:

#1 Kirsten Guckes

Abstract Name: Exploring the Variation in *tsiv2* Gene Copy and Sequence in *Vibrio fischeri*: Implications for Self vs. Non-Self Recognition

Bacteria interact with each other in many different forms through both direct and indirect means. The type VI secretion system (T6SS) is a means of direct competition where one bacterial cell physically injects another and releases toxic effectors. With these toxic effectors, there must be a way to neutralize them, and that task is completed by immunity factors. Currently, literature is lacking in characterization of these effectors and immunity proteins. To address this gap, we utilize the symbiosis between *Vibrio fischeri* and the Hawaiian Bobtail squid, *Euprymna scolopes*. This symbiosis provides an ideal platform to study interactions within only the *V. fischeri* species. *VasX* is one of the toxic effectors that has been found in the *V. fischeri* genome. Its counterpart immunity factor, *TsiV2* has been found directly downstream of *VasX* in the genome. The number and sequence identity of the *tsiv2* genes differ between and even within each strain. It has been hypothesized that the varying *TsiV2* proteins are utilized in competition to neutralize both self and non-self *Vas X*, but the function of each different *tsiV2* gene is poorly understood. To address this hypothesis, we have

analyzed tsiv2 genes using sequence alignments and gene synteny, as well as begun phenotypic characterization of the tsiv2 variants during bacterial competition. These findings will increase our understanding of the function for tsiv2 genes in competition between bacterial symbionts possessing the T6SS. With a better understanding of their mechanisms, more effective treatments for bacterial infections can be created, and the bacterial nanotechnologies could be mimicked for medical use.

Joshua Schulze-Reimpell

Discipline: Economics

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#5 Adam Stivers

Grace Reek

Abstract Name: Institutions in the Mind: Comparing Index-Based and Perceived Economic Freedom as Predictors of Entrepreneurship and GDP

Our project aims to examine how individuals and businesses perceive economic freedom and how those perceptions differ from traditional measures based on institutional characteristics. Existing indices, such as the Fraser Institute's Economic Freedom of North America (EFNA), rely entirely on quantifying policy variables, where data about government spending, taxation, labor regulation, legal quality, monetary stability, and trade openness are used to assess economic freedom. However, these indices overlook how these policies are experienced by entrepreneurs, consumers, and workers. Perceptions can substantially influence behavior, decision-making, and economic outcomes. In this project, we therefore aim to capture entrepreneurs' and managers' perceptions of economic freedom, to develop an index of perceived economic freedom, and to compare our index with the EFNA as predictors of entrepreneurship and GDP. For this purpose, we will design a survey containing items closely aligned with the EFNA's core areas, with a particular focus on government spending, taxation, and labor market freedom. Our survey will be rolled out using Prolific, a web service to connect researchers with participants nationwide. Participants will be American entrepreneurs and managers. We hypothesize that perceptions of economic freedom will significantly differ from the EFNA and that they will better explain variations in entrepreneurship and GDP in the United States than the EFNA alone. Our goal is to combine this new perceived index with existing EFNA data to inform policymakers more effectively.

Jake Schwaderer

IN - University of Evansville

Discipline: Education

Authors:

#1 Andrew Thompson

Vincent Petro

Abstract Name: Do Artificial Intelligence Detectors Work? The Effects of Generator and Prompt Type on Detection Accuracy and Reliability in Academic Settings

The recent rise in the prevalence of artificial intelligence (AI) in academic settings has contributed to increased doubt regarding the accuracy of AI detectors. These concerns emerge because student writing falsely classified as AI generated can lead to negative consequences including plagiarism allegations and student sanctions. Previous studies have demonstrated that AI model and detector impact predicted AI-generated text (AIGT) percentage. However, given the extensive variety of AI generators and detectors utilized in academic settings, additional investigation into the performance of less-researched yet common tools is necessary. Correspondingly, an experiment was conducted to investigate the following research question: How do generator and prompt type affect the accuracy and reliability of common AI detectors? Alongside student-written responses, ChatGPT-5, Claude, Copilot, and DeepSeek were used to examine detection across common AI generators. To allow for investigation in realistic academic settings, three prompt types common to this environment were included: a short-answer quiz response, a project-report methods section, and a methods section for an academic manuscript. Extraneous factors such as topic and word length were standardized across conditions. Detection accuracy was assessed for two common detectors: Grammarly and Scribbr. With multiple outcomes of interest, a multivariate analysis of variance (MANOVA) was conducted, and group comparisons were used to identify possible effects on AIGT detection. Results indicate that the generator and prompt may both play a role in the detection results of at least one detector. The text generator had a prominent impact on the percentage of text flagged as AIGT. Additionally, a significant effect for prompt was detected under certain conditions. While detectors generally distinguish between student and AI responses, a concerning number of false positives, inconsistency between and within detectors, and the potential risk of academic penalties tied to incorrect detection imply that AI detectors cannot yet be reliably implemented in academia.

Lillian Schwartz

Discipline: Biochemistry

Authors:

#1 Lillian Schwartz

#2 Cecilia Le

#3 Funsho Afolabi

#4 Mohammad Halim

Abstract Name: Scorpion Venom Based Antiviral Peptides Targeting 3-Chemotrypsin Like Protease of SARS-CoV-2

A new type of coronavirus was first detected in December 2019 at Wuhan city, the capital of the Hubei province of China. This virus is designated as severe acute respiratory syndrome-related coronavirus-2 (SARS-CoV-2). Like other coronaviruses, SARS-CoV-2 has 4 structural, 16 non-structural and 9 accessory proteins. The 3-Chemotrypsin Like Protease (3CLpro) encoded by ORF1 as nsp5 has been found to play a

critical role in viral polyproteins maturation and replication. It is a protease similar to chymotrypsin that utilizes cysteine rather than serine as a nucleophile in the active region of the protease. The viral replication process could be interrupted or stopped if the activity of this enzyme is inhibited. Peptide therapeutics are effective because of their high affinity with receptors and low toxicity. Additionally, they can reduce off-target side effects because of their target specificity. Scorpion venom contains a mixture of peptides and proteins with varied bioactivities and receives great attention due to their potential application in peptide drug development. The aim of this research is to synthesize scorpion venom peptide using chemical synthesis and test their effectiveness on inhibiting the 3CLpro. The scorpion peptides were synthesized using solid phase peptide synthesis protocol with a high swelling rink-amide resin with a loading capacity of 0.6 mmol/g and mesh size of 100-200. After the peptide synthesis, the peptide-resin complexes were cleaved with 95% TFA, 2.5% H₂O, and 2.5% Triisopropylsilane. The cleaved peptides were filtered and precipitated by adding cold ether. The purity and identification of the peptides were confirmed by liquid chromatography and mass spectrometry. The inhibition efficiency of peptides against 3CLpro was tested using FRET assay, the best candidate peptide showed an IC₅₀ value of 6.65 micromolar, indicating that 3CLpro activity was significantly reduced with increased peptide concentration.

Markelle Scott

Discipline: Biochemistry

Authors:

#1 David Riese

Abstract Name: Mutations in the ERBB4-ERBB2 Dimer Interface May Elucidate the Role of These Dimers in BRAF-WT Melanomas

Introduction: Melanoma is an aggressive and deadly subtype of skin cancer. Approximately half of melanomas harbor a gain-of-function mutation in a BRAF allele. The growth of these tumors is reduced by immune checkpoint inhibitors (ICIs) or a combination of BRAF and MEK inhibitors. Unfortunately, the melanomas that possess a wild-type BRAF allele (BRAF-WT melanomas) are not responsive to targeted therapeutics, and ICIs are not highly effective against these tumors. Thus, our long-term goal is the development of drugs that are effective against BRAF-WT melanomas. Methods and Anticipated Results: We have previously shown that expression of the ERBB4 receptor tyrosine kinase gene is both sufficient and necessary to drive the proliferation of four BRAF-WT melanoma cell lines. ERBB4 encodes a receptor tyrosine kinase that is closely related to the Epidermal Growth Factor Receptor (EGFR), ERBB2 (HER2), or ERBB3 (HER3). Moreover, three ERBB4-dependent, BRAF WT melanoma cell lines also depend on ERBB2. Previous data indicate that ERBB4 homodimers inhibit tumor cell proliferation. Thus, we hypothesize that ERBB4-ERBB2 heterodimers drive these ERBB4- and ERBB2-dependent, BRAF-WT melanoma cell lines. To test this hypothesis, we are evaluating the activity of mutant alleles that affect the cytoplasmic ERBB2/ERBB4 asymmetric dimer interface. We are testing whether mutations in the N-lobe of the ERBB4 kinase domain cause loss-of-function phenotypes (reduced signaling and stimulation of proliferation) and whether mutations in the C-lobe of the ERBB2 kinase domain cause loss-of-function phenotypes. Finally, we will test whether the activity of loss-of-function ERBB4 N-lobe mutant alleles can be rescued by loss-of-function ERBB2 C-lobe mutant alleles. Anticipated Conclusion: Positive results would suggest that ERBB4-ERBB2 heterodimers drive the proliferation of ERBB4- and ERBB2-dependent melanomas and that such melanomas will respond to combination therapies that feature FDA-approved anti-ERBB2 agents, including pertuzumab and lapatinib.

Landon Scott

Discipline: Biology

Authors:

#1 Caroline Himbert

#2 patricia Erickson

Abstract Name: From Treatment, Recovery to Relapse? Investigating The Role of Ultra-Processed Food (UPF) in Colorectal Cancer Survivorship

Background: Ultra-processed foods (UPF) are industrial formulations made from food-derived or synthetic substances that contain little or no whole foods and are typically ready-to-consume, high in fat, salt, or sugar, low in fiber and nutrients, including items such as packaged snacks, sugary beverages, confectionery, and processed meats. UPF has been associated with increased colorectal cancer risk. However, the effect of UPF intake on colorectal cancer survivorship remains underexplored. Objective: This study aimed to summarize the evidence on associations between UPF intake and colorectal cancer survivorship outcomes while exploring underlying biological mechanisms. Methods: A systematic literature search identified 3,450 peer-reviewed publications, 57 of which were included in this review. Survivorship outcomes were categorized into mortality (n=17), treatment-related toxicities (n=25), or quality of life (n=15). Results: Higher UPF intake was consistently associated with increased colorectal cancer-specific mortality. Evidence also indicated associations between higher UPF intake and poorer quality of life, including sleep disturbances, elevated fatigue, and reduced physical and psychosocial functioning. Additionally, several studies reported increased treatment-related toxicities linked to UPF intake, such as gastrointestinal symptoms, adverse side effects, and treatment discontinuation. Proposed biological mechanisms underlying these associations included systemic inflammation, gut microbiota disruption, and metabolic dysregulation. Conclusion: Our review suggests that higher UPF intake is associated with increased colorectal cancer-specific mortality, poorer quality of life, and greater treatment-related toxicities. Considerable heterogeneity was observed across studies in how UPF intake was assessed. Future research should prioritize prospective, longitudinal designs and integrate objective biomarkers, such as metabolomic profiles, to improve measurement of post-diagnosis dietary exposures and their impact on survivorship.

Rachel Sedlak

Discipline: Chemistry

Authors:

Abstract Name: Presence of Residual Explosives on Varying Surfaces as Detected by an Explosive Trace Detector

Canine Explosive Training Aids (CETAs) are a valuable training tool used by the Canine Training Center (CTC) to train explosive detection canines. CETAs contain true explosive material and must be handled with caution to ensure safety and prevent contamination. Even with proper packaging and procedures, there is still a concern for contamination of the CETA and the training environment. This study investigated whether residual explosive particles were present and how long they remained after the CETAs were removed from a training area. It also evaluated whether the surface the CETA was on affected how long the residual particles remained. A series of locations were set up with CETAs and then swabbed at 0 hours, 1 hour, 4 hours, and 24 hours after the CETA was removed. An explosive trace detector (ETD) analyzed the swabs for the presence of explosive particles. Results indicated that CETAs can leave residual particles, but this varies depending on the explosive within the CETA. Additionally, the surface the CETA was placed on affected how long the residual particles remained. Due to sensitive information requirements, the identities of the explosives were withheld and instead referred to as Substance X, Substance Y, and Substance Z. The CETA containing Substance Y had particles that remained for at least 24 hours on a carpeted surface and less than one hour on a hard surface. Further testing is needed to identify the trends of other explosives not covered in this study and to determine how long residual particles can remain beyond 24 hours.

Tiffany See

Discipline: Biology

Authors:

#1 Nasya Ramli

Sophia Pietsch

Abstract Name: Effects of Ketogenic Diets on Neuroblastoma Tumor Growth in Adjuvant Therapy Versus Monotherapy via Xenograft Mouse Model

Neuroblastoma is a pediatric cancer with poor prognosis in high-risk cases, with survival rates remaining below 50% despite current available treatment. The need to develop and implement new neuroblastoma treatment methods are critical, as neuroblastoma accounts for 15% of childhood cancer-related mortality. Because high-risk neuroblastoma shows strong dependence on glycolysis for energy, known as the Warburg effect, safe nutritional interventions that shift tumor metabolism offer a critical path for therapeutic improvement. The ketogenic diet reduces glucose availability and elevates ketone bodies, creating metabolic pressure on glycolysis-dependent tumors and giving this approach increasing potential as an alternative therapeutic strategy. This study investigates the relative impact of monotherapy with ketogenic diets and adjuvant therapy integrating ketogenic diets with chemotherapy on neuroblastoma xenograft tumor growth and viability. Using a two-way ANOVA, data on tumor volume (mm^3) and percent survival (%) were extracted and compared from two studies, one exhibiting a monotherapeutic approach and the other a KD adjuvant approach. Through analyzing two cell lines (SH-SY5Y and SK-N-BE(2)) over a 22-day period, results showed no statistical effectiveness of the type of treatment or cell line on overall tumor volume. However, the interaction between treatment and cell line approached significance, suggesting that an adjuvant approach in a chemoresistant cell line (SK-N-BE(2)) may impact tumor reduction. Overall, this study highlights a potential strategy for reducing toxic chemotherapeutic practices in high-risk pediatric oncology while simultaneously exploring alternate treatments that progress toward reducing neuroblastoma mortality rates.

Skylor Seetaram

Discipline: Biochemistry

Authors:

#1 Blaise Williams

#2 Carl Saint-Louis

Abstract Name: Positional Effects of Electron-Deficient Heterocycles on the Emission and Aggregation Behavior of polycyclic-1,2-BN-heteroarenes

Incorporation of a boron–nitrogen (B–N) unit into polycyclic aromatic hydrocarbons generates azaborines, a versatile class of heteroarenes that combine strong absorption, high photochemical stability, and tunable emission. Among them, nitro-substituted polycyclic-1,2-BN-heteroarenes (PBNHs) have emerged as promising electron-deficient n-type frameworks for organic optoelectronic devices. However, the introduction of $-\text{NO}_2$ groups often promotes strong π – π stacking, which induces aggregation-caused quenching (ACQ) and severely compromises fluorescence efficiency. To overcome this limitation, we designed and synthesized a series of PBNHs incorporating electron-deficient heterocycles at distinct positions on the pyrrolidinone hemisphere. By systematically varying heterocycle placement and introducing sterically demanding

substituents, we sought to distort molecular planarity, suppress intermolecular stacking, and induce aggregation-induced emission enhancement (AIEE). Comprehensive spectroscopic studies revealed that the positional orientation of electron-deficient heterocycles exerts a pronounced influence on photophysical behavior, modulating emission efficiency, spectral response, and aggregation tendencies. Several derivatives exhibited reduced ACQ, and in select cases, clear AIEE activity while preserving favorable absorption and stability. These findings demonstrate that positional control of electron-deficient heterocycles is a powerful strategy for tailoring the optical properties of BN-based chromophores. This design principle enables the development of next-generation electron-deficient AIE-active azaborine materials with significant potential in sensing, adaptive photonics, and optoelectronic applications.

Jonathan Segal

Discipline: Mathematics

Authors:

#1 George Recck

Abstract Name: Going to WAR: Balancing Talent Accumulation with Situational Leverage to Refine Wins Above Replacement

Wins Above Replacement (WAR) reigns as the definitive metric in Major League Baseball because it standardizes disparate contributions, hitting, fielding, and positional value, into a single number. It allows analysts to instantly compare a defensive shortstop to a power-hitting first baseman. However, while WAR meticulously accounts for where a player plays on the field, it ignores when they perform. By design, WAR is context-neutral; it values a run scored in a blowout the same as a run scored in a high-leverage, game-deciding moment. This research questions whether prioritizing talent accumulation over narrative context has detached player valuation from the actual goal of the sport. Guided by the question, "What combination of methods produces the most accurate gauge of success?" this study utilizes a quantitative analysis of MLB team and player data from 2015 through 2025. I am employing multivariable regression and optimization modeling to compare the predictive power of WAR against situation-dependent metrics, specifically Win Probability Added (WPA) and Run Expectancy (RE24). The project tests the hypothesis that current models undervalue clutch performance. Preliminary analysis suggests that while WAR measures skill, it often misaligns with actual team outcomes because it dismisses the "luck" and timing that decide tight games. My continuing research aims to develop a composite statistic that weighs high-leverage performance more heavily than raw accumulation. Ultimately, this project seeks to bring the definition of value back to the only statistic that truly matters: team wins, arguing that a player's worth is defined not just by their talent, but by their ability to deliver when the game hangs in the balance.

Jess Segarra

Discipline: Visual Arts

Authors:

Zora Weir-Gerzog

Ashton Hoo

Abstract Name: Applied Arts Lab at Virginia Commonwealth University

The mission of the Applied Arts Lab (AAL) at Virginia Commonwealth University School of the Arts is to reduce human suffering through visual design and storytelling. This project was founded by Jason Bennett

(Co-director, Department Chair of Communication Arts) & Sterling Hundley (Co-director, Communication Arts Professor). Students in the School of the Arts enroll through a Vertically Integrated Projects (VIP) course and work alongside medical professionals, scientists, and government officials to solve real world problems with real world impact. Current projects include Social Stories (a collaboration with the Evan-Haynes Burn Center to create illustrations for use with neurodivergent children), 3D prosthetic development, medical illustration, 3D scanning/modeling the Greenbank Telescope (the world's largest fully steerable radio telescope), and more. Students have successfully merged artistic skills with scientific research to produce tangible results. Through collaboration with CoStar Group, VCU students and professors have developed a detailed scale model of the 485 foot tall Greenbank Telescope using photogrammetry software and drone footage. The Stravitz-Sanyal Institute for Liver Disease and Metabolic Health worked with students to create four illustrations to explain liver conditions to patients in an accurate yet approachable way. Students have created a workflow for modeling prosthetics to fit patients in a rapid and economically efficient manner. By bridging the gap between design and scientific innovation, students at VCU School of the Arts are paving the way for future arts research. The Applied Arts Lab is creating impacts that can be seen and felt in the Richmond community and beyond.

Alyssa Segura

Discipline: English and Literature

Authors:

Abstract Name: John Donne's Feminine Consideration of the Body of Christ in Death's Duell

As John Donne's preaching career came to a close, he delivered a potent sermon, posthumously titled "Death's Duell." A man widely considered to be consumed with death, Donne did not stray from remembering his own mortality and calling others to do the same. Donne's last sermon contains striking images of the human body, particularly the suffering body of Jesus. Using medieval theories on blood, the research of Caroline Walker Bynum, and a feminist lens, this paper explores how Donne presents an evidently feminine Jesus, especially in death. Even further, Donne calls his audience to respond to Jesus as one would to a mother, an occurrence seldom found in his other sermons or even his contemporaries' recorded sermons. This paper begins by investigating how Donne presents the woman's womb, that is, as a place of death which nourishes a child with blood, turning a life-giving body into one of death. Building on this idea, and in contrast to it, this paper then explores three aspects of Jesus' body mentioned in "Death's Duell": his circumcision, his crucifixion, and the human response to the dying body of Christ. Late medieval Christian's stressed the ability of blood to purge and nourish the body, often championing the women's body, which bleeds monthly. Similar to medieval depictions of Christ, Donne presents the dying Christ, his body and blood, as a source of food and nourishment, like a woman's body is to a child. The femininity of blood and the body was both subverted and championed in John Donne's "Death's Duell."

Yelarys Seidin

Discipline: Computer Science

Authors:

Abstract Name: The Underpromoter's Riddle: A Computational Analysis of the Knight Promotion in Chess

This research addresses a classic question in chess strategy: why do players sometimes underpromote to a knight (worth 3 points) instead of a queen (worth 9 points)? The goal is to move beyond decades of anecdotal

discussion to quantitatively determine if knight underpromotion is primarily a tool of tactical necessity or a matter of stylistic choice, and whether players miss hidden opportunities by defaulting to queen promotion. While chess databases track the frequency of underpromotion, they offer little insight into the rationale for the choice. Prior work has focused on general player performance, but no large-scale quantitative analysis has leveraged modern chess engines to classify the comparative outcomes of knight versus queen promotion decisions. This study fills this gap by analyzing the consequences of the decisions. We will consider a large database of high-level online chess games, examining promotion decisions from two complementary angles: when players chose knight promotion and when they chose queen promotion. The first angle addresses whether knight underpromotion represents tactical necessity or stylistic choice. The second angle examines whether players miss superior knight promotions by defaulting to queen. Utilizing the Stockfish chess engine in custom Python scripts, we will compare the outcome of the actual promotion choice to the outcome of the hypothetical alternative (knight if queen was chosen, or queen if knight was chosen) and classify the results through a 5-tier system: Brilliant, Optimal, Equivalent, Suboptimal, and Blunder. The findings will reveal whether knight underpromotion serves as a tactical tool versus a stylistic preference, and whether cognitive bias toward the conventional choice causes players to miss game-winning opportunities. This analytical framework will replace subjective opinion with objective data, providing an evidence-based answer to a classic question in chess strategy and serving as a model for analyzing human decision-making in complex environments.

Varun Sekar

IL - Elmhurst University

Discipline: Economics

Authors:

#1 Angel Mosqueda

Abstract Name: Modeling U.S. Home Prices Using Macroeconomic Variables

This project analyzes the macroeconomic determinants of U.S. housing prices by examining how key national indicators influence changes in the federal home price index over time. Using annual data from the Federal Reserve Economic Data (FRED) database, the study focuses on five major explanatory variables, GDP, the Consumer Price Index (CPI), the unemployment rate, the federal funds rate (FFR), and nationwide mortgage rates, to evaluate their combined impact on home price fluctuations. These variables were selected because they capture both broad macroeconomic conditions and factors that directly affect household purchasing power and housing demand. After collecting, cleaning, and transforming the data, multiple linear regressions were estimated to identify the significance and directional influence of each macroeconomic indicator. Diagnostic tests and graphical analysis were used to assess trends, potential outliers, and the economic plausibility of the results. The modeling framework allowed for a comparison of the relative contributions of each factor and highlighted patterns in the housing market across periods of volatility, including recessions and monetary tightening cycles. The empirical results indicate that the unemployment rate has a statistically significant and negative effect on home prices, consistent with the notion that weaker labor markets reduce household demand. CPI exhibits a positive relationship with housing prices, suggesting that inflation raises construction costs and nominal asset values. GDP also shows a positive association with home prices, reflecting broader economic growth. In contrast, both the federal funds rate and mortgage rates display negative coefficients, indicating that tighter monetary policy and higher borrowing costs tend to reduce housing demand and slow price growth. Overall, this project demonstrates that macroeconomic stability plays a central role in shaping U.S. housing price dynamics. The findings offer policymakers, lenders, and prospective homeowners insight into how shifts in the broader economy translate into changes in real estate values.

Jennifer Selbi

Discipline: Psychology

Authors:

#1 Grayson Fraiser

Ella Utt

Abstract Name: Gender Differences in Phone Use Perceptions and Impact on Digital Availability in College Age Students

Digital availability is defined as the extent to which a user feels obligated to stay active in responding to digital communication messages. Research shows that one-third to one-half of college students use their phone in every class with negative effects including loss of focus, less understanding of course material and distraction from other students' phone usage. There is limited research examining if students are aware of how much time they spend on their phones. One study found that "light users" overestimated their phone usage due to anxiety of too much screen time, and "heavy users" underestimated their phone usage due to feelings of guilt. Females were more likely to underestimate the number of calls per week compared to males. Data collection for this study will occur at the start of the spring semester in January 2026. Students at a small, private university in the northeast United States will be recruited to complete an online survey using Alchemer and enter in a gift card raffle. Students will complete the Mobile Maintenance Expectations Scale (Hall & Baym, 2011) which assesses how much they feel others expect them to be available for messaging throughout the day. Students will also report how many hours they believe they spend on their phone during a typical weekday and weekend as well as the hours of actual cell phone use over the past week based on their phone data. We hypothesize that: (a) students' perceptions of their phone use will be significantly lower than their actual phone use time, (b) heavy phone users will report higher digital availability scores compared to light phone users, and (c) gender differences will be exploratory due to the limited available research. Students' knowledge of their personal screen usage can create an intervention and reduce hours spent on mobile phones.

Samantha Semler

Discipline: Chemistry

Authors:

#1 Luciana Aronne

Ashley Kramer

Abstract Name: Fungal Degradation of Pretreated Plastic Waste

Plastic waste can persist in the environment for centuries, with natural degradation time ranging from 20 to 1000 years. Alongside damaging the environment, recent studies have concluded that microplastics have been found in the body, including the brain. This alarming presence shows that plastics can cross into the blood barrier and affect human health, emphasizing the importance of eliminating waste. One promising method is to biologically degrade plastics via fungal digestion. When plastics are fed to fungi as their sole carbon source, the fungi are able to break down the carbon present in the plastic. This research focuses on low-density polyethylene (LDPE) films. In an attempt to accelerate the rate of biodegradation, pretreatments are applied to plastics. These pretreatments include using nitric acid, sulfuric acid, hydrogen peroxide, heat, and microwave. Research will be done to see if modifying the surfaces of plastics through these treatments will aid in introducing more degradable functional groups on the plastic surface. Surface and chemical changes will be analyzed using infrared (IR) spectroscopy and scanning electron microscopy (SEM) imaging. The goal of this project is to determine if the pretreatment already established will work on everyday consumer

plastics for the future, therefore having the capability of both widespread application as well as effective elimination of excess plastic waste.

Anirudh Sengupta

Discipline: Mathematics

Authors:

#1 Anirudh Sengupta

Abstract Name: Using Markov Chains and Statistical Analysis to Model Intentional Fouling Situations in NCAA Division 1 Men's Basketball

Intentionally fouling a team during their offensive possession is a strategy that basketball teams have employed for many years. Though popularized in the National Basketball Association (NBA), the technique has also made its way into Collegiate Basketball. The purpose of intentionally fouling is often to slow down opponent scoring and expose poor free-throw (FT) shooters. Despite previous studies using Markov chains or analyzing intentional fouling in the NBA, there is a lack of research combining these methods with collegiate men's basketball rules, particularly the one-and-one bonus. This paper will examine the optimal times to start intentionally fouling when trailing, using Markov chains and additional statistical analysis of data from NCAA D1 Men's Basketball. Additionally, this study will account for the Bonus and Double-Bonus rules specific to College Basketball. Play-by-play data was compiled from over 4,000 games in the 2024-25 season to calculate statistics that would help identify the probabilities of different plays. Transition matrices were created to determine the expected points in a possession with and without fouls. By categorizing data based on the time remaining in the game, the expected points for all D1 teams in various situations were calculated, enabling the development of a strategy to identify the optimal time for a team to benefit from fouling. The specific examples of the Florida Gators, Alabama Crimson Tide, and App State Mountaineers demonstrate that the optimal time to start fouling changes based on the opposing team. Additionally, the matrices were used to calculate the maximum FT% of a player for which it would be optimal to foul, rather than to give up a possession. While situations change on a game-by-game basis, the graphs created in this study will provide a general idea of when teams are expected to score fewer points in FT situations compared to offensive possessions.

Siddarth Senthil

Discipline: Biology

Authors:

#1 Ruiping Tang

#2 Shanmathi Ramasubramanian

#3 Lohitash Karumbaiah

Abstract Name: Shared Transcriptomic Signatures Between Traumatic Brain Injury and Hippocampal Aging in Sprague-Dawley Rats

Traumatic brain injury (TBI) survivors frequently suffer from chronically progressive complications, including accelerated brain aging, leading to cognitive decline. Current understanding suggests that TBI triggers inflammatory, immune, and metabolic effects that mirror mechanisms of aging. Yet, the molecular connection between TBI pathology and aging processes remains unclear. To address this gap, we acquired and analyzed hippocampal RNA-seq data from public rodent TBI and aging studies. Rna-seq was processed

with nf-core/rnaseq pipeline, and analyzed using differential gene expression analysis, GO enrichment analysis, and WGCNA to identify shared biological signatures between TBI and aged animals. We found 594 TBI-associated and 74 aging-associated differentially expressed genes (DEGs), with 29 shared upregulated genes between the conditions. These overlapping DEGs converged on immune related pathways, particularly antigen presentations, adaptive activations, and complement associated synapse remodeling. Network level comparisons showed that the patterns of gene co-activation after TBI resembled those found in aging, particularly in immune and neuroinflammatory pathways. Patterns of gene enrichment also indicated strong representation of peripheral immune-associated transcripts, evidencing that TBI engages systemic immune mechanisms resembling those seen in immune aging. Taken together, these findings show that TBI and aging share coordinated transcriptional patterns centered on adaptive immunity, neuroinflammation, and synaptic regulation. This alignment supports the emerging view that TBI can induce an age-advanced transcriptional state in the hippocampus. Additionally, the prominence of peripheral immune signatures raises the possibility that TBI functions not only as a localized brain injury, but also a body-wide immune event that mirrors or accelerates key molecular features of biological aging.

Kayal Senthil

Discipline: Gender, Ethnicity, Diversity, or Cultural Studies

Authors:

Abstract Name: Voicing Sapphism on Campus: An Oral History Project

Sapphic or women-loving-women (WLW) identity is considered an inclusive and embrative LGBTQ+ identity that refers to women and non-binary people attracted to other women. While this identity label is broad, it is often debated and controlled to limit people's inclusivity into the group. This study documents the sapphic identity within the contemporary college environment. Focusing on the intersections between sexuality and gender, their relationship to safety and openness is explored. The college setting is characterized by the intersecting and overlapping of identities, including different age ranges and roles in academia. The methodology for this project involves conducting oral histories with five faculty members and ten undergraduate students at the University of Kentucky (UK) to document the materiality, society, and community of the sapphic identity. The interviews will be recorded and deposited in the Louie B. Nunn Center for Oral History at the UK Libraries Special Collections Research Center for future research. Themes about safety as a campus community member, associations and connections to labels and materiality within queer spaces will be recorded. The aim of this study is to document sapphic voices within the University of Kentucky college campus. As a large, public R1 campus, UK attracts a diverse body of students, yet sapphic identity remains outside of predominately heteronormative Greek and sports culture on campus. On campuses such as UK, queerness is often marginalized and resides outside of normative culture and community. The act of embodying and reinventing queerness lies at the center of the queer identity in the contemporary context of political, social and academic influences. This research will explore how sapphic academics navigate performance, conversation, safety, inclusion, and change, documenting the negotiation of sexuality and gender in academia.

Shivani Senthil Kumar

Discipline: Health and Human Development

Authors:

#1 Hayley Silverstein

Abstract Name: An Atypical Presentation: Catatonia Mimicking Acute Stroke

Catatonia is a neuropsychiatric syndrome characterized by dramatic alterations in both movement and behavior. Catatonia is very common among older adults admitted to the hospital. However, it is frequently overlooked due to its potential to present similarly to stroke, particularly in those with prior central nervous system injury. This project explores how a multidisciplinary team used one geriatric patient's experience to determine if he had developed catatonia after having suffered a stroke and what providers need to be looking at when evaluating similar patients. The patient with a medical history of stroke secondary to a left middle cerebral artery stroke, hypertension, and hyperlipidemia, who experienced sudden confusion, disorganized behavior, urinary complaints, and difficulty speaking was evaluated urgently for acute stroke using brain CT and MRI scanning and EEG, which demonstrated chronic stroke changes and diffuse slowing but no evidence of new ischemia. The patient's clinical presentation included mutism, rigidity, poor response to commands, and decreased spontaneous movement and he received a high rating for severity on a standardized catatonia rating scale. Following a psychiatric recommendation for a lorazepam, the patient's gaze, rigidity, and verbal output all improved significantly within 48 hours and was discharged home on hospital day seven with complete resolution of his catatonic symptoms and a plan for ongoing outpatient follow-up. The case illustrates that while catatonia may develop suddenly and present with a new stroke-like presentation, it will typically be absent of focal neurological deficits or have evidence of new ischemic events on imaging studies increasing the risk of misdiagnosis and delayed treatment. Additionally, the case highlights the need for routine screening for catatonia in older adult inpatients presenting with behavioral changes and the need for collaborative efforts between hospitalists, psychiatrists, and neurologists to identify this condition and provide better outcomes for aging adults with neurovascular diseases.

Lauren Seo

Discipline: Political Science

Authors:

Abstract Name: From Social Orphan to Political Subject: Racialized Humanitarianism in Transnational Korean Adoption

The essay examines how advocacy, power, and belonging intertwine within the context of transnational Korean adoption by analyzing my positionality as the Korean American student representative in the World Hug Foundation (WHF). Although I'm not an adoptee myself, my work with adoptees in mentoring sessions, workshops, and heritage trips placed me in a liminal position as a half-insider, neither fully an insider nor an outsider of the adoptee community. From this vantage point, I analyze the process of formation of discomfort or unbelongingness generated within the adoptees through the broad history of US empire, racialization, and humanitarianism. My interactions with the adoptees, adoptive parents, and adoptive agents are introduced alongside scholarly work by Pate (2014), Graves (2020), Kim (2010), and Kim (2024). The essay will determine how the concepts of racialized humanitarian sentiment, governance through love, and liminal belonging experienced by the adoptees are framed, addressed, and managed in real-life discourses regarding them. In this context, the adoptee heritage program works as a mechanism for the liminal belongings adoptees go through when adoptees navigate being seen as Korean in Korea while lacking language or cultural capital. The essay will demonstrate that transnational adoption was not a neutral care for the adoptees but a political action embedded in imperial histories, white normative family models, and global kinship regimes. Through my work as a non-adoptee advocate for the Korean American adoptees, the essay will closely reflect on the limitations of the transnational adoption process. Ultimately, the essay calls for shifting from viewing adoptees as 'social orphans' to highlighting them as epistemic and political agents whose voices must be central to research, policy, and practice.

Michael Sergio

Discipline: Exercise Science and Nutrition

Authors:

#1 Tim Werner

#2 Michael Sergio

#3 Nicholas Rolnick

Abstract Name: Impact of Blood Flow Restriction Cuff Design on Upper Body Exercise

Differences in cuff blood flow restriction (BFR) bladder design (single-chambered [SC-BFR] and multi-chambered [MC-BFR] systems) may influence exercise performance, perceptual responses, and cardiovascular outcomes. PURPOSE: To compare SC-BFR versus MC-BFR cuff design on acute performance, perceptual, and cardiovascular outcome measures during four sets of upper body bilateral biceps curl exercise to volitional failure using recommended application BFR guidelines. METHODS: In a randomized cross-over design, twenty-six healthy physically active individuals (22.6 ± 5.5 years old, 10 females; 25 reported engaging in resistance-exercise consistently) performed four sets of bilateral biceps curls to volitional failure using 20% of the 1-repetition maximum under three conditions: SC-BFR, MC-BFR, and a non-BFR control, post-exercise perceptual responses, and cardiovascular measures pre- and post-exercise. RESULTS: SC-BFR significantly reduced total repetitions compared to MC-BFR ($\Delta = -19.5$; $p = 0.002$; 95% CI = -34.9 to -3.9) and N-BFR ($\Delta = -48.7$; $p < 0.001$; 95% CI = -74.7 to -22.8). MC-BFR and N-BFR conditions demonstrated comparable performance in later sets. RPD was significantly higher in SC-BFR compared to MC-BFR and N-BFR ($p < 0.001$), while MC-BFR elicited lower RPE than SC-BFR ($p = 0.025$). Both SC-BFR and N-BFR conditions significantly reduced post-exercise diastolic blood pressure and mean arterial pressure, whereas MC-BFR did not. SC-BFR blunted post-exercise increases in carotid-femoral pulse wave velocity ($p = 0.328$), whereas the other conditions showed elevations ($p < 0.05$). CONCLUSION: SC-BFR induces greater repetition reduction and perceptual discomfort than MC-BFR, while MC-BFR demonstrates similar performance and comfort to N-BFR in later sets. SIGNIFICANCE/NOVELTY: Findings suggest cuff design plays a role in acute performance and perception-related responses, but not cardiovascular responses. The authors declare no conflicts of interest.

Barry Sermons

Discipline: History

Authors:

Abstract Name: All You Have in Life is Your Name: Uncovering My Family's History in America and Origins in Africa

The purpose of my research was to use any available documents to uncover the story of my family by working my way from my parents backward from one generation to the next. In this presentation, I will discuss the process and results of my ongoing genealogical research, which I began this past summer under the guidance of my faculty mentor. Through gathering and analyzing oral histories, family documents, legal records, and documents from digital databases, I was able to craft a narrative of several generations of my family history. As a senior citizen returning to pursue my educational goals, this project has been fulfilling in ways that I had not imagined. Through telling my family's story, I am able to offer an intimate understanding of the history of African Americans.

Berania Serna Perez

Discipline: Psychology

Authors:

#1 Melissa Caballero

Marco Sotelo Avila

Abstract Name: Family Closeness and Familial Responsibilities Predicting Academic and Well-Being Outcomes for First-Generation Latine/x Students

Familism—a cultural value that emphasizes family closeness, loyalty, and support over one's own needs—is a collectivist value that plays a critical role within Latine/x communities. Research repeatedly shows that familism is protective for Latine college students in the transition to college. Yet, familial roles—the responsibilities and expectations a member holds in a family—play a more complicated role due to the cultural value mismatch (i.e., a psychological tension) that can play out in college. When universities value independence, students who come from more collectivist backgrounds, like Latine/x and first-generation (FG) college students, experience a cultural value mismatch due to the competing expectations from home and school. Cultural value mismatch has been linked to negative academic and well-being outcomes in separate studies. This study investigates the relationship between familism, family roles, and both academic performance and well-being. We conducted a secondary analysis of survey data collected from Latine/x FG college students during their first year in college (n=62) and we used a hierarchical regression analysis to test our hypotheses. We hypothesized that familism would predict higher academic performance (GPA), higher resilience, and lower stress. Although our hypotheses were not supported, we observed marginal trends. Higher self-family overlap marginally predicted higher GPA, and more family role engagement marginally predicted stress, but family role engagement did not moderate any of the predicted relationships. These insights can help inform future studies examining relationships between these variables and contribute to discussions about how college spaces can consider the role of family in creating resources that help Latine college students thrive academically and in their overall well-being.

Victoria Serrano Ortiz

Discipline: Biology

Authors:

#1 Milson Luce

Abstract Name: Effects of Energy Drinks on Heart Rate in Academic Settings

This research explores the effects of energy drinks on heart rate among students in academic settings. Energy drinks, often consumed for their stimulating effects, are widely used by students to enhance focus and combat fatigue during studying or examinations. However, the physiological impacts, particularly on heart rate, are not well-documented in the context of academic environments. This study aims to assess how the consumption of energy drinks affects heart rate variability and overall cardiovascular response during cognitive tasks in students. Using a controlled experiment, participants will be administered energy drinks containing 200 mg of caffeine and other stimulants, and their heart rates will be monitored at baseline, 10, 20, and 30-minute intervals while they engage in academic tasks. Participants will also complete a pre-and post-consumption survey in which they will self-report any signs of stress or jitteriness. Results from other experiments related to energy drinks suggest that energy drinks lead to a significant increase in heart rate, with variations observed across different subgroups based on factors such as age, gender, and habitual caffeine use. The study further investigates the implications of these cardiovascular changes on academic performance, stress, and cognitive function. Findings aim to provide a deeper understanding of the physiological consequences of energy drink consumption in students and contribute to informed

recommendations regarding their use in academic settings. This research highlights the need for greater awareness of the potential risks associated with these beverages, especially in environments where mental performance is critical, and underscores the importance of promoting healthier alternatives for cognitive enhancement.

Emily Serrano-Orellana

Discipline: Biology

Authors:

Abstract Name: The Role of Middle and Hind leg in Stink Bug (*Halyomorpha halys*) Gait: Insight from Induced Autotomy

The voluntary loss of a limb is known as autotomy, which is a common defensive mechanism among arthropods, allowing them to escape predation or captivity. Although autotomy can be beneficial, it often compromises locomotion by alternating stability, gait, and propulsion. A hexapod uses an alternating tripod, the removal of a single leg could disrupt this coordinated pattern. *Halyomorpha halys*, known as the brown marmorated stink bug, uses this alternating tripod for locomotion. In this study, we examined how induced autotomy of either a hind limb or middle limb affects forward velocity, coordination, and overall gait stability in stink bugs. Using high-speed camera recordings and 3D reconstruction in Argus allowed us to measure changes in stance patterns, velocity, and gait coordination pre- and post-autotomy. Preliminary data have shown that forward velocity decreases after the removal of either the hind or middle limb. Despite predictions, removing the middle limb did not significantly alter coordination, and individuals did not show a shift to an alternative walking pattern. These preliminary findings suggest that losing any limb will cause a decrease in propulsion, but middle limbs may not play such a significant role in coordination and stability as previously hypothesized. Further data collection is needed to support these early trends and further evaluate how individuals modify their locomotion after autotomy.

Bryce Settlemier

Discipline: Art History

Authors:

Abstract Name: Magic or Miracle? Examining the Conflicting Rhetoric Around Early Christian Iconography from Ancient Rome

Between the years 300 and 500 AD, the Romans produced a collection of gold-glass medallions depicting Jesus holding a religious tool while performing his miracles. The nature of this object has been widely debated due to its absence from traditional Biblical stories, leaving the interpretation of the object itself up to broader social and cultural contexts. Naturally, the ability for varied interpretations of these images have resulted in label conflicts. Considering the positions of museums as moderators between academia and the general population, label conflicts can cause misinformation amongst the millions of visitors the museums receive annually. For example, in the British Museum, the artifact is titled “medallion” and the technology held by Jesus is called “the rod of power” in the object description. The Metropolitan Museum has a near-identical artifact labeled “Gold Glass Medallion with Christ as a Miracle Worker” and the object is called a “wand” in their description. My research thesis aims to highlight the variations in iconographic labels across institutions like the British Museum, the Metropolitan Museum of Art, and the Vatican Museum. Using methodologies like historiography to analyze object files in their respective archives, I have been tracing

conflicting terminology throughout the written record to determine how museums decided on modern label selections. Once the terminology has been identified, I compare it against the religious environment in which the iconography emerged, as well as their archaeological, visual, and material contexts.

Emily Settles

Discipline: Visual Arts

Authors:

Abstract Name: Sister Sin and Spare Rib: Safety, Softness, and the Resilience of Womanhood.

This body of work explores the strength of feminine joy, the power of softness, and the resilience of womanhood through large-scale oil paintings and acrylic prints. The central guiding questions for the work are: How can I use paint and printing processes to emphasize the importance of feminine joy, the power of softness, and the inherent resilience of womanhood? Further, can these representations offer experiences of empowerment from collective patriarchal trauma? By considering womanhood through a lens of agency, safety and joy, this project counters narratives that render women's experiences ornamental or subjugated. Instead, the artist offers an alternative: a vision of womanhood in which vulnerability serves as an act of reclamation, healing, and collective strength. Feminine power is extended through the inclusion of Great Danes in the artwork. No longer symbols of male ownership or domesticity, the dogs embody sacred protectors. They mirror the emotional states of the women they accompany while evoking mythic resonance, from the mother wolf of Roman lore to witches and their familiars. Rather than focusing solely on the historical oppression inflicted upon women, the work acknowledges its role in women's lives while highlighting a reciprocal force: joy as resistance. By celebrating women's relationships, via their friendships, self-love, or communal care, the paintings reclaim agency over the narrative of womanhood. Broaching such a subject is deeply personal to the artist yet universally relevant. Inspiration for the work stems from firsthand experiences while also drawing on a broader societal context in which women's voices are continually diminished. The artist asserts that in the joy and resilience shared between women, there exists a network of strength, from which all may draw and contribute to.

Josiah Severe

Discipline: Biology

Authors:

#1 Josiah Severe

#2 Ken Adams

Abstract Name: Evaluating the Role of NAB2 Phosphorylation in its Liquid-Liquid Phase Separation

The protein NAB2 plays an important role in regulating gene expression in cells and affects a variety of cell behaviors including differentiation, proliferation, and apoptosis. However, the mechanisms that control NAB2 activity are not well understood. Recent data in our lab demonstrates that NAB2 undergoes liquid-liquid phase separation (LLPS), which is phenomenon increasingly appreciated for its roles in regulating a variety of proteins and cellular events, including transcription factors and gene expression. LLPS is a biophysical event in which specific proteins separate from their surrounding liquid environment, forming their own more concentrated, yet still liquid, phase in the form of condensates. LLPS is mediated through multivalent interactions between unstructured regions of proteins, referred to as intrinsically disordered regions (IDRs), and computational analysis predicts that NAB2 has multiple IDRs. In addition, LLPS by

proteins can be affected by post-translational modifications such as phosphorylation (adding a phosphate group to serine or threonine amino acid residues) and our lab has identified 10 putative phosphorylation sites on NAB2. Thus, the aim of this research is to determine whether NAB2 phosphorylation plays a role in regulating its LLPS. Through recombinant DNA technology, the potential phosphorylation sites (all serine or threonine residues) of NAB2 fused to GFP (NAB2-GFP) will be mutated to an alanine using site-directed mutagenesis on a pNAB2-GFP expression construct to block phosphorylation. The mutant constructs will be transfected into human cells grown in culture and NAB2 LLPS, based on the formation of condensates, will be evaluated using fluorescence microscopy. Thus far, five mutant constructs have been generated; however, more mutant constructs are required to determine dephosphorylation exhibits any alterations in droplet formation, which will clarify the potential role of NAB2 phosphorylation in regulating its LLPS behavior.

Luke Sewell

Other/Institution Not Found

Discipline: Computer Science

Authors:

#1 Andrew Fagg

#2 Melissa Wilson

Abstract Name: Zero2Neuro: A Zero-Code Solution for Deep Neural Networks

Machine learning (ML) is becoming used widely in multiple domains of science and yet many domain scientists struggle with creating ML-based models, running experiments, and evaluating the results. One of these forms of machine learning is deep neural networks, which are used across scientific domains for their ability to classify images, perform speech recognition, detect anomalies, and many more tasks. To address the problem of helping domain scientists utilize deep neural networks we developed Zero2Neuro, a tool-kit that provides a minimal code solution to creating, training, and evaluating deep neural network-based models. Zero2Neuro aims to help domain researchers with little to no coding experience have the ability to utilize these models in their research and to help reinforce good practices when developing these pipelines. The toolkit allows users to specify experiment, data, and network configuration details via three configuration files to develop a machine learning pipeline. We also include multiple examples of best practices for use on personal computers, supercomputers, and Jupyter Lab in a GitHub repository as well as in-depth documentation. Work is ongoing with the toolkit as we are currently introducing Zero2Neuro to domain experts for use in their research and incorporating their feedback into the development for our planned full release by the end of the year.

Bryanna Seymore

Discipline: Biology

Authors:

#1 Bryanna Seymore

#2 Sirjani Hedieh, PhD, MD

Abstract Name: Impact of health disparities on cervical cancer outcomes among African American women

Impact of health disparities on cervical cancer outcomes among African American women
Mentor Sirjani Hedieh H, PhD, MDBryanna Seymore
Background: Cervical cancer outcomes remain unequal in the United States, with African American women experiencing higher mortality and later stage diagnoses compared to

other groups. The primary research question guiding this review is: How do health disparities affect cervical cancer outcomes among African American women? Understanding these disparities is essential for developing strategies that improve early detection and survival. Method: A structured literature search was conducted in January 2025 using PubMed to identify peer reviewed studies published from 2021 to 2024. The search focused on cervical cancer, screening, prevention, and health outcomes among African American women. Duplicate articles were removed, and titles and abstracts were screened for relevance. Studies were included if they focused on African American women and reported findings related to screening behaviors, follow up care, health care experiences, or clinical outcomes. Studies that did not meet these criteria or examined unrelated populations were excluded. After full text review, fifteen studies were included in the final analysis. Results: The search initially identified ninety five articles. Seventy were excluded during title and abstract screening for not meeting inclusion criteria, and ten additional studies were excluded after full text review. The fifteen included studies consistently reported disparities in screening access, follow up care, patient trust, communication with providers, and overall clinical outcomes. Conclusions: The literature demonstrates that health disparities continue to significantly influence cervical cancer outcomes among African American women. Culturally informed, accessible, and targeted strategies are needed to reduce these gaps, improve early detection, and enhance long term survival. Keywords: Cervical cancer, African American women, disparities, screening, outcomes

Amber Seymour

Discipline: Film/Photography Studies

Authors:

Abstract Name: ADHD and Autism affected by a sense of identity in oneself and how one is perceived in society.

How do the effects of social pressure on Autism and ADHD create disrupted personalities and a greater need to conform for societal comfort? Articles such as “Autism is Me” and “Struggles of an AuDHD Student” help in understanding the struggles of individuals facing stigma with these conditions. Artists such as Van Gogh, Da Vinci, Warhol, and Picasso are important inspirations on the stigma around individuals on the spectrum and/or with ADHD in art during their time. Personally, being diagnosed with Kanner’s Syndrome (Classic autism) and combined type ADHD gave a sense of why there were struggles with identity and social life into adulthood, with the reality of being “normal” in society becoming more evident with each interaction and stronger with new norms every day. In the film art presented, clips of home videos, glitched footage, and personal/conversational dialogue are used to showcase the external and internal struggles with identity under pressure. There will be intentional discomfort to create the reality of how society can and will force conformity upon people who do not “fit” the standards. The result is to generate open curiosity towards ADHD and Autism, with the intention of breaking stigma and pressure towards identity. Addressed in future pieces will be different struggles faced culturally and ethnically by individuals for a diverse series. This piece fits into my portfolio as it is based on self-identity and personal growth. This will be part of a future series on greater awareness, intentionally diversifying each piece based on individuals from other countries.

Yifan Sha

Discipline: Health and Human Development

Authors:

#1 Marc Joel Henry

#2 Sarah Schrauth

#3 Yijin Liu

#4 Cassandra Riehle
#5 Nelly Machado
#6 Maya Campbell
#7 Philine Bovet
Hanlin Liu

Abstract Name: Nutrition incentives and shopper behavior: Survey insights and behavioral modeling from a SNAP farmers market match program

Low fruit and vegetable (FV) intake increases the risk of chronic disease, and low-income households participating in the Supplemental Nutrition Assistance Program (SNAP) continue to face cost and access barriers that limit FV consumption. Nutrition incentive programs aim to reduce these barriers by making FV purchases more affordable for SNAP participants. We analyzed eight years of survey data from a SNAP nutrition incentive program (2018–2025; N = 1,071) using descriptive analyses and Poisson and logistic regression to assess shopper experiences and engagement at a Wisconsin farmers market. Most participants reported eating more FV (90%), trying new foods (63%), and saving money on groceries (85%) as a result of the program. Nearly all respondents (93%) described the market as welcoming, although some noted barriers such as transportation limitations (18%), weather (23%), and limited hours (13%). Higher incentive redemption was significantly associated with increased visit frequency, with each additional \$10 in incentives corresponding to approximately 17% more visits ($\beta = 0.016$, $p < .001$). Visit frequency also predicted next-season participation, with each additional 2024 visit increasing the odds of returning in 2025 by 60% (OR = 1.60, $p = .011$). These findings suggest that incentives may support a behavioral pathway in which affordability encourages more frequent attendance, which in turn promotes sustained engagement and improved FV access for low-income households. This work highlights both strengths and persistent barriers within the program and provides insights to inform the development of equitable and accessible statewide nutrition incentive strategies.

Rashida Shabazz

Discipline: Visual Arts

Authors:

Abstract Name: How Black People Talk to God: Ritual, Memory, and Spiritual Agency in Contemporary Black Expression

This project investigates the ways Black people communicate with the divine through everyday ritual, language, sound, and embodied practice. I explore spiritual communication as a multidimensional practice shaped by ancestral memory, domestic space, community structure, gendered labor, and the ongoing struggle for identity, joy, and rest. My research draws heavily from the iconography of the Black church (particularly African American churches), including architecture, sermons, metaphors, parables, and the emotional atmosphere created through communal worship. The church functions as a space of community, spiritual grounding, and cultural affirmation, offering a sense of connection. During Sunday service, praise and worship is expressed through instruments, hymns, shouting, dance, and improvisation. I also study the significance of fashion in the church, where dressing becomes an act of dignity, self-presentation, and resistance. Historically, Sunday service offered one of the few spaces where Black people could move through the world freely and momentarily step outside the constraints of forced labor and discrimination. My work also considers Blues and R&B as forms of release, storytelling, and celebration. These musical traditions translate the experiences of everyday life into sound, carrying both the pleasure and the hardship of living under an oppressive system. The artists Carrie Mae Weems, Kara Walker, and Nina Simone influence and shape my art practice. My project responds to the histories of the Black church, the Civil Rights Movement, the Trans Atlantic Slave Trade, and the ongoing need for redemption, healing, and creative expression. By analyzing my lived experience, oral history interviews, sonic and visual culture, and

performance, I examine how worship becomes a language of survival. The resulting body of work includes mixed media collage, photography, videography, painting, dresses, poetry, installation, and music that illuminates Black spirituality as a living, shifting conversation that moves across generations.

Gwyneth Shaddon

Discipline: Biology

Authors:

#1 Julie Marshall

Abstract Name: Increasing Lycopene Production in Green Zebra Tomato Using CRISPR/Cas9 Gene Editing

CRISPR/Cas9 has become an increasingly popular method for gene editing in fruit crops. In this experiment, CRISPR/Cas9 is used to increase lycopene production in the Green Zebra variety of *Solanum lycopersicum*. A point mutation is used to knockout the Stay Green (SGR1) gene causing an overexpression of the Phytoene Synthase 1 (Psy1) gene. This method consists of seed sterilization, cotyledon infection using *Agrobacterium tumefaciens* EHA105, and tissue cell culture. A mutation causing increased lycopene production has several implications. The increase in lycopene production from the knockout of the SGR1 gene will suggest that the Green Zebra tomato variety has the same SGR1-Psy1 gene relationship as the standard *Solanum lycopersicum* tomato. A successful mutation will also show that CRISPR/Cas9 is not only an efficient way to increase nutritional value in a tomato, but it will also suggest that CRISPR/Cas9 is a viable way to correct mistakes brought about through the domestication of the tomato.

Malaika Shafqat

Discipline: Biology

Authors:

#1 Malaika Shafqat

Abstract Name: Identifying Biomarkers for Early Detection of Endometriosis: Addressing Diagnostic Delays in Women's Health

Millions of women worldwide are affected by endometriosis, a condition that is frequently misdiagnosed or underdiagnosed due to its broad symptom range and overlap with other disorders. Endometriosis occurs when tissue similar to the uterine lining grows outside the uterus, leading to inflammation and severe pain. This condition can also cause painful periods, abdominal discomfort, and chronic pelvic pain. Although endometriosis has been described in older medical literature (1690), it was not identified under a microscope until 1927, which contributed to a long history of misunderstanding and inconsistent recognition. Research on endometriosis has led to the development of some non-invasive options for patients, and there has also been an increase in clinical trials. However, these non-invasive options are currently very limited, and a definitive cure remains elusive. The research thus far has concluded that lifestyle adjustments such as exercise, over-the-counter (OTC) pain relievers, and hormonal birth control can help with pain management of symptoms. Although this represents progress, these approaches manage symptoms rather than identifying the underlying causes or supporting early diagnosis. After reviewing current peer-reviewed research, this project will focus on evaluating potential biomarkers to support earlier detection of endometriosis and accurate diagnoses. The main objective is to address the factors contributing to delayed diagnosis and improve overall understanding of endometriosis. Moving forward, this project will explore strategies for increasing public and clinical

awareness while also examining blood, urine, and tissue biomarkers that may support earlier and more reliable detection.

Shriya Shah

Discipline: Biology

Authors:

#1 Pavel Ortinski

Abstract Name: Effects of Psilocybin on Cognitive Flexibility Using a Naturalistic Attentional Set-Shifting Task in Rats

Substance use disorder is a global crisis, impacting millions of people worldwide. One of the key factors in recovery is cognitive flexibility, which is our brain's ability to adjust and shift strategies when situations change. Psychedelics like psilocybin have shown therapeutic potential by enhancing this flexibility. However, most previous studies use artificial operant tasks like lever pressing that don't reflect how rats naturally behave or learn. My project employs an instinctive Attentional Set-Shifting Task (ASST), which involves burying food in a medium and requiring rats to discriminate between different stimuli. This provides a more realistic model for understanding how psilocybin may affect learning. All 24 Sprague-Dawley rats were trained to dig in bowls filled with different mediums and odors to obtain a food reward. After successful training, each rat was injected with either psilocybin or saline. They were then tested at two time points: 24 hours and one week post-injection. The testing session consisted of series of progressively harder tasks called set-shifting tasks, during which rats were presented with different combinations of sensory cues. Performance of rats was measured using trials to criterion, number of errors, and latency to dig. A notable difference was observed in the intradimensional reversal task one week post injection. Rats that received psilocybin required fewer trials to reach the correct response compared to those that received saline. This suggests that psilocybin may enhance reversal learning, a measure of cognitive flexibility. Interestingly, these effects appeared one week later and not immediately after administration. This points to psilocybin's longer-term neural adaptations, rather than a short-term boost in performance. Ultimately, this research helps bridge the gap between animal and human studies, highlighting how psychedelics may improve cognitive flexibility and their future use in treating substance use disorders.

Sahil Shah

Discipline: Biology

Authors:

#1 Bryan Brown

Abstract Name: Sex differences in the Gut Microbiome from Human Microbiome Project 16S rRNA data

In maintaining human health and regulating metabolic processes, the gut microbiome has been revealed to play a critical role. However, sex-related differences in microbial composition vary significantly across studies. Prior research has identified associations, but the influence of other factors such as hormonal concentration, genetic responses, and immune responses still remain under investigation. In this project, we analyzed publicly available 16s rRNA gene sequencing data from the NIH Human Microbiome Project (HMP16SData)1, focusing on stool samples from two variable regions (V1-3 and V3-5) to examine microbial variation by sex. Using the phyloseq R package, we performed alpha diversity analysis (Observed richness, Shannon index) and beta diversity analysis (Bray-Curtis distances with PCoA) to assess the microbial

community structure. Furthermore, we performed differential abundance analysis with DESeq2, identifying several genera that significantly differed between males and females. Preliminary results indicate distinct sex-based differences in microbiome composition with genera such as Prevotella, Lactobacillus, Ruminococcus varying in relative abundance across these sexes. To evaluate the predictive capability, we implemented a logistic regression by training samples and using genus-level microbial abundances to classify the samples by sex. Additionally, the model demonstrated measurable predictive accuracy, suggesting sex-specific microbial signatures can serve as a discriminative marker. The research contributes to a growing understanding of how sex influences gut microbiology. This will also lead the way for practical applications to be understood such as personalized dietary and therapeutic interventions, while theoretical contributions can advance knowledge of host-to-microbiome interactions.

Veer Shah

Discipline: Computer Science

Authors:

#1 Nikhil Khattar
Nikhil Khattar

Abstract Name: A Hybrid LLM-RAG Tutoring System for Adaptive, Step-By-Step Student Learning

AI tools are now widely used in college courses, but most systems still give students direct answers instead of helping them think through problems on their own. This limits opportunities for meaningful learning and self-regulated problem-solving. This project investigates how an AI-driven tutoring platform can be designed to guide students through step-by-step reasoning while adapting to their progress, rather than simply providing solutions. To address this problem, we developed a hybrid tutoring system that combines large language models, Retrieval-Augmented Generation (RAG), and real-time analysis of student interactions. RAG pipelines supply accurate course-specific context, and a lightweight classifier identifies the topic of each question to activate structured reasoning pathways. As part of this project, I implemented the data logging and topic-classification components and helped design the adaptive prompting framework. The system records how students interact with the tutor, common mistakes they make, and where they ask for clarification. These logs are being used to generate personalized review materials, targeted practice problems, and recommended reading based on each student's performance trends. The platform is currently being piloted in an undergraduate computing course at an R1 university using a mixed-methods evaluation. Quantitative analysis focuses on usage patterns and reductions in repeated errors, while qualitative data comes from student surveys and open-ended feedback. Preliminary results show growing use of the platform before major exams, along with a 17% decrease in repeated errors on logic-related tasks among early adopters. Students report that the step-by-step guidance helps them better understand problem structure and stay focused while studying. These early findings suggest that structured, adaptive AI tutoring has the potential to strengthen students' reasoning processes, improve conceptual understanding, and support more effective study habits across different course topics.

Sohum Shah

Discipline: Biology

Authors:

#1 Benjamin Hafey

Abstract Name: Dissecting Non-Redundant Roles of BET Paralogs in T Cell Exhaustion

The BET family of proteins—including BRD2, BRD3, and BRD4—are epigenetic regulators that read acetylated histones and recruit transcriptional machinery to activate gene expression. Positioned at the intersection of chromatin structure and transcription, they influence cell identity, proliferation, and immune responses. Their broad regulatory roles have made BET proteins prominent therapeutic targets, particularly in cancer immunotherapy. Current research investigates pan-BET inhibitors that are used to “rescue” exhausted CD8⁺ T cells by restoring effector function. However, because current inhibitors act on all BET paralogs simultaneously, it has remained difficult to determine which specific proteins drive these immunological effects. To address this, we generated three transgenic mouse models with a dTAG and a HaloTag, in which BRD2, BRD3, or BRD4 can be selectively and rapidly degraded upon ligand treatment. We validated efficient degradation both ex vivo and in vivo, observing near-complete loss of predominant isoforms within hours. The HaloTag enabled us to perform live-cell imaging of the respective BET protein’s condensates. Using chronic ex vivo activation protocols, we developed exhausted-like CD8⁺ T cells and confirmed phenotypes via flow cytometry. Acute depletion of individual BET paralogs during exhaustion produced distinct changes in both cell-surface markers and transcriptional programs. We were able to use the HaloTag to visualize exactly how the condensates changed and/or degraded. RNA-seq revealed paralog-specific regulation of key immune genes including *Ifn-γ* and *Tnf-α*. These findings demonstrate that BET proteins are not functionally redundant and instead exert paralog-specific control over T cell transcriptional programs. This work highlights the potential of paralog-targeted BET modulation as a more precise immunotherapeutic strategy than existing pan-BET inhibition.

Siara Shah

Discipline: Biology

Authors:

Abstract Name: HPA Axis and its Relation With the Body- Understanding Biology and Psychology’s Mutual Influence

This literature review examines the hypothalamic-pituitary-adrenal (HPA) axis and how it regulates both stress and recovery in reconstructive surgery, focusing particularly on the biochemical, enzymic, and epigenetic processes whereby psychological distress impacts the healing process via cortisol, both as a facilitator and inhibitor thereof. Synthesizing multiple peer-reviewed studies, this research review categorizes current research into five interrelated domains: physiological stress responses, local versus systemic cortisol regulation, enzymatic control, epigenetic modulation, and personalized treatment models. The literature will draw on various scholarly articles and will categorize various pieces of current research regarding this topic among the following five areas: • Responses to stress • Local and systemic regulation • Enzymic regulation • Epigenic regulation • Treatment approaches Throughout various studies, stress was indicative to stimulate the HPA axis, resulting in an increase in cortisol levels and a suppression of the production of pro-inflammatory cytokines, which are crucial to the healing process. The influence of psychological stress on a delay in the healing process by as much as 40% was highlighted by a study by Gouin & Kiecolt-Glaser (2011). Cohen et al. (2009) and Ajjan et al. (2022) further confirmed that the regulation of cortisol production by enzymes, including 11β-HSD1, largely affects the healing process. Epigenetic studies by Willmer et al. (2022) and Miller et al. (2025) identified that stress, as well as exercise, affects the methylation patterns of FKBP5, which, in turn, affects the sensitivity to glucocorticoids. The article concludes that the process of recovery following reconstructive surgery should be viewed as a psychoneuroendocrine, rather than a strictly mechanical, procedure. Tailor-made therapies involving cortisol enzyme blockade, stress management prior to surgery, and genomic analysis may allow for maximized tissue healing and results, by relating endocrine, psychological, and genetic frameworks, providing a diverse perspective involving mind, hormone, and healing.

Maya Shah

Discipline: Psychology

Authors:

#1 Amandeep Dhaliwal

Abstract Name: The Role of Intellectual Humility, Trauma, and Psychopathy in Gun Violence: Understanding Their Implications on a Path Toward Prevention

Gun violence has become a threatening phenomenon that has been affecting the lives of Americans nationwide. Two main traits that show a predisposition towards gun violence are psychopathy and trauma. We focused on the interaction between childhood trauma and psychopathy and analyzed how intellectual humility affects this relationship. When looking at the relationship between these two traits, we found that psychopathy had a positive relationship with trauma ($r = 0.75$, $p < 0.001$). This means that there is a highly reactive at-risk population (traumatized psychopaths) that is more likely to use guns for violent purposes. The findings also confirm our hypothesis that psychopathic traits have an inverse relationship with intellectual humility. This further supports the idea that increasing IH could have the opposite effect of decreasing psychopathy. A moderation analysis showed that the relationship between trauma and psychopathy was moderated by intellectual humility $F(3, 157) = 74.16$, $p < .001$. This lowers a key predisposing factor for gun violence, psychopathy, and diminishes the reactivity of a highly at-risk population of traumatized individuals exhibiting psychopathic tendencies. So, systematically teaching concepts associated with intellectual humility in schools could decrease the likelihood of traumatized psychopaths committing an act of violence. IH courses include implementation of projects and teaching styles that emphasize passion for information rather than external benefits. Additionally, a subscale of intellectual humility, had a positive relationship with psychopathy ($r = .38$, $p < 0.001$). This means that psychopathic individuals are more likely to change their minds. So, persuasive methods may be used to reason with psychopaths and prevent them from pursuing gun violence. This study utilizes novel relationships to help understand and address those who are prone to gun violence. These promising results could be used in the future to analyze methods to intervene against aggressive behaviors like gun violence in schools.

Arineh Shahbazi

Discipline: Physics and Astronomy

Authors:

#1 Mubarak Mujawar

Haiden Fox

David Pace

Abstract Name: A Feedback Loop Control to Automate Cold Atmospheric Pressure Plasma (CAPP) Based Additive Manufacturing

Currently, nanoparticle annealing based additive manufacturing process requires high temperatures, making them unsuitable for a broad range of applications. By lowering the temperature and developing a process to use Cold Atmospheric Pressure Plasma (CAPP) for annealing, many more doors are opened to a wide range of materials, films, and environments for space, communication, and microelectronics. CAPP-based additive manufacturing technology is continuously evolving, making projects like nanoparticle annealing more feasible. In this work, we designed a CAPP jet printer assembly consisting of a 0.25-inch outer diameter glass tube connected to a 3D printing nozzle. The flow of Argon gas in the tube is maintained by a mass flow controller. The plasma jet is created by applying a high voltage ($\sim 10\text{kV}$, 0.01 A) to copper electrodes on a glass tube. The current work highlights the development of a Python and NI LabVIEW-based digital interface

to automate our CAPP jet-based plasma printing process by designing a control system with a feedback loop for the power supply, pressure monitor, Mass Flow Controller, and x-y-z stage. The data from the power supply and MKS mass flow controller were acquired using an NI USB 6001 I/O device. The program integrates the acquisition, in-situ analysis, and real-time data visualization, apart from allowing more access to end users. Moving forward, we aim to create a web-based portal to remotely control the mass flow controller and 3D printer.

Yumnaa Shaheen

Discipline: Psychology

Authors:

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Abstract Name: Relationships Between Sleep, Pain, and Physical Activity in Idiopathic Generalized Epilepsy

People with idiopathic generalized epilepsies (PwIGE) represent about 20% of all epilepsies but comprise <1% of epilepsy research. Many PwIGE lead sedentary lifestyles which may contribute to sleep disruptions and increased pain; these all negatively impact quality of life (QoL), but their relationships remain unclear. We investigated associations between physical activity levels, sleep quality, and pain levels in PwIGE. We hypothesized that PwIGE will exhibit decreased levels of physical activity associated with decreased sleep quality and worse pain, and a negative association between sleep quality and pain. 68 PwIGE (43 female, mean age 31.63), completed assessments of QoL (Short Form-36 (SF-36)), sleep (Pittsburg Sleep Quality Index (PSQI)) and physical activity (Leisure Activity Total Score (LATS)). PwIGE were stratified into two groups: 36 (53%) self-reported as seizure-free (NoSz) and 32 (47%) reported experiencing seizures (Sz) within the last six months. Two-sample t-tests compared seizure groups. Pearson correlations determined relationships between LATS, PSQI and SF-36-Pain scores in combined and separate seizure groups. Seizure groups did not differ in age, sex distribution, epilepsy onset age, or epilepsy duration (all $p > 0.05$). Mean scores were significantly worse for Sz compared to NoSz on SF-36-Pain ($p = 0.011$) and LATS ($p = 0.007$), and no significant differences on the PSQI ($p = 0.256$). There were significant correlations between PSQI and SF-36-Pain in the combined group ($r = -0.42$; $p < 0.001$) and in the NoSz ($r = -0.41$, $p = 0.015$) and Sz ($r = -0.42$, $p = 0.016$) groups. LATS was not significantly correlated with PSQI or SF-36-Pain (all $p > 0.05$). Contrary to our hypothesis, self-reported physical activity level was not associated with either sleep quality or pain levels. However, significant correlations of poor sleep quality with increased pain regardless of seizure control status showcase a relationship that warrants further study in PwIGE. Future directions may include physiological measures of physical activity, sleep, and pain for further examining such effects.

Salman Shahzad

Discipline: Biology

Authors:

- #1 William Bailey

Abstract Name: Proteomic Changes in HDL following Spinal Cord Injury

In Spinal Cord Injury (SCI), cholesterol homeostasis is significantly disrupted by initial damage to cholesterol-rich tissue, chronic inflammation, and systemic dysregulation. This metabolic shift increases the risk of cardiovascular disease and hinders SCI recovery. High-Density Lipoprotein (HDL) is best understood for its role in reverse cholesterol transport and cardioprotection based on the amount of cholesterol it carries. However, current research suggests that the composition of HDL is a stronger predictor of cardioprotection than HDL-cholesterol (HDL-C) quantity alone. The distinction of quality versus quantity is critical in the context of SCI, as this injury alters HDL-associated proteins even as HDL-C levels decrease. HDL has a heterogeneous population that aids in anti-coagulation, anti-inflammation, and immune response. Since HDL has a host of responsibilities, dysregulated HDL not only affects cholesterol transport but also other processes. To elucidate how proteomic changes impact HDL function, we performed Gene Ontology (GO) analysis to identify upregulated and downregulated biological pathways before and after injury. Our gene ontology analysis categorized the proteins into four primary families: cholesterol transport, immune function, coagulation, and inflammation. Our study found a downregulation of cholesterol transport-related pathways, indicating an increased risk of atherosclerosis. Conversely, there was upregulation of immune function and coagulation pathways. These results illuminate HDL's shift toward a prothrombotic and proinflammatory state following SCI. The upregulation of coagulation in the absence of vascular injury increases thrombotic risk, such as stroke. Moreover, the overactive immune response supports mechanisms of foam cell formation and secondary injury seen in SCI patients. To conclude, dyslipidemia following SCI is primarily a disruption of the lipoprotein proteome rather than a purely quantitative decrease of HDL-C. Consequently, therapeutic strategies should prioritize modifying HDL protein composition to restore homeostatic function, rather than solely increasing HDL-C levels, to improve long-term cardiovascular and neurological outcomes in SCI patients.

Anan Shaibu

Discipline: Social Work and Human Services

Authors:

#1 Anan Shaibu

#2 Wesley Furlong

Abstract Name: Parent Involvement in Immigrant Families: Impacts on School Engagement and Academic Achievement.

This study examines the relationships between parental involvement, school engagement, and adolescent well-being and academic performance, with a particular focus on immigrant families. Parental involvement is widely recognized as a critical factor in shaping students' educational trajectories, yet its influence within immigrant households remains underexplored. Guided by self-system theory, this project conceptualizes parental involvement as a multidimensional construct home-based support, school-based participation, and academic socialization and investigates its direct and indirect effects on academic achievement and psychological well-being. Using a quantitative design, we will integrate validated survey instruments with report card data and interviews with parents and students to capture cultural nuances and educational aspirations, including whether discussions about higher education occur in the household. Our conceptual model tests mediation, where behavioral and emotional school engagement explains the link between parental involvement and child outcomes, and moderation, where ethnicity and socioeconomic status (SES) shape these associations. SES is expected to influence both the level and effectiveness of parental involvement, as families with greater resources may have more opportunities to engage, while lower-SES families may rely on home-based strategies that still significantly impact engagement. Anticipated findings include evidence that academic socialization such as communicating educational expectations plays the strongest role in enhancing engagement and achievement while mitigating stress and depressive symptoms. By incorporating

micro-level factors (family practices and aspirations), mezzo-level influences (school climate and engagement), and macro-level contexts (SES and cultural norms), this study seeks to identify culturally responsive strategies that support both academic success and mental health. Ultimately, the project aims to inform educators, and community organizations about effective interventions that promote equity and holistic well-being among diverse student populations, while highlighting the importance of family-school partnerships in reducing achievement gaps and fostering pathways to higher education.

Sohana Shaikh

Discipline: Social Work and Human Services

Authors:

Abstract Name: Manipulation for Profit: The Economic and Public Health Consequences of Tobacco Industry Influence

The tobacco industry spends tens of millions each year lobbying the federal government, even as tobacco-related diseases cost the U.S. hundreds of billions in healthcare spending. This imbalance shows how corporations use economic power to shape policies that protect profits over public health. Sam Kean's *The Icepick Surgeon* illustrates how similar patterns recur throughout history: institutions have often used scientific language to justify harm while defending their own interests. Although scholars have examined lobbying expenditures and regulatory capture, we still lack a clear understanding of how tobacco companies coordinate economic influence with manufactured scientific doubt to manipulate policy outcomes. Our research investigates how tobacco corporations use lobbying expenditures, revolving-door employment, and industry-funded research to influence policy decisions. We connect these strategies to the dynamics Kean describes, where scientific authority becomes a tool for maintaining power. Our literature search draws on databases such as JSTOR and policy documents and campaign finance records from federal government websites. Key search terms included "tobacco lobbying," "regulatory capture," "corporate influence," and "policy manipulation." Our analysis identifies three strategies companies use to shape policy. First, directing political contributions toward legislators on health committees to obstruct restrictive regulations. Second, funding research that creates uncertainty about tobacco's harms, weakening scientific consensus and delaying public health protections. Third, cultivating insider relationships through revolving-door hiring, recruiting former regulators as lobbyists to shape rulemaking from within. Across these tactics, the industry frames regulation as an economic threat rather than a public health necessity, echoing Kean's accounts of institutions that use authority and strategic messaging to shield harmful practices. At the same time, grassroots advocacy and evidence-based policy initiatives are pushing back. Understanding these strategies shows how economic power enables systemic manipulation and informs potential reforms such as campaign finance regulation, limits on revolving-door employment, and independent research funding.

Mehmood Shajih

Discipline: Psychology

Authors:

#1 Mehmood Shajih

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#3 Jennifer Bivin

Abstract Name: Why Wait? Examining Situational Predictors of Delaying in the Marshmallow Test: A Meta-analysis

The classic marshmallow test has been viewed as a powerful assessment of young children's ability to delay gratification and exert self-control. This is partly due to its simplicity: children are given a singular choice between a less preferred reward immediately or wait for a more preferred reward after a set amount of time. On the surface, the task appears to assess self-control. The test is also popular because of findings that it predicts a range of later-life outcomes, such as academic performance and behavioral conduct. However, researchers have found that contextual factors significantly influence children's delay-wait behavior. These findings, vital as they are, presume that the marshmallow test is a fundamentally sound measure of delay behavior rather than something else. We consider whether this is a reasonable assumption. A meta-analytical approach was employed to investigate the effects of procedural variations on the results of the marshmallow task and its attrition. The study compiled ~110 articles using three databases: PsycInfo, ERIC, and ProQuest Central. Articles that passed screening are being coded for their sample characteristics, procedural characteristics, and effect sizes to determine variations in results. Consistent with best practices in meta-analysis, we are also taking steps to identify the grey literature, for example, by reviewing conference proceedings and soliciting studies via listservs. The coded data will subsequently be analyzed through a meta-regression. We expect the study to advance research and theory related to the marshmallow test. By clarifying key issues with the task, we raise important questions about measurement and interpretation that have not yet been addressed. We also expect the research to prompt procedural improvements that reduce ambiguity and noise in wait-time measurement. The empirical results will provide much-needed clarity concerning the impact of procedural variations on wait times and attrition, however they turn out.

Muhammed Shalan

AL - University of Alabama at Birmingham

Discipline: Biology

Authors:

#1 Ewan Jada

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Abstract Name: Chemogenetic Modulation of Glucagon-like Peptide-1 Producing Neurons in the Brainstem Influences Cocaine Reward Processing

Glucagon-like peptide-1 (GLP-1), known for its role in glucose regulation and appetite control, has emerged as a potential modulator of reward pathways, offering promise in understanding the neural mechanisms of substance use disorders, including cocaine use disorder. With over two million regular cocaine users in the U.S. and its contribution to 20% of drug overdose deaths, understanding the role of GLP-1-producing neurons (Gcg-expressing neurons) can guide therapy development. Previous research identified GLP-1 receptors and Gcg neurons in the caudal nucleus of the solitary tract (NTS), a critical brain region involved in reward processing and interoception. However, we used Fos staining in Gcg-GFP reporter mice to demonstrate that while cocaine broadly activates the NTS, it does not significantly activate Gcg neurons, contradicting previous reports. This study investigates whether chemogenetic modulation of Gcg-NTS neurons influences cocaine-seeking behavior using a conditioned place preference (CPP) paradigm. Gcg-Cre mice received bilateral NTS injections of excitatory (hM3D-Gq), inhibitory (hM4D-Gi), or control (mCherry) viral vectors. Following recovery, mice underwent cocaine-conditioned place preference and reinstatement testing after a cocaine prime (20 mg/kg). Neuronal activation was quantified via Fos immunohistochemistry. As a positive control for DREADD functionality, a feeding suppression and refeed assay was conducted, and hM3D-Gq mice showed a significant reduction in food intake at 1-hour post-DCZ administration, confirming successful activation of Gcg-NTS neurons. Chemogenetic manipulation of Gcg-NTS neurons did not produce statistically significant effects in cocaine-conditioned place preference. This suggests that cocaine reward may involve more complex circuits than previously appreciated, beyond the contribution of Gcg-NTS neurons. Gcg-NTS neurons robustly influence feeding, supporting a homeostatic role, but their contribution

to cocaine-context learning remains unclear. Ongoing behavioral analysis and validation of viral targeting will clarify whether these neurons modulate cocaine reward.

Connie Shamdin

Discipline: Anthropology and Archaeology

Authors:

#1 Yasemin Ipek

Abstract Name: Migrant Labor in the Gulf States: Ideology, Geopolitics, and Global Perceptions

This research examines how major international media outlets frame the treatment of migrant workers in Gulf states. While scholars have compellingly documented labor exploitation and its dramatic consequences in these states, little attention has been given to how international audiences engage with this issue. Media coverage, particularly English-language reporting targeting Western audiences, plays a significant role in shaping global awareness and public understanding of human rights issues in Gulf states. By conducting a comparative media analysis of articles from The Guardian, Fox News, and Al Jazeera between 2010 and 2025, this study investigates how each outlet portrays Gulf governments, migrant workers, the causes of their exploitation, and accountability for labor abuses. Preliminary findings suggest the following: Fox News emphasizes Gulf states' reform efforts and the positive implications of these reforms; Al Jazeera highlights recruitment corruption and pandemic-era hardships; and The Guardian centers worker testimonies and systemic exploitation. By combining discourse analysis and narrative analysis methods, the study deciphers the power dynamics and ideologies that inform seemingly "objective" reporting. These methods reveal how tone, imagery, and framing strategies influence whether migrant workers are depicted as economic contributors, victims of structural injustice, or individuals with agency and personal stories. The main argument is that media framing of migrant labor issues in Gulf states is primarily shaped by ideology and geopolitics. This analysis contributes to critical media studies literature and scholarly discussions on the global political economy of migrant labor and racial capitalism. In doing so, it offers a global perspective on migrant labor and expands our understanding of inequality, racism, and labor in Gulf states and beyond.

Yasin Shams

Discipline: Biology

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Abstract Name: Microbial Changes upon Chemotherapy Induced GI Toxicity in Colon Cancer Patients—a Population Study

Background: Growing evidence supports the idea that the microbial metabolism of drugs, and therefore the host microbiome composition, can modulate the toxicity of chemotherapeutic agents. Such microbial activity can directly impact the treatment efficacy of cancer patients, as well as disease development and progression. Irinotecan is a broad-spectrum cytotoxic anticancer agent that induces cell death in rapidly dividing tumor cells and disrupts the gut microbiome. This microbial dysbiosis is clinically significant because certain bacteria produce β -glucuronidases, enzymes that convert irinotecan's inactive glucuronidated metabolite, ethyl-10-hydroxy-camptothecin (SN38G), back into its active form (SN38). The resulting local reactivation

contributes to mucosal injury and diarrhea, which occurs in 50–80% of patients and often necessitates dose delays, dose reductions, or hospitalization. While treatment with cytotoxic agents can induce changes in the composition, structure, and function of the gut microbiome, whether an individual's gut microbiome composition directly influences response to irinotecan treatment remains to be determined. Objective: The goal of this project is to investigate alterations in microbiome composition in colon cancer patients experiencing chemotherapy-induced gastrointestinal toxicity. Design methods: We will conduct a systematic review of mouse and human gut microbiomes profiled with 16S and shotgun metagenomic sequencing exposed to irinotecan and other cytotoxic chemotherapeutic agents. PubMed, Embase, and additional databases will be searched for relevant studies, with inclusion restricted to publications reporting original data deposited in publicly accessible repositories. Microbiome composition will be compared across available groups, such as healthy versus cancer patients and individuals with or without diarrhea, using relative abundance changes and diversity metrics (alpha and beta diversity). Conclusions: From these analyses, we aim to identify microbial signatures associated with chemotherapy-induced gastrointestinal toxicity and assess whether individual gut microbiome composition correlates with response to irinotecan, providing preliminary evidence for a potential direct influence.

Ashley Shanahan

Discipline: Biology

Authors:

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Abstract Name: Multifaceted response of microglia in a cuprizone model of demyelination

Multiple Sclerosis (MS) is an autoimmune disease, characterized by myelin loss, neuroimmune response, and neurodegeneration. The cuprizone diet model of MS causes oligodendrocyte death and myelin loss, and cuprizone withdrawal promotes oligodendrocyte regeneration and recovery. Thus, this model offers a paradigm to selectively study the neuroimmune response to demyelination and remyelination. Microglia are the primary resident immune cells of the brain, and although microglia activation is a robust response following cuprizone administration, the specific triggers of microglia activation are not well-defined. Moreover, the potential effects of cuprizone on microglia are unknown. In the current study, we characterized the temporal dynamics of microglial activation to cuprizone-induced demyelination. We administered mice with a cuprizone diet for 1, 2, or 4 weeks, or 4 weeks followed by one week on a regular chow (remyelination condition). Immunofluorescence analysis of the corpus callosum revealed a dramatic increase in microglia number and area by one week, that persisted throughout four weeks, followed by a partial reduction during remyelination. Three dimensional confocal imaging showed that activated microglia expressed the phagocytosis marker CD68 and colocalized with myelin, indicating microglial engulfment of myelin during cuprizone treatment. Next, we conducted real time qPCR in microglia-enriched samples from mice treated with cuprizone for one week. mRNA levels of *Tnf* and *Ifnb1*, genes involved in the proinflammatory cytokine response, were downregulated in the cuprizone group. This downregulation was correlated with upregulation of *Cd68* mRNA, indicating that the microglial switch to phagocytosis during cuprizone treatment is accompanied by a downregulation in inflammatory signaling. Surprisingly in the retina, which does not contain oligodendrocytes or myelin, microglia showed a suppressed phagocytic state, marked by fewer CD68 punctae. Our novel findings reveal that the microglial response during cuprizone treatment is paradoxical: a direct response to cuprizone, and an opposite and indirect response to the ongoing demyelination.

Mary Shanahan

Discipline: Communications

Authors:

#1 Molly Shanahan

Abstract Name: A media-framing comparison of reproductive rights between Peru and Colombia

This study examines how newspapers based in Peru and Colombia based frame news articles about a woman's access to abortion through narrative devices. Therefore, the proposal analyzes tone, word choice, and sentence structure to uncover how print media constructs discourse regarding reproductive rights. This project contributes and extends to current academic discourse due to the language of the articles examining the use of tone and narrative techniques. This project engages with institutional policy because this research hinges how institutions help out with laws and legality of access to abortion. The data methods will decode and deconstruct narratives and synthesize insights for each of the articles. The data collection method will employ multi-scope framing analysis, examining textual, thematic, and linguistic devices to find patterns among the articles. This research project might conclude the articles from Colombia and Peru will contrast one another in regards of tone and language to a woman's access to abortion. Ultimately, the research project contributes to how language and framing in Latin American media influences public discourse and policy.

Holly Shannon

Discipline: Geography/Geology

Authors:

#1 Benjamin Agbemor

Abstract Name: Water memories and stewardship among residents of Wisconsin

Wisconsin is a water-rich state in the US, ranking fourth nationally in total water area. Water resources have long supported recreation, economic development, and a sense of place for many generations of residents and visitors alike. However, the water resources that have become a symbol of Wisconsin's wealth and identity now appear frequently in narratives that describe a state of concern. For example, there are growing incidents of surface and groundwater contamination, as well as rising levels of neurotoxins and other carcinogenic compounds in the state's water resources. Despite these threats and changes, questions regarding how people feel about water and how these connections continue to shape sense of place, identity, and attitudes have remained largely undocumented. Studies have demonstrated that people's affective connections to nature, including blue and green spaces, influence both well-being and environmental stewardship. Building on this foundation, this research seeks to examine how place-based storytelling generates feelings of interconnection that could foster empathy and stewardship for protecting water resources. This research will adapt the "watershed storytelling" methodology for exploring people's affective ties with blue spaces. The study will examine the following questions: How do residents describe the intrinsic value of water? How do residents experience and express their attachment to water? How do memories and sensory experiences of water differ across generations? How could storytelling foster empathy and a sense of care for water? The research will adopt both purposive and snowball sampling techniques for data collection. The researchers will collect and analyze qualitative data that explores sentiments relating to sense of place, sense of responsibility, perceptions of water quality change, emotions, and the willingness to act.

Shane Shar Baloch

Discipline: Biology

Authors:

Abstract Name: Early Detection and Accurate Differentiation Between Epilepsy and Non-epileptic Mimics in Adolescents.

Early and accurate differentiation between epileptic seizures and non-epileptic mimics in adolescents is essential for preventing long-term cognitive, behavioral, and developmental complications. Because these conditions often appear similar, misdiagnosis remains common and delays appropriate treatment. This review brings together research across classification systems, genetics, molecular mechanisms, and emerging therapeutic approaches to highlight strategies that improve early detection and diagnostic precision in pediatric populations. The International League Against Epilepsy (ILAE) classification framework provides a clear structure for identifying childhood epilepsy syndromes and guides targeted genetic testing, including next-generation sequencing for disorders such as Dravet syndrome. Molecular studies further clarify the biology behind seizure activity. Research on adenosine signaling shows how genetic mutations disrupt neurochemical pathways and help explain overlaps between epilepsy and conditions such as autism spectrum disorder. Epidemiological work, including large cohort studies of drug-induced seizures, demonstrates how population-level data can uncover causal relationships while limiting bias. Genetic disorders such as tuberous sclerosis complex illustrate the value of proactive management. Early EEG monitoring paired with preventive treatment before seizures begin has been shown to delay seizure onset and reduce the risk of developing drug-resistant epilepsy. Recent studies on Glut1 deficiency syndrome also highlight the importance of distinguishing epileptic events from non-epileptic metabolic episodes. Improved metabolic testing and clearer diagnostic criteria have reduced misdiagnosis and opened the door for targeted therapies. This includes early-stage work on gene-based treatments aimed at restoring cellular energy balance and reducing seizure susceptibility, offering a potential future option for disorders rooted in metabolic dysfunction. Despite these advances, gaps remain in translating scientific insights into universally effective care. Future progress will require long-term clinical monitoring, broad genetic and biochemical profiling, and standardized intervention pathways. A multidisciplinary approach that integrates clinical, molecular, and population-based strategies will be essential to improving early diagnosis and personalized epilepsy management in adolescents.

Anya Sharma

Discipline: Health and Human Development

Authors:

#1 Jorge E Quintero

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Abstract Name: Plotting Parkinsons: Visualizing Motor and Non-Motor Symptoms on the MDS-UPDRS

Throughout the research and development of treatments for neurodegenerative disorder, like Parkinson's disease, large sets of clinical data are often being sifted through in a search for trends and improvements in patients. With a focus in Parkinson's disease and symptom progression, the International Parkinsons and Movement Disorder Society, MDS, developed a unified scale to evaluate the various aspects of Parkinson's disease. The MDS-sponsored revision of the United Parkinsons Diseases Rating Scale, the MDS-UPDRS, requires a physical exam and summarizes the characteristics of the motor and cognitive effects of daily living and motor complications. The summed totals support efficient communication between patients and doctors, but fail to accurately portray the distribution, range, and anatomical location of the various symptoms and disabilities. In depth analysis reveals a need for better paths for visualization of clinical data. To address this

issue, my team has developed multiple versions of a data figure modeled after the Vitruvian Man. In this model, the test results have been color coded and graphically distributed to show the progression of symptoms over a period of time. Furthermore, multiple trials and iterations of this model have been used in a larger clinical trial related to Deep Brain Stimulation and peripheral nerve tissue transplantation into the Substantia Nigra and Nucleus Basalis of Meynert. Ultimately, the goal is to identify innovative means to better visualize and analyze clinical data throughout neurodegenerative research.

Sumiran Sharma

Discipline: Engineering

Authors:

#1 Sumiran Sharma

Abstract Name: Colorimetric Dressing for Detection of Wound Infection

Burn injuries are highly susceptible to potential microbial invasion and subsequent infection due to the disruption of the protective skin layer and battlefield environment. Challenges such as early excision and skin grafting persist due to slow healing, infections, and burn progression which complicates the treatment process and potentially worsens the healing outcomes. The current standard of care relies first on clinical assessment of a patient's symptoms, and often antibiotics are used indiscriminately, even without confirmation of infection. This contributes to the development of antimicrobial-resistant strains of microorganisms. Infection detection involves culturing tissue samples, which is a time-consuming process. Patients managing their care at home often have reduced access to medical care and may delay seeking treatment, leaving the infection to spread rapidly. The solution to this is based on the detection of a molecule produced specifically by pathogenic bacteria. By incorporating a textile sensor window into a wound dressing, exudate absorbed by a dressing could change color if the wound is infected. The dressings consist of electrospun chitosan membranes, which are often used in regenerative applications like dressings. Chitosan is intrinsically anti-inflammatory and anti-microbial. We demonstrated feasibility by showing that small pieces of chitosan membranes with enzyme and substrate adsorbed turned from yellow to purple in the presence of *Staphylococcus aureus* and *Pseudomonas aeruginosa*, two common wound contaminants. This would provide a "window to the wound," allowing patients and clinicians to monitor the tissue status without having to remove the dressing, preventing further injury from dressing removal and reducing the risk of contamination from the environment. The research goals are to optimize fabrication, determine what concentrations of microbes can be detected, and determine how long it takes for color to develop. The next steps are to conduct preclinical evaluations to test the sensors at different concentrations and monitor response timings.

Samantha Sharp

Discipline: Political Science

Authors:

Abstract Name: The Tipping Point for Lunar Governance

As humanity prepares to return to the Moon, the greatest risk lies not in technical failure but in militarized competition: without clear governance, the race for lunar dominance could escalate into the first serious conflict in space. Traditionally, spacefaring nations have delayed rulemaking until disputes arise, but the stakes on the Moon are too high for reactive policy. Without agreed-upon guidelines, rival actors may clash over settlements, access to high-value locations, and rights to extract resources, threatening human life and

long-term stability. Using frontier case studies, ripeness theory, and international norm formation, this research addresses the critical gap in understanding when international governance becomes feasible and why timing will shape the success or failure of future cooperation. With both the U.S. and China planning sustained lunar operations, there becomes a narrow opportunity to establish governance before strategic infrastructure and resource use create irreversible first-mover advantages. The Outer Space Treaty provides a foundational framework but leaves critical gaps regarding surface use and resource extraction, exposing nations and private actors to potential disputes. Lack of wide-spread ratification of the Moon Agreement shows that overly broad or redistributive models lack political feasibility. However, narrower, targeted agreements such as the Return and Rescue Agreement and Liability Convention demonstrate that incremental, well-scoped rules can succeed. This paper explains why there must be galvanization around lunar governance now, before competition escalates into conflict. It argues the legal and political tipping point for governance will emerge in the late 2040s, when sustained operations, commercial extraction, and strategic interdependence make unregulated competition too costly to maintain. At that stage, frontier pressures will intersect with ripe conditions for negotiation, compelling actors toward international cooperation. The tipping point has not yet arrived, making early action essential. Only by establishing clear expectations now can the Moon develop through peaceful international collaboration.

Brailey Sharpe

Discipline: Computer Science

Authors:

#1 Brailey Sharpe

Abstract Name: Computational Workflows Using Molecular Dynamics Simulations and Deep Learning

Proton transfer plays a critical role in many chemical and biological systems, but its ultrafast dynamics make the underlying phenomena difficult to capture experimentally. This raises a central question: how can computational workflows be constructed to accurately capture molecular behavior relevant to proton transport in supercooled water–glycerol environments, where hydrogen-bond disruption shapes diffusion pathways? To address this, the project focuses on the computational design, validation, and optimization of molecular dynamics (MD) simulations capable of generating high-resolution datasets suitable for downstream machine learning tasks. MD protocols are developed in GROMACS with systematic consideration of factors such as force-field selection, numerical stability at low temperatures, trajectory-sampling efficiency, and system-scaling strategies that preserve structural heterogeneity near the glass transition. Together, these simulation choices aim to capture the disruptive hydrogen-bond behavior observed in spectroscopy experiments and remain computationally tractable for large-scale data generation. Validated MD trajectories then function as structured datasets for neural network models that analyze spatial organization and time-dependent behavior in molecular configurations. Integrating simulation output with machine-learning pipelines provides a basis for identifying patterns and structural relationships that are challenging to resolve experimentally or through MD alone. The resulting workflow, spanning simulation design, data preprocessing, and neural modeling, demonstrates how computational methods can extend physical inquiry by transforming complex molecular motion into analyzable data. Building on this foundation, the project focuses on identifying structural features relevant to proton-associated dynamics and on improving machine-learning representations as additional simulation data becomes available. The immediate goal is to refine the integration of MD output with AI-assisted analysis in a way that remains reliable under low-temperature conditions. These developments will be presented in the context of current efforts to combine high-performance simulation with data-driven modeling in computational science.

Samuel Shaw

Discipline: Economics

Authors:

Abstract Name: Economic Impact of the Great Lakes Aquarium

Located on the shores of Lake Superior in Duluth, Minnesota, the Great Lakes Aquarium is a key cultural and educational institution dedicated to showcasing the unique ecosystems of the Great Lakes region and beyond. The spending of nearly 200,000 out of town visitors each year drawn to the region by the Great Lakes Aquarium, as well as the aquarium's spending for its own operations, results in a substantial economic impact on the City of Duluth. This study seeks to quantify that impact using regional input-output modeling, mobile analytics data, and a visitor spending profile developed using prior data. Unlike traditional economic impact studies, this research incorporates mobile analytics data to validate visitor attendance, measure dwell time, and identify common visitor patterns, such as frequenting nearby leisure and dining establishments post-visit. Furthermore, a detailed visitor spending profile was developed using prior assumptions and existing data rather than costly and time-intensive intercept surveys. Results of this study indicate that the Great Lakes Aquarium contributes nearly \$43 million in output to the city in a typical year, along with supporting 387 jobs in the local economy.

Brityn Shaw

Discipline: Gender, Ethnicity, Diversity, or Cultural Studies

Authors:

#1 Mariko Yamada

Abstract Name: The Death of Free Art by the Hands of a Dancer

Although dance has been intertwined with culture for centuries, the question still stands for what makes one style more cultural than another, and how that has impacted society's view of dance. In this paper presentation, I dissect two examples observing the portrayal of characters and "ideals vs taboos." I will consider the complicated relationship between class and art that could lead to the death of free art. The history and representation of ballet envelop itself in suggestive content to present it as a higher art form void of culture, completely ignoring its roots ridden in western heritage. With that, an inherent separation has been created by Euro-American anthropologists placing a "we" vs "they" dynamic against cultures foreign to them. Along with the language, there is a discrepancy in defining cultural dance, where the connection arises in the primitive vs civilized archetypes. As we traverse beyond the anchors holding us to our past, many dance forms may be slowly becoming a distant memory to what our ancestors practiced. We must focus on educating the youth about the true meanings within the now hollowed walls of dance to prevent that from happening. Every dancer is as much a product of their past as they are a reflection of their times. Analyzing multiple sources, I argue my stance against the usage of the words "primitive" and "ethnic" in the dance world, along with the growing exclusivity of dance as the luxury of enjoyment that people can buy their way through an artificial art form.

Maryam Shaw

Discipline: Nursing and Public Health

Authors:

#1 Amber Paulus
#2 Eric Johnson
#3 Jason Kidd

Abstract Name: Mapping the Intersection of Clinical and Social Risk Factors for Kidney Disease: A Geospatial Analysis to Inform Community-Based Screening

Chronic kidney disease (CKD) disproportionately affects socially disadvantaged communities both globally and in the US. While chronic comorbidities including hypertension, diabetes, and obesity are known to lead to CKD, their intersection with social determinants of health (SDOH) like poverty, housing, transport, language, and the legacy of historic disinvestment, remains under-mapped for planning equitable prevention and screening. We integrated county-level estimates of cardiometabolic risk derived from CDC PLACES, social vulnerability derived from CDC/ATSDR SVI, and end-stage renal disease (ESRD) burden to visualize where clinical and social risks for chronic kidney disease (CKD) co-occur. We built a composite CKD risk score from age-adjusted hypertension, diabetes, and obesity, examined treatment coverage via BP-medication use, overlaid Social Vulnerability Index (SVI), and displayed ESRD burden. We then created two rule-based “hotspot” screens: (1) High CKD risk + high SVI + ESRD present and (2) Low CKD risk + high SVI (prevention targets). Maps revealed a broad high-risk corridor across the Southeast/Appalachia and Gulf Coast, distinct pockets of high hypertension with comparatively lower medication uptake, and clusters where high social vulnerability precedes clinical risk. These outputs nominate concrete counties for community screening and prevention initiatives and provide an adaptable framework for health-equity planning.

Julia Shawn

Discipline: Exercise Science and Nutrition

Authors:
#1 Kevin Fink

Abstract Name: Walk, Learn, Achieve the Study in Motion

Regular physical activity is widely recognized for its positive impact on health and performance, yet fewer than half of college students meet recommended activity levels. Since college represents a pivotal period for establishing lifelong habits, integrating sustainable movement strategies into academic environments may offer meaningful benefits for students’ long-term well-being. Current public health guidelines emphasize the importance of moderate to vigorous aerobic activity each week, but many students struggle to meet these targets due to academic demands, limited time, or lack of accessible equipment. Introducing familiar, low-barrier options such as compact treadmill desks in study spaces may help bridge this gap by allowing students to engage in light physical activity without interrupting their academic workflow. Walking requires minimal effort, reduces intimidation compared to more complex equipment, and can be seamlessly incorporated into study routines. The advantages of physical activity extend beyond physical health, positively influencing cognitive functioning, mental well-being, and academic performance. Movement has been shown to enhance executive functioning, attention, memory, and processing speed, both immediately and over longer periods. These cognitive benefits, paired with improved stress management and reduced depressive symptoms, suggest that even modest increases in activity can support students’ resilience and academic success. Promoting exercise in accessible formats may therefore contribute simultaneously to health and performance outcomes. This project expands on earlier research by increasing participant numbers and simplifying data collection to improve the validity and generalizability of findings. By examining how treadmill desk use affects academic outcomes, cognitive performance, and overall well-being, the study aims to highlight the value of incorporating movement into traditionally sedentary environments. Ultimately, this work seeks to demonstrate how shared treadmill desks can foster healthier study habits and contribute to a more supportive and productive campus community.

Valerie Shcherbakova

Discipline: Health and Human Development

Authors:

#1 Jeremy Via
#2 Leila Griffin
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Abstract Name: IMPACT OF RESILIENCE AND PERCEIVED DISCRIMINATION ON BLOOD PRESSURE IN EMERGING BLACK ADULTS

BACKGROUND: Black adults experience the greatest prevalence of cardiovascular disease (CVD) risk of any racial or ethnic group in the United States. Racial discrimination is associated with elevated ambulatory blood pressure (ABP) and may exert a weathering effect that contributes to health disparities. While psychological stress resilience may mitigate CVD risk, limited research has examined its influence on perceived racial discrimination and ABP components, particularly nocturnal dipping and morning surge in young Black adults. **METHODS:** Black adults aged 18-29 (n=38, 47% female) completed 24-hour ABP monitoring, with readings taken every 20 minutes during waking hours and every 30 minutes during sleep. Nocturnal dipping was calculated as the ratio of average sleep to wake systolic and diastolic pressure. Morning surge was quantified using morning sleep trough, pre-awakening, and rising morning surge values for systolic and diastolic pressure. Participants completed a Brief Resilience Survey and a questionnaire assessing personal-level discrimination. Median splits categorized participants into low versus high discrimination and resilience groups. Independent t-tests assessed differences in discrimination groups and further stratified resilience groups. **RESULTS:** Among participants with low resilience, low personal-level discrimination resulted in significantly higher sleep trough morning diastolic surge (17.61 ± 4.43 vs. 8.13 ± 7.33 mmHg, $p=0.016$) and pre-awakening morning diastolic surge (11.50 ± 5.17 vs. 3.75 ± 4.68 mmHg, $p=0.013$), when compared to those with high personal-level discrimination. This finding was not observed in participants with high resilience. Only participants who exhibited low resilience and high personal-level discrimination were considered non-dippers ($<10\%$ systolic dipping percentage). **CONCLUSION:** Young Black adults reporting low resilience and high personal-level discrimination demonstrated attenuated morning surge alongside non-dipping nighttime patterns, which may represent an important early marker of elevated CVD risk. Future research should explore interventions aimed at enhancing resilience, including positive health behaviors such as regular exercise.

Amaia Shedd

Discipline: English and Literature

Authors:

Abstract Name: Public Recognition of Female Track Athletes in the U.S.

Discrimination and inequality in sports towards women is a topic that is gradually gaining acknowledgment. Women are portrayed in the media differently than men and presented differently than their male counterparts. Until recently, women were rarely featured in athletic commercials, often seen in advertisements promoting food products or household items. Even when women are shown in sports media, they are frequently positioned alongside men, which leads to them being overshadowed. This misrepresentation projects harmful stereotypes and discredits the significant achievements of female athletes. This research explores the extent to which market representation and personal branding influence public recognition of female track athletes in the U.S. As a part of this research, I pose the following research questions: To what extent does market representation affect public recognition of female track and field athletes in the U.S.? To what extent does personal branding affect public recognition of female track and field athletes in the U.S.? By examining media portrayals, endorsement opportunities, and public perceptions, this study will contribute to a wider understanding of gender-based inequalities in sports. This research uses surveys and interviews as combined methods to examine the factors influencing public recognition of female track athletes. Surveys will gather quantifiable data from large, diverse populations to assess how market representation affects public recognition and identify broad trends. Interviews will provide in-depth qualitative insights into how personal branding strategies, social media presence, and individual athlete choice impact visibility and fan engagement. The findings may enhance women's agency in athletic spheres and encourage media organizations to adopt more equitable representation practices. This research expects to reveal significant disparities in media coverage and demonstrate that athletes with stronger personal branding will achieve greater public recognition despite their limited marketing representation.

Haley Sheffield

Discipline: Political Science

Authors:

Abstract Name: Voting Turnout Due to Felony Disenfranchisement

In the United States today, there are around 4.4 million Americans who are barred from voting due to felony convictions, due to various disenfranchisement laws and policies. My study will examine the impact of laws and policies that restrict ex-felons' voting rights on overall voter turnout rates in the United States from 2000-2004. My hypothesis is that laws restricting the voting rights of ex-felons affect overall voter turnout in a negative way compared to people without felony convictions. These restrictions negatively affect not only voter turnout but also the individuals who have had their rights stripped. By having policies set up for convicted felons, the inability to vote, you can see a drastic change in voter participation compared to those who have no criminal record. To explore this relationship, I used a quantitative research approach by using data from the voting census bureau and voter turnout data, then compared the population of those without the right to vote. I also analyzed the different policies and laws between various dates to see the difference in voter participation across America. I found that 5-27% of ex-felons participated in the voting process; however, after states enacted restoration processes, this percentage increased to 20-55%. My findings indicate that when ex-felons have access to automatic restoration, voter turnout increases in the political process. With this, if all states allowed automatic restoration for ex-felons, voting turnout would significantly increase.

Haleigh Shelton

Discipline: Architecture, Construction Management, and Interior Design

Authors:

#1 Haleigh Shelton

Abstract Name: Beyond Game Day: A Case Study on Event Based Architecture in Campus Design

This research explores how Event-Based Architecture (EBA) principles can be applied to permanent and temporary architecture, campus planning, and event operations within a campus environment. It examines how EBA strategies, event accreditation, operations, overlay design, and adaptability, inform the integration of temporary structures with existing campus buildings and spaces to craft innovative and effective events. Through this framework, the study advances the understanding of environmental design strategies and the dynamic relationships between people, place, and space. EBA represents a “specialized discipline in which architects leverage expertise in venue and event design to influence both the planning and execution of live events as well as the conception of future facilities. The foundational EBA principles established by event design firms include event accreditation, which manages access and branding; overlay design, which adapts permanent architecture through temporary structures and signage; and operations, which ensures coordinated event execution” (Populous, 2020). Utilizing Louisiana State University as a case study, phase I employed a qualitative approach, exploring Southeastern Conference arenas and Olympic stadiums, observing live events, and interviewing stakeholders at EBA design firms, to apply the EBA principles to the permanent sports architecture campus masterplan. This research further applies adaptability as a key principle to reimagine how temporary architecture enhances event design. Adaptability provides the capacity to craft event programming to bring versatility to university sports architecture and its surrounding landscape through spatial, site, community and cultural analysis, generating economic, educational, and cultural value for all stakeholders that can be integrated in campus design.

Charles Sheppard

Discipline: Chemistry

Authors:

#1 Charles Sheppard

#2 Michael Leopold

Abstract Name: An Amperometric Sensor with Anti-Fouling Properties for Indicating Xylazine Adulterant in Beverages

Amperometric electrochemical sensing schemes, which are easily fabricated and can directly relate measured current with analyte concentrations, remain a promising strategy for the development of the portable, in situ detection of commonly employed adulterants. Xylazine (XYL) is a non-narcotic compound designed for veterinary use as a sedative known as Rompun®. XYL is increasingly being abused as a recreational drug, as an opioid adulterant and, because of its chemical properties, has found unfortunate prominence as a date rape drug spiked into beverages. In this study, a systematic exploration and development of fouling-resistant, amperometric XYL sensors is presented. The sensing strategy features layer-by-layer (LBL) modification of glassy carbon electrodes (GCEs) with carbon nanotubes (CNTs) for sensitivity and the engagement of cyclodextrin host-guest chemistry in conjunction with polyurethane (PU) semi-permeable membranes for selectivity. The optimization of different materials and parameters during development created a greater fundamental understanding of the interfacial electrochemistry, allowing for a more informed subsequent design of effective sensors exhibiting XYL selectivity, effective sensitivity, rapid response times (<20 s), and low estimated limits of detection (~ 1 ppm). Most importantly, the demonstrated XYL sensors are versatile and robust, easily fabricated from common materials, and can effectively detect XYL at >10 ppm in both common alcoholic and non-alcoholic beverages, requiring only minimal volume ($20\ \mu\text{L}$) of the spiked beverage for a standard addition analysis.

Binazir Sherbekova

Discipline: Economics

Authors:

#1 binazir sherbekova

#2 Joshua Bedi

Abstract Name: The Impact of Natural Resource Dependency on Economic Growth of Central Asian Countries

This paper examines impact of natural resource dependence on the economic development in Central Asian countries: Kazakhstan, Kyrgyzstan, Uzbekistan, Turkmenistan, and Tajikistan. The economies of these countries are overly dependent on oil, gas, gold, and cotton, which creates both opportunities and threats. For example, oil rents in Kazakhstan exceeded 20% of GDP and 60% of exports, which shows its exposure to the impact of world oil prices. Kyrgyzstan is dependent on gold mining at the Kumtor mine, hydropower, and remittances, and GDP growth increased from -7.2% in 2020 to +9.0% in 2022. Turkmenistan, where gas exports account for the majority of government revenues, remains vulnerable due to weak diversification. Uzbekistan, a major exporter of cotton and natural gas, has recently embarked on reforms that have allowed for growth of more than 5% in recent years. Tajikistan, which has fewer resources, depends on remittances, which account for more than 30% of GDP. The paper concludes that weak institutions like corruption, excessive government control, and lack of transparency limit the benefits of resource wealth. A comparison with Norway shows that dependence on resources does not automatically lead to a "resource curse." Norway directs oil revenues to a sovereign wealth fund, has an accountable government and a low level of corruption, which turns wealth in natural resources into stability. This shows that the real difference lies in the quality of institutions. The conclusion is that Central Asian countries should strengthen their institutions if they want to transition from resource dependence to economic growth.

Keri Sherer

Discipline: Biology

Authors:

#1 Keri Sherer

#2 Kristen Curran

Abstract Name: Evaluating the effect of bmal1 knockout on rev-erb α expression in activin induced *Xenopus laevis* animal cap ectoderm.

Circadian rhythm is a phenomenon, such as sleep-wake, that oscillates over a 24 hour period. A molecular timekeeper is present in virtually all adult cells which involves a transcriptional/translational feedback loop (TTFL). Two components of the TTFL are Bmal1 and Rev-erb α . In the model organism *Xenopus laevis*, pluripotent animal caps (ACs) can be directed to become any cell type. This allows us to study the roles of clock-controlled genes during specification of cell fate. We hypothesize that Bmal1 and Rev-erb α regulate a shift in metabolism necessary for mesoderm specification. My experiment involves knocking out bmal1 in one cell embryos using CRISPR-Cas9, isolating and inducing ACs to form dorsal mesoderm (50ng/ml activin), and evaluating the effects on rev-erb α expression using qPCR. First, we isolated RNA from 12-24 hour old embryos, reverse-transcribed RNA into cDNA, and confirmed rev-erb α efficiency by passing a standard curve. Next, we compared bmal1 and rev-erb α expression in animal caps 0, 3, and 6 hours after activin induction. The next step is to analyze rev-erb α expression after bmal1 knockout. We expect that bmal1 knockout will decrease rev-erb α expression. The significance of this experiment is that we already know that Bmal1 transcribes rev-erb α in adults, but do not know if this relationship occurs during mesoderm specification in embryos.

Zakaria Sherif

Discipline: Computer Science

Authors:

#1 Herman Ray

#2 Joseph White

#3 Jonathan Boardman

Abstract Name: Comparative Analysis of Monotonically Enforced Univariate Binning Strategies in Classification Using Logistic Regression

Logistic regression, a workhorse for applications like credit scoring models, fundamentally assumes a linear relationship between continuous predictors and log-odds. This assumption often fails in practice, as risk patterns are typically non-linear. Discretization (binning) is a critical preprocessing step that allows logistic regression to capture these complex trends, significantly improving model performance. Yet, "the" optimal binning strategy is not well-established. This study addresses this gap by comparing ten monotonically enforced univariate binning strategies to evaluate their impact on logistic regression model performance and stability in risk assessment. Ten binning algorithms, including Equal Frequency, Decision Tree, ChiMerge, Isotonic Regression, and several hybrid methods, were evaluated. Each was used to discretize predictor variables for a logistic regression model. Performance was assessed using bootstrapped 95% confidence intervals derived from 1000 replicates for the Area Under the Receiver Operating Characteristic Curve (AUROC) and the Kolmogorov-Smirnov (KS) statistic. All strategies produced high-performing models, with AUROC values ranging from 0.8745 to 0.8850. The hybrid EqualFreqChi method achieved the highest mean AUROC (0.8850, CI: 0.8809-0.8887), with ChiMerge (0.8842, CI: 0.8793-0.8889), and DecisionTree (0.8832, CI: 0.8786-0.8876), also performing well. For class separation, DecisionTree (KS: 0.6136, CI: 0.6022-0.6248), and IsotonicRegression (KS: 0.6135, CI: 0.6013-0.6246), were the top performers, while the baseline Equal Frequency method was consistently among the lowest. Although performance differences were marginal in this particular use case, supervised methods like ChiMerge and Decision Tree-based binning offer an advantage over simpler techniques. The strong performance of the hybrid EqualFreqChi method also highlights the value of combining strategies. Since predictive power is comparable across the top methods, the optimal approach depends on the analytical goal. For instance, goals may include computational efficiency, where a less intensive method such as EqualFreqChi could be favored over a more complex one, without a significant trade-off in performance.

Gabriella Sherry

Discipline: History

Authors:

Abstract Name: Remembering Muhammad Ali: How ESPN Reports Following Ali's Death Have Shaped His Legacy

Muhammad Ali is widely praised as one of the greatest boxers of all times, but he fought in more places than the boxing ring. He advocated for Americans' most basic freedoms and used the principles of his Muslim faith to do so. Ali's membership in the Nation of Islam in the 1960s and 1970s empowered him to become an activist in the Black freedom struggle. Historians have investigated the intersections of Ali's racial and religious identities in relation to his social justice activism, offering compelling evidence that Ali's decision to

join the Nation of Islam in 1964 directly inspired him to act as a leader in the civil rights movement. My research explores the extent to which popular, contemporary media outlets, specifically ESPN, connect Ali's religion to his role in the rights revolution of the 1960s. Based upon my examination of ESPN articles following Ali's death in 2016, my project argues that the journalists continually failed to correlate Ali's membership in the Nation of Islam to his role as a civil rights activist. The erasure of Ali's Muslim identity from collective memory and his legacy is part of a greater challenge America continues to face—accepting, celebrating, and remembering marginalized identities. By understanding the complexity of Ali's intersecting identities, we can model the resistance and resilience necessary for meaningful social change.

Nadine Shetiah

Discipline: Psychology

Authors:

#1 Nadine Shetiah

Abstract Name: Biological Pathways and Sensory Meaning in Autism: A Cross-Level Synthesis

This medical humanities project examines how autism is represented across scientific, clinical, and lived-experience perspectives, focusing on sensory and developmental models. Both social and biological research confirm that autism cannot be reduced to a single concept. Autistic people describe their experiences in terms of perception, sensory intensity, and adaptive regulation, rather than deficits as described in diagnostic manuals. Biological models emphasize mechanisms like sensory processing, neural circuits, and genetic pathways. Social models emphasize development, interaction, and environment. This project compares, integrates, and synthesizes how diverse fields and actors – especially autistic people themselves – define and describe a key autistic trait: neurodivergent sensory perception. It begins with a scoping review of current literature, including biological and social models and theories of autism. The literature review examines animal behavior paradigms used to operationalize autistic sensory perception, such as valproic acid rat models and FMR1 and Shank3 knockout mice. This review also analyzes social science theories of autism and studies of autistic people's perspectives. Expected results are that biological and animal models often describe certain behaviors as markers of autism or dysfunction, confirming an accurate animal model, whereas autistic people often attribute similar behaviors as forms of sensory regulation and adaptation. Biological findings prioritize important measurable outputs. Lived perspectives emphasize context, function, and internal experience. The overlap of these findings can suggest that autism cannot be defined by one single explanation. It will highlight where and how animal models of autism fall short of being useful for understanding lived experience, and if and how published animal model research considers lived experience perspectives. This cross-level synthesis offers guidance for improving the design of behavioral assays, interpreting animal findings, and developing clinical approaches that align more closely with autistic perspectives and take a non-deficit approach.

Dhruv Shevade

Discipline: Engineering

Authors:

Abstract Name: Will AI Replace Civil Engineers? An Undergraduate Investigation of Emerging Roles, Applications, and Expert Perspectives

My research began with a question that's increasingly relevant across engineering fields: Will AI replace civil

engineers, and how is AI currently being used in the profession? To explore this topic, I conducted a multimethod study that included a thematic review of 31 peer-reviewed papers and a survey of six academic and industry professionals with 2.5 to 25 years of experience in geotechnical, structural, and water resources engineering. Analyzing the papers revealed three major themes shaping current AI applications: AI-driven inspection of data acquired using drones and multimodal sensors for faster and safer bridge and road inspections, including automated defect diagnosis through computer vision; emerging machine learning models for predicting defect progression; and AI-supported maintenance planning using reinforcement learning and decision frameworks. The survey results reinforced these findings, with professionals reporting the use of AI for multi-domain information exploration, reducing research time, and presenting results in flexible formats. They emphasized challenges such as information bottlenecks, the need for complete datasets, and had concerns about data quality and AI's interpretability. Respondents also noted persistent, non-technical challenges in civil engineering that AI cannot solve. An example like managing expectations across stakeholders highlights the critical importance of human judgment and communication. My preliminary findings show that while AI can automate repetitive or hazardous tasks and enhance analytical workflows, experts consistently view it as a tool that augments rather than replaces civil engineers. I am now working with a faculty mentor to formally collect additional data and refine my thematic framework on a larger scale. Through this project, I've come to understand AI as a powerful collaborator that, when used responsibly with human expertise, can strengthen sustainability, resilience, and innovation across the built environment.

Katherine Shiells

Discipline: Psychology

Authors:

#1 Katherine Shiells

Abstract Name: Obstructive Sleep Apnea and Panic Disorder: A Critical Review of the Bidirectional Comorbidity

Obstructive Sleep Apnea (OSA) has a population prevalence of 2-4%, and is a sleep disorder that includes repetitive interruptions in breathing during sleep. Symptoms include sudden awakening, increased sympathetic arousal, sleep fragmentation, and daytime sleepiness, and are connected to the future development of significant health disorders. Panic Disorder (PD) is an anxiety disorder that includes symptoms of intense fear, increased heart rate, elevated blood pressure, and decreased quality of life. 18% of panic attacks occur from a sleeping state, and so, the comorbidity of obstructive sleep apnea and panic disorder is extremely significant in effective clinical treatment of patients. Panic attacks and OSA events can also occur in similar sleep stages (non-REM) with shared symptoms of shortness of breath and sudden awakenings. This paper aims to examine the bidirectional relationship between obstructive sleep apnea and panic disorder in the population and analyze the current, yet limited, literature on the subject. Twelve empirical studies were selected for this review, using the keywords: Sleep apnea or obstructive sleep apnea or apnea; panic disorder or panic or nocturnal anxiety. The studies determined that individuals with both OSA and PD presented with increased respiratory irregularities, which worsened individuals' sleep quality, arousal levels, somatic symptoms, and anxiety. Future longitudinal studies should aim to increase sample sizes, as diagnostic and treatment technology is now allowing a deeper analysis of the comorbidities that these two conditions are associated with. Increased awareness of OSA-PD comorbidity is essential for timely and accurate diagnosis. Increased awareness in research and clinical practice of the bidirectional relationship between OSA and PD is essential to emphasize how both conditions exacerbate each other's symptoms through shared physiological, neurological, and psychological mechanisms. An integrated clinical approach that considers both sleep and mental health may offer significant improvements in patient outcomes and quality of life.

Zanghyeoun Shim

Discipline: Engineering

Authors:

#1 Eric Bogatin

Abstract Name: Resistance Characterization of PCB Traces and Vias for Improved Reliability in Modern Electronics

Printed circuit boards (PCBs) form the foundation of nearly all modern electronic devices, and their electrical performance is strongly influenced by the quality and uniformity of the copper features built into the board. These include surface traces that carry signals and power, as well as copper-plated vias that connect internal layers. Although these structures appear simple, small variations introduced during fabrication can meaningfully affect current flow, signal quality, and system reliability. In this project, I measured the electrical resistance of PCB traces and vias using precise four-wire measurement. This method eliminates the influence of lead and contact resistance, allowing for highly accurate evaluation of the copper itself. I also used best measurement practices to minimize measurement variation. By fitting the trace data to geometric resistance models, I extracted the sheet resistance and the etch-back introduced during manufacturing. The results show that trace variation is small and predictable, indicating that the trace fabrication process is highly reproducible across the lot. In contrast, the measured via resistances were significantly higher than the predictions—often by 20 to 90 percent, far beyond the measurement uncertainty. This demonstrates that via variation is large and not captured by simple geometric models. The discrepancy suggests that via plating is a major source of electrical variability and may vary substantially from board to board, even within the same manufacturing lot. The results not only provide practical guidelines for evaluating interconnect resistance in PCBs but also offer a foundation for improved modeling of signal integrity, thermal management, and reliability in high-performance boards. Therefore, this study provides valuable insights that can contribute to enhancing the overall quality and reliability of various modern electronic devices.

Demetrius Shine

Discipline: Physics and Astronomy

Authors:

#1 Demetrius Shine

#2 Robert Price

Robert Price

Abstract Name: Quantifying The Coandă Effect: Measuring how Airfoil Curvature Influences Lift

This project examines how airfoil surface curvature impacts airflow attachment and lift generation through the Coandă effect. Five 3D-printed NACA airfoils with camber values ranging from 0% to 9% were tested in an industrial wind tunnel at velocities of 5–20 m/s. Pressure sensors placed along each surface recorded changes in pressure distribution and lift. Airfoils with moderate camber displayed stronger attachment and a measurable increase in lift coefficient compared to lower curvature profiles. Higher curvature designs showed early separation, leading to a rise in drag. Smaller scale smoke visualization validated these results by generating longer attached flow regions for optimally curved surfaces. These results provide quantitative evidence connecting curvature to Coandă-driven lift enhancement and give insight into efficient flow control strategies that are relevant to optimal airfoil and UAV design. Limitations include minor turbulence fluctuations, which will be addressed in future testing.

Avery Shipp

Discipline: Anthropology and Archaeology

Authors:

Abstract Name: Understanding the Everyday: Investigating ancient Maya society in the city of Dos Hombres through household archaeology

The perspective of micro-scale social analysis in the archaeology of the ancient Maya presents the opportunity for a critical, detailed understanding of ancient households as a means for uncovering more about the everyday lives of those who lived there. Numerous household investigations have been conducted in northwestern Belize, with important findings occurring at the site of Dos Hombres. This research contributes to these previous findings, investigating the social, economic, and ritual activities that link a courtyard, Courtyard A-4 located directly adjacent to the large plaza, to the larger polity of Dos Hombres. Previous research in the courtyard household group revealed architecture in the southern courtyard boundary and locations of likely refuse disposal. While previous research has been conducted within Courtyard A-4, the largest and easternmost structure in the courtyard had remained unexcavated. The excavation of this household structure was necessary to create a holistic picture of the people who lived in the courtyard and their relation to the larger Dos Hombres polity during the Terminal Classical (CE 700-900). This study presents the results of a 1x3 m unit excavated on the eastern side of Structure A-29 in context with the previous findings to create a comprehensive picture of everyday life at this household located adjacent to Dos Hombres. The research presented reveals much about the daily activity of the inhabitants, including ritual domestic activities at the site, indicating that those who lived here likely practiced ancestor veneration and may have held an important role within the Dos Hombres polity.

Alexander Shipp

Discipline: Biology

Authors:

#1 Destini Thornton

#2 Zarna Raichura

#3 Satyanarayana Pondugula

#4 Angela Calderón

Abstract Name: Evaluation of CYP3A4 Induction from Kratom — HIV Antiretroviral Drug Interaction using Quantitative PCR

Kratom, *Mitragyna speciosa* Korth, a tropical tree native to Southeast Asia, gained popularity in the United States for its psychoactive properties and potential therapeutic benefits. However, the use of kratom with antiretroviral (ART) drugs for HIV treatment raises concerns about potential pharmacokinetic interactions. Kratom contains mitragynine, the major bioactive alkaloid, which can interfere with drug metabolism in hepatocytes. Hepatocytes are the chief functional cells of the liver and are responsible for completing metabolic functions and they deliver more clinically translational data in terms of measuring CYP enzyme activity. Previously, the experimental design was developed and control parameters were optimized. Hepatocytes were cultured using various media and overlays, allowing for the most reproducible hepatocyte environment in control parameters. As sandwich-culture hepatocytes are more physiologically relevant, we focused on determining the best overlay to use for our experiment. In this project, we will implement the optimized experimental design by using human hepatocytes in a sandwich culture as a model to assess whether kratom extract and mitragynine induce CYP3A4 expression and how they interact with commonly prescribed HIV ART drugs. For induction assessment, the hepatocytes were plated in the optimized sandwich

culture and kratom, HIV ART drug, or a combination of both was administered for a 48-hour treatment period. mRNA was extracted and isolated from the hepatocytes for qPCR analysis to determine the cycle quantification (Cq) of each treatment. Using the $\Delta\Delta C_t$ method, we analyzed the relative expression of CYP3A4 and determined statistical significance via one-way ANOVA. FDA guidelines indicate that an increase of 2 or greater in mRNA expression is defined as induction. First trial results revealed that high concentrations of kratom extract and mitragynine induce CYP3A4. In summary, we analyzed CYP3A4 induction effects between Kratom and HIV ART drugs in human primary hepatocyte cultures.

Avery Shippen

Discipline: Education

Authors:

Abstract Name: Breaking the Sound Barrier: How Verbal Participation Shapes International Student Integration in the Carter School

International students play an integral role in U.S. higher education by strengthening campus diversity, developing intercultural learning opportunities, and boosting the national economy. While universities work to recruit international students, many of their programs rely on learning approaches that overlook the challenges faced by students from non-participatory educational institutions. This study investigates how international students' propensity for oral engagement influences their ability to integrate into participatory pedagogy, specifically within the Jimmy and Rosalynn Carter School for Peace and Conflict Resolution at George Mason University. Existing literature shows two contrasting perspectives: one that emphasizes oral participation when used as a metric for academic success leads to inequities, and the other that proposes oral engagement strengthens intercultural competencies and social integration, allowing for academic acculturation. A survey was administered to international Carter School students at all degree levels to collect information on their oral engagement abilities, prior educational experiences, and perceptions of how the pedagogy of the Carter School impacts integration. Preliminary findings suggest a linkage between international students' oral engagement and their integration, with certain themes playing a more significant role. Students' prior educational experiences, especially those with early exposure to authority-based teaching, had lower confidence in oral communication than those from a discussion-based background who had inherent familiarity with oral participation as a means of social integration. Participation choices were dependent on TESOL-based educational backgrounds' focus on content comprehension and personal development, which led to topic understanding and personal confidence being key factors for engagement. Students unanimously perceived the Carter School as a positive environment that allowed for language fluency, peer connection, and strengthened comprehension. This suggests that universities with large populations of international students will benefit from a participatory pedagogy, as it works to allow better integration into the school system, leading to a more connected student body.

Madeline Shirk

Discipline: Political Science

Authors:

- #1 Madeline Shirk
- #2 Emma Smith
- #3 Brent Krueger
- #4 Aaron Best
- #5 Virginia Beard

Abstract Name: Drinking Water Quality and Accessibility in Zambia

Poetice is a non-profit organization based in Choma, Zambia. Poetice staff work closely with two communities within the city of Choma - Kabanana and Mwapona - where they are involved in interventions to improve drinking water quality and access. The Global Water Research Institute (GWRI) worked with Poetice to evaluate water access and quality across existing water sources, with a goal of identifying potential improvements brought about by boreholes Poetice recently installed. Poetice and GWRI designed and trained staff on household surveys, which gathered information about household demographics, water collection and usage, cost, health, economic factors, and security. We also collected 59 water samples from three different site-types - shallow wells, taps and boreholes. The samples were tested for metal and VOC contaminants, E. coli, and total coliforms. In Mwapona, forty-two percent of the sampled sites had E.coli present and eighty-eight percent had total coliforms present. Seventy-five percent of the sampled sites were free from detectable metal and VOC contaminants. These results equip Poetice to communicate effectively with community members about the safest water sources to use. This research was supported by the Global Water Research Institute, Sawyer Foundation, Schaap Endowed Fund for Undergraduate Research, and the Hope College Biology and Chemistry Departments.

Matthew Shirley

Discipline: Computer Science

Authors:

Abstract Name: Robotic Autonomous Navigation with Critical Visual Inspection

Autonomous navigation with seamless data collection becomes essential for overcoming potential hazards in a critical rescue mission. This project creates and tests the limits of a robotic system that analyzes the surroundings of an object of interest in real-time by analyzing streamed video data. Various navigation and artificial intelligence (AI)-based image detection algorithms have been developed; however, there is a need to analyze the challenges and constraints that occur when combining them on a physical system. This project utilizes a Scout Mini rover equipped with a lidar and camera, making it capable of autonomous navigation and data collection. The rover navigates through a known generated map to a given destination, and if an object of interest is detected in real time, a data collection procedure will occur. This procedure involves capturing a frame of lidar data, saving coordinates, and streaming camera data wirelessly. The transferred data is processed on a server frame by frame through a convolutional neural network (CNN) to classify objects that the algorithm is trained to detect. To test the reliability of the CNN on the server to detect surrounding objects, streamed frames were saved and analyzed at different confidence thresholds such as 80%. Images captured from the robot are noisy due to a combination of the movement of the robot and specifications of the camera. Therefore, utilizing a pretrained general purpose model, Faster R-CNN, objects were only detected at low confidence thresholds and misclassified due to poor quality of captured images. In conclusion, to increase the accuracy of object detection on moving autonomous vehicles with low specification cameras, either a domain specific CNN needs to be trained, or an algorithm that uses AI based super-resolution or deblurring techniques should be explored to increase the accuracy of object detection.

Soham Shirolkar

Discipline: Engineering

Authors:

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Abdul-Malik Zekri

Abstract Name: An Interactive, Scalable Platform for Automated Neuron Segmentation and Proofreading in Connectomics

Nanoscale connectomics, the mapping of neural wiring at the synapse-level resolution in volumetric electron microscopy (EM) data, has already delivered complete synaptic wiring diagrams of entire microcircuits and small nervous systems that have enabled direct tests of circuit organization and computation. As the connectomics pipeline becomes more efficient, it now promises to scale to whole-brain reconstruction in larger organisms. Currently, the rate-limiting steps are segmentation and human proofreading, so realizing the full potential of advances will require that solutions to these bottlenecks be made accessible and scalable across laboratories of all sizes. Recent advances in segmentation have enabled large-scale automated neuron reconstruction. However, state-of-the-art automated segmentation can be prohibitive for smaller labs and those without extensive computing resources. Moreover, these reconstructions still require extensive human proofreading to correct residual errors and ensure circuit-level accuracy. To address these challenges, we present an automated and interactive neuron segmentation platform using Napari that integrates segmentation foundation models with a structured data-management pipeline optimized for large-scale volumetric image data. At the core of the platform is a prompt-based, human-in-the-loop segmentation workflow that enables users to iteratively guide and refine automated reconstructions with real-time feedback. This tight integration of automated inference with user correction enables rapid validation and correction of segmentation errors, leveraging automated segmentation to reduce the proofreading bottleneck. The system is also designed for memory-efficient interaction with large volumetric datasets, enabling scalable rendering, editing, and validation of reconstructions of full EM volumes with sufficiently low latency for interactive use on modest GPU hardware, supporting parallel proofreading across users with basic compute resources. In our workflow, this approach has already reduced end-to-end segmentation and proofreading time from weeks to hours for individual neuronal reconstructions.

Mason Sholtis

Discipline: Sociology

Authors:

#1 Mason Sholtis
#2 I-Chun (Nicky) Wu

Abstract Name: The Effects of Psychological Predictors and Social Behaviors of Conspiracy Belief on Relationships.

Conspiracy theories have played a large part in political and social discourse, especially during the COVID-19 pandemic when anti-vaccine conspiracy theories were on the rise. Since then, an influx of stories of relationships and families being torn apart because of conspiracy belief has occurred, with extreme cases being reported on news stations around the world. Some of these cases have led to the non-compliance of safety guidelines and promotion of unsafe actions that put people in danger, leading to a large amount of research on the predictors of conspiracy belief and its effects. The results of this research have found conspiracy belief to emerge in certain psychological traits that express selfishness and manipulative behavior, as well as social norm perception and behaviors. Analyzing the cause of the relational strain within cases, a clear comparison to the predictors of conspiracy belief can be made, however, the connection between the predictors and effects of conspiracy belief remains unverified and a deep examination of what the personal reaction is to conspiracy belief is lacking. In this paper, I propose my research question, "How do the predictors of conspiracy belief and the influence of social norms and behavior affect interpersonal relationships?". Using this question, I plan on gathering participants through online means, and analyzing

their demographics, psychological traits as well as their social behavior and comparing it to their interaction with conspiracy believers. I anticipate similar results to methods borrowed from previous research, as well as a connection between traits identified to be predictors of conspiracy belief and behaviors within relationships affected by conspiracy belief. In doing this, I hope to provide insight into how people interact with conspiracy believers and hope future research will build upon my findings to potentially develop methods that reduce conspiracy belief and promote healthier relationships.

Alyeska Shore

Discipline: Interdisciplinary

Authors:

Abstract Name: From Isolation to Integration: Reimagining Connection in Disconnected Times.

Across the world, people are experiencing a growing sense of social and cultural disconnection - from community, culture, and even self. Yet dominant health systems continue to focus on individual treatment, often overlooking the collective, cultural, and spiritual roots of this crisis. My research explores (1) how dominant health frameworks overlook the relational and symbolic ways people heal, and (2) how creative, culturally grounded practices - such as art, storytelling, movement, and ceremony - can restore connection where clinical models fall short. Through a three-month internship with Te Oranganui, a Māori-led health organization in Aotearoa, I examined how Mātauranga Māori (traditional knowledge) is woven with Western frameworks to support holistic care. Using participant observation, semi-structured interviews, and participatory art-based reflection, and guided by decolonial and relational ethics, I explored how healing takes shape through relationships, place, and collective practice - rebuilding connection across spiritual, cultural, and communal dimensions of health. Findings suggest that healing from social and cultural disconnection is collective, relational, and deeply tied to place. Across wānanga (higher learning spaces), communal mirimiri (bodywork) sessions, and daily interactions, connection is restored through shared creativity, symbolic storytelling, and ritual practices that center relationship over diagnosis. When people engage with healing as a communal and symbolic process, it not only supports individual well-being but also strengthens the social and spiritual fabric that clinical models often overlook. This research offers insight into how culturally grounded, multi-method approaches can inform more relational models of care. Recognizing the spiritual, symbolic, and communal dimensions of healing can contribute to broader conversations about decolonizing health systems and reimagining care as a process of reconnection - between people, culture, and the natural world.

Molly Shower

Discipline: Biology

Authors:

#1 Molly Shower

Abstract Name: No guts, no glory: Variation in invertebrate community composition and succession in eviscerated European starling (*Sturnus vulgaris*) carrion in southeastern Wisconsin

Carrion provides an immense, but ephemeral, opportunity for a variety of invertebrate taxa in a diverse microecosystem. Among the most well-researched characteristics of these microecosystems are community composition and temporal insect succession patterns, both of which are known to vary based on numerous environmental and cadaveric conditions; nevertheless, many potential causes of variation remain under-

researched. In this study, the impact of carrion evisceration on the invertebrate community composition and succession timeline in a new growth forest in southeastern Wisconsin was assessed using six juvenile European starling (*Sturnus vulgaris*) carcasses from August 19th to September 8th, 2025. Overall, community composition varied slightly between control and eviscerated *S. vulgaris* carcasses ($R = 0.1051$, $p < 0.05$), with a greater invertebrate diversity at control carcasses (control $H' = 2.13$, eviscerated $H' = 1.19$). Timelines of colonization, modeled using the duration of presence of Calliphorid (Diptera) larvae, showed that the eviscerated group had on average a later peak larval density (control $\mu = 4 \pm 0 \text{ days}$, eviscerated $\mu = 5.3 \pm 0.58 \text{ days}$) and a later disappearance of feeding larval masses (control $\mu = 8 \pm 2 \text{ days}$, eviscerated $\mu = 14 \pm 3.46 \text{ days}$). The earlier drop-off of Calliphorid larvae colonization in the control group coincides with an earlier start of active decay, and a final assessment of the carcasses found a greater degree of skeletonization in the control group, indicating that the decomposition process proceeded more rapidly in the control. This study suggests the presence of visceral organs in carrion has an impact on both the invertebrate community composition and succession timeline. These results present a novel factor for consideration in decomposition research.

Jade Shull

Discipline: Environmental Science and Sustainability

Authors:

#1 Jade Shull

#2 Barbara Merk

Abstract Name: Plants and Pollinators on VCU'S Campus: A Diversity Assessment of an Urban Meadow and Lawn Site

The purpose of this study is to compare plant and pollinator diversity in a native urban meadow versus a traditional lawn on VCU's campus and to incorporate public input on these ecosystems. The Office of Sustainability at VCU seeks to increase campus biodiversity. This research will confirm the efficacy of their biodiverse planting initiatives and provide a robust framework for future meadow management and monitoring protocols. The newly planted Cumberland Wedge Meadow is the study site with a nearby traditional lawn area as the control. Four inventories were completed between late September and mid-October. Quadrats were used to identify and count vegetation to estimate species diversity. For pollinators, data was collected via 3-minute, fixed duration surveys within 2m by 6m transects, with all pollinators observed within the boundaries being identified and counted. Shannon diversity indices were calculated in R using species counts to assess the overall abundance and evenness of species within each site. Supplemental to quantitative data collection, a qualitative survey of the campus community was performed to elicit diverse input on planting strategies. The Shannon diversity index (H) values demonstrated a higher level of plant diversity in the meadow ($H=1.63$) relative to the lawn ($H=1.08$), signifying superior species richness and evenness in the meadow. Pollinator diversity followed a similar pattern, recording a high index of $H=1.87$ in the meadow and $H=0$ in the lawn. The VCU meadow, characterized by a higher abundance of native plants and greater plant diversity, supports a richer and more abundant pollinator community when compared to the adjacent lawn site. This independent study concludes that the implementation of more biodiverse native plantings on campus is an effective strategy for increasing pollinator populations. Furthermore, a qualitative study demonstrated community endorsement, with 96% of 29 VCU community respondents indicating strong support for planting initiatives.

Oscar Shute

Discipline: History

Authors:

#1 Oscar Shute

Abstract Name: Lincoln's Folly, Cherokee Secession, a Diplomatic Failure and a Human Tragedy: The story of why John Ross and the Cherokee Nation sided with The South.

This paper examines the Cherokee Nation's secession during the American Civil War, framing it as both a diplomatic failure of the Lincoln administration and a human tragedy for the Cherokee people. It argues that internal class divisions, the influence of pro-slavery elites, and the structural corruption of the Indian Office created fertile ground for Confederate diplomacy, while Union mismanagement and neglect forfeited potential Native alliances. Particular attention is given to John Ross, whose pragmatic leadership was undermined by Confederate commissioner Albert Pike's exploitation of factional divides and the Union's withdrawal of military and financial support. Although large segments of the Cherokee population resisted secession, elite pressure and the absence of federal engagement pushed the nation toward the Confederacy. The study contends that this episode reveals the perils of disregarding peripheral actors and treating local elites as representative of entire communities, a lesson with enduring implications for diplomacy in regions marked by class inequality and contested sovereignty.

Nivedita Shyamsundar

Discipline: Chemistry

Authors:

#1 Jill Millstone

#2 Kaveen Tennakoon

Abstract Name: Overcoming Barriers in Kinetic Analysis to Resolve Mechanisms of Nanoparticle Formation Using Video-Based Analyses

One central challenge in nanomaterial chemistry is understanding the transformation of molecular reagents into discrete solid nanoparticles (NPs); relevant steps require high spatial, temporal, and chemical resolution to interpret. Standard tools such as ultraviolet-visible extinction spectroscopy lack the resolution to track fast steps in NP formation. Ultrafast spectroscopies improve temporal resolution and resolution of molecular transformations but often miss the formation of the solid NPs and are typically inaccessible to non-experts. Computational approaches, such as population balance models (PBMs), simulate changes in NP concentration and size to inform NP nucleation and growth, but their accuracy depends on experimentally measured kinetics that are seldom available. Together, these challenges limit our ability to mechanistically explain NP formation and tune synthesis conditions for drug delivery, disease diagnostics, and renewable energy. In this project, I bridge this gap by developing a video-based analytical tool that estimates NP formation kinetics from real-time color changes to identify NP formation mechanisms. I applied this tool to probe how phosphine-ligand steric bulk about a gold center directs NP formation. I synthesized a series of three gold-phosphine complexes with increasing steric bulk and tracked color intensity as a measure of NP formation, observing slower particle formation for more sterically hindered ligands. Complementary analysis using transmission electron microscopy-generated NP size distributions does not follow classical expectations from the kinetic analysis, suggesting that a non-classical pathway—particle coalescence—may govern final particle size. To test this, I am developing a PBM that simulates NP formation under classical and non-classical conditions. Importantly, the video-based tool I developed can track reactions with temporal resolution limited only by the frame rate and analyze solutions with higher optical densities than traditional absorption spectroscopies, including opaque samples. Overall, this research addresses limitations in experimental resolution and computational parameterization, enabling new methods to establish mechanism-based control of nanomaterial properties.

Abdul Siddique

Discipline: Biology

Authors:

Abstract Name: Discovering Antibiotic-Producing Bacteria in Local Soil Through Tiny Earth Research

With the rising global prevalence of antibiotic-resistant infections, the search for novel antimicrobial-producing bacteria has become a scientifically relevant pursuit. Tiny Earth is an international undergraduate research initiative to study soil microorganisms for antibiotic-producing compounds through accessible, authentic research experiences. Here we present two soil samples collected from the Zachary Taylor Trail creek bed in Arlington, Virginia (38.90512° N, 77.12245° W), an environmentally nutrient-rich and microbiome-diverse location. To achieve isolated single colonies, a series of dilutions was performed on each sample, and through these dilutions, colonies with unique morphologies were successfully isolated and purified on a nutrient agar plate to reduce contaminants and ensure a diverse representation of isolates for study. Purified isolates underwent screening for antimicrobial activity against the Tiny Earth ESKAPE analog pathogens: *Escherichia coli*, *Staphylococcus epidermidis*, *Enterobacter aerogenes*, *Mycobacterium smegmatis*, *Enterococcus raffinosus*, and *Acinetobacter baylyi*. Isolate #2 didn't produce any zones of inhibition, while isolate #1 produced zones of inhibition. Isolate #1 produced zones of inhibition against *E. aerogenes*, *M. smegmatis*, *E. coli*, and *S. epidermidis* with the potential for broad spectrum activity between Gram positive and Gram negative pathogens; it is even more compelling that this isolated was identified as a Gram negative after Gram staining, correlating to common soil genera *Pseudomonas* which are known for producing a multitude of secondary metabolites with biological efforts against other competing microorganisms. Future directions include polymerase chain reaction and gel electrophoresis to support genetic inquiry and accurate taxonomic identification, as well as to determine the genetic potential for antimicrobial production. These results confirm the Tiny Earth initiative as naturally occurring, non-pathogenic soil bacteria can be scientifically validated as potential sources of viable antimicrobial components to fight antibiotic-resistant pathogens.

Rozmeen Siddiqui

Discipline: Biology

Authors:

#1 Anthony Garcia

#2 Jefferson Gomez

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#4 Zander Truy

#5 Ritishka Kapoor

#6 Valentina Dargam

Abstract Name: Method Development for Inductively Coupled Plasma-Mass Spectrometry Quantification of Cadmium and Trace Metals in Mouse Diets

Cadmium (Cd) is a toxic heavy metal and environmental contaminant widely found in industrial emissions, tobacco smoke, and contaminated food and water. Cd primarily accumulates in the kidneys and liver, where its long biological half-life contributes to prolonged systemic toxicity. It is classified as an independent risk factor for cardiovascular disease (CVD) by the American Heart Association, with chronic exposure linked to

hypertension, atherosclerosis, and cardiac dysfunction. Despite its established cardiovascular risk, the mechanisms by which Cd exposure alters cardiovascular function remain poorly understood. In this study, we aim to develop a mouse model of Cd exposure to investigate its associated CVD effects. Mice are provided with diets containing 10, 50, and 100 parts per million (ppm) of cadmium chloride (CdCl₂) to represent low, moderate, and high exposure levels, respectively. We will quantify Cd levels in the custom-made diets and organs using inductively coupled plasma mass spectrometry (ICP-MS). Samples from the Cd-supplemented diet pellets, blood, urine, heart, kidneys, bones, and other tissues are digested in nitric acid to prepare solutions compatible with ICP-MS analysis. The objective is to refine digestion parameters by finding the optimal nitric acid concentration, volume, and incubation period needed to ensure complete sample dissolution. Once the samples are fully digested, we will quantify Cd levels using ICP-MS. These results will help assess how different dietary Cd levels and exposure durations influence its accumulation in various tissues, providing insight into metal toxicity and potential cardiovascular effects.

Nora Siddiqui

Discipline: Health and Human Development

Authors:

Abstract Name: Investigating the Use of Clinical Preventative Measures on the Impact of Myopia Progression in Children and Adolescents

The prevalence of myopia, or nearsightedness, has surged since the pandemic in 2020, especially within younger children and adolescents, raising concern amongst ophthalmologists and public health specialists. This poster discusses environmental and behavioral contributors to myopic progression, focusing on increased screen time, reduced outdoor exposure, and the structural development of the eye. The findings in clinical studies used in this poster consider how demographic and genetic factors influence an individual's susceptibility to myopia. This poster also explains certain preventative measures such as the use of contact lenses to slow axial elongation, as well as multi-colored light therapies (blue, red, blue-violet lights) and how they can boost natural production of hormones within the eye to prevent myopia. Furthermore, studies conducted to test topical low-dose atropine treatments are evaluated to understand how they can stop the progression of the eye condition in children, when they are most susceptible to developing myopia. This poster also examines the regulatory challenges around topical atropine, which is a treatment used around the world, but is not FDA approved, preventing it from being used in clinical settings. By integrating research and clinical data, this review will offer a comprehensive understanding of myopia and its multifactorial origins to understand the paths of action for early intervention within all populations, focusing on pediatric communities. Moreover, this poster uses its findings to offer solutions and practices that can be implemented in urban settings (schools, offices, ect.) to catch early onset of myopia and prevent it from developing. Ultimately, it advocates for a more proactive effort against the development of myopia and urges professionals to advance the treatments for the wide-spreading eye condition.

Preranajyoti Siddula

Discipline: Psychology

Authors:

Abstract Name: Effectiveness of Mindfulness-Based Stress Reduction (MBSR) for Undergraduate Students: A Systematic Literature Review on Stress Levels

MBSR (Mindfulness-Based Stress Reduction) therapy is a psychological intervention that seeks to decrease stress levels by focusing on an individual's concentration in the moment and openness to new experiences (Pan, 2024). In more recent times, prevalent psychological signs of distress seen in university students include anxiety, mental stress, and emotional distress (Pan, 2024). The purpose of this research is to investigate the effects of MBSR on stress levels of varying undergraduate student populations. University students have the autonomy to decrease stress levels and enhance self-care practices by regulating their thoughts, emotions and behaviors through practices such as meditation. The study design of this investigation includes finding MBSR relevant academic articles utilizing the Web of Science database and conducting a systematic literature review to ensure an objective lens. The data collection process for finding relevant articles consists of peer-reviewed academic articles using randomized controlled trials focusing on MBSR and its effects on stress levels in university students. Initially, key conclusions were drawn from the data. Following creating concept maps to visualize patterns in the data, broader themes were identified. These themes were then synthesized to investigate the research question. A key finding from the literature review has shown that university students that participated in MBSR training saw significantly reduced depression, stress, and anxiety levels compared to a control group. MBSR training can promote positive mental health and an inclusive environment. An implication to MBSR in a college setting would be to include it in stress management and mental health services to improve student well-being. A limitation to this implication would be that this practice may not be effective for everyone. In future studies, MBSR should be studied comparative to other stress-reduction strategies to test its complete effectiveness.

Miguel Sierra-Velazquez

Discipline: Health and Human Development

Authors:

#1 Nehemiah Stewart

#2 Juan Song

Abstract Name: Characterizing the Cell-Autonomous Role of CHCHD2 in Neural Stem Cell Fate Decisions during Adult Hippocampal Neurogenesis

Adult Hippocampal Neurogenesis (AHN) is an exciting process wherein an endogenous pool of neural stem cells (NSCs) in the hippocampus makes fate decisions to become adult-born neurons. NSCs primarily rely on glycolysis and fatty acid oxidation. As they shift into active proliferation or differentiation, they increasingly depend on mitochondrial oxidative phosphorylation (OXPHOS). Coiled-coil-helix-coiled-coil-helix domain containing 2 (CHCHD2), a mitochondrial gene that enhances mitochondrial dynamics and OXPHOS, has emerged as a critical mediator of molecular pathways regulating AHN. It is highly expressed in NSCs, and global CHCHD2 knockout impairs AHN. Elucidating CHCHD2's necessity in AHN is key to advancing our understanding of NSC biology and identifying strategies to enhance neurogenesis. A tamoxifen-inducible triple-transgenic mouse model (Ascl1CreERT2:CHCHD2^{fl/fl}:R26^{tdTomato}) was used to selectively excise CHCHD2 in active NSCs and trace their neurogenic lineage progression. Coronal dentate gyrus sections were collected at neurogenic time points (7-, 14-, and 32-days post-injection) for immunohistochemistry and confocal imaging. Neurogenic lineage progression was assessed using cell-type-specific markers, while cellular morphology was quantified via radial process length, dendritic complexity, and dendritic spine density. While proliferation and immature neuron populations increased, the marked NSC and progenitor pools remained unchanged. CHCHD2 excision increased NSC activity but biased NSCs toward premature neuronal differentiation into immature neurons. CHCHD2-deficient cells exhibited shorter radial processes, reduced dendritic branching, and decreased spine density, indicating impaired morphological maturation as well. These observations indicate that CHCHD2 is necessary to maintain balanced NSC self-renewal and differentiation along with maintaining proper NSC neurogenic lineage progression.

Preston Siewert

Discipline: Chemistry

Authors:

#1 Zhiqing Yan

#2 Boluwatife Ajewole

Abstract Name: Synthesis and Binding Study of p-t-butylcalix[4]arene Hosts Featuring Pyridine or Quinoline Motifs on the Lower Rim

Molecular baskets are a group of synthetic host molecules designed to govern the inclusion of desired guest molecules. We present the synthesis and binding studies of p-t-butylcalix[4]arene hosts bearing pyridine motifs on the lower rim. The two pyridine-containing motifs are nicotinoyl groups or 7-quinoline carboxylate groups. The synthetic pathway involves converting a carboxylic acid into an acid chloride using thionyl chloride. The resulting acid chlorides are used to di-functionalize two of the phenol groups in p-t-butylcalix[4]arene in an acetonitrile solution. The hosts are purified by column chromatography and characterized via ¹H NMR and MS. The host-guest binding studies are carried out by ¹H NMR and UV-Vis titrations with silver(I) triflate. The binding constants are obtained based on non-linear curve fitting of selected chemical shifts.

Mia Signorelli

Discipline: Engineering

Authors:

#1 Damian Stoddard

Abstract Name: The Effects of UV Degradation on the Dynamic Properties of Indigenous Woods for Blast Hazard Mitigation

As global interest in sustainable construction grows, wood has emerged as a promising renewable material due to its high strength-to-weight ratio, cost-effectiveness, and availability across diverse regions. While prior research highlights wood's efficiency in energy absorption and shock dissipation, its long-term performance after environmental exposure—particularly under extreme dynamic loading—remains insufficiently understood. This study addresses a critical knowledge gap by examining the extent to which ultraviolet (UV) induced surface degradation affects both flexural strength and high-strain-rate energy absorption capacity across multiple wood species and grain orientations. The focus of this project is to investigate how ultraviolet degradation influences the dynamic mechanical behavior of indigenous wood species used in blast-mitigation and protective structural systems. The research employs a three-phase experimental approach. In the first phase, hardwood and softwood specimens with controlled grain orientations undergo accelerated UV exposure designed to replicate months or years of environmental aging. In the second phase, quasi-static four-point bending tests are conducted to quantify reductions in flexural strength and stiffness, establishing a baseline for interpreting dynamic behavior. In the third phase, dynamic impact experiments using a two-stage light gas gun to evaluate how UV exposure alters the materials' ability to absorb energy and deform under blast conditions. Data from these phases will be compared across species, grain orientations, and exposure durations to identify trends in mechanical degradation and their structural implications. It is anticipated that UV exposure will significantly reduce flexural strength, diminish energy-absorption capacity, and potentially alter deformation modes during high strain-rate loading. These results will be discussed in the broader context of designing sustainable, resilient, and locally sourced protective structures. By developing predictive relationships between environmental aging and dynamic performance, this project contributes new knowledge to the study of natural materials in extreme conditions and supports the advancement of safer and more sustainable blast-resistant infrastructure.

Mabia Sikder

Discipline: Psychology

Authors:

#1 Amanda Furman
#2 Hannah Stadler
#3 Peter Hamilton
#4 Kaitlin Bountress
#5 Matthew Banks
#6 Gretchen Neigh

Abstract Name: Impact of Low Resource Availability during Early Post-Natal Development on Adolescent Play Behavior in Rats

Maternal postpartum depression is a prevalent health concern that affects a mother's long-term health as well as the maternal-infant bond, a foundation for infant social development. Low socioeconomic status (SES) generates additional stressors that can have a significant negative impact on new mothers and their infants. Studies show women who present with four SES risk factors have an eleven times higher risk of experiencing postpartum depression than their counterparts. Furthermore, low SES during infancy has been linked to effects later in development for children and adolescents, including observations of emotional dysregulation and increased rates of depression, anxiety, and aggression. Individual contributions of the early postnatal environment versus other stressors in childhood and early adolescence are difficult to discern in humans because they are rarely limited to discrete developmental phases. Rodent studies can provide opportunities for controlled assessment of models of SES, typically manipulation of available resources, limited to specific developmental phases. Here, we tested the hypothesis that exposure to limited bedding and nesting (LBN), a model of low SES, during early development, will alter play behavior during adolescence. On postnatal day (PND) 2, Long-Evans dams and their pups were assigned to LBN (n= 74 male, 78 female) or standard housing (n= 80 male, 82 female). On PND 21, all offspring were weaned from their mothers and pair-housed by sex in standard housing conditions. Play behavior was recorded on PND 36 and analyzed with EthoVision XT 18. Outcome measures include latency to play, interaction speed, and play duration. Two-way ANOVAs will be used to determine whether the impact of LBN on play behavior differs by sex. Investigating the impact of early life stressors on play behavior will build an understanding of postnatal stress exposure on later social behavior development. This will allow for further insight into the development of potential intervention strategies.

Hailey Silva

Discipline: Chemistry

Authors:

#1 Haley McAllister

Abstract Name: Kill the Lights: Quantifying Dynamic Bond Behavior through Manipulating Light Sensitive Molecules

A human embryo develops in the womb through stem cell evolution. Controlling this development was recently discovered to be possible through manipulating the stem cell environment. The environment (typically tissue) controls cell growth based on its stiffness. The exact process, however, has to be explored

through experimental cell studies. Hydrogels, or polymers swollen in water, mimic the stem cell environment well. Manipulating hydrogels to imitate the dynamic tissue environment is possible through a stimulus such as concentration or temperature. Light is an ideal stimulus since the application is reversible, precise, and tissue-friendly. Whereas other stimuli can kill stem cells, light does not. Hydrogel stiffness can be altered with light through the incorporation of photoactive molecules and reversible bonds into the hydrogel. Analyzing the success of this incorporation requires observing the material change properties with light irradiation. My goal is to quantify how light can change the behavior of the photoactive molecules in dynamic bonds. I am analyzing how changing substituents on the photoactive molecules change the general behavior of the dynamic bonds. Harnessing specific characterization techniques to analyze these properties will help us gain a better understanding of how light affects dynamic bonds. My analyses will be used to understand how these photoactive molecules will behave in a hydrogel. Conducting cell studies atop these hydrogels will deepen our understanding of the processes behind organ formation, which could benefit the biomedical field by improving the creation of prosthetic organs like ears and noses.

Natasha Silva

Discipline: Biology

Authors:

#1 Kaylee Marrero

#2 Matthew DeGennaro

Abstract Name: Investigating Microbial Signatures of Mosquito Oviposition Sites

Mosquito-borne diseases remain a pressing global health concern, killing nearly 1 million people every year, and understanding mosquito oviposition behavior may reveal new avenues for vector control. Female *Aedes aegypti* mosquitoes lay their eggs near water, and previous studies have shown that they often exhibit aggregation behavior during this process, which is the non-random distribution of *Ae. aegypti* females at one oviposition site over another. We hypothesize that mosquito aggregation at oviposition sites alters the microbial composition of the water, producing bacterial communities or signatures that are more favorable for larval development. To test this, we designed an aggregation assay in which cages containing 35 gravid mosquitoes were presented with two equal oviposition sites. Acrylic traps around each site restricted movement once a choice was made. After 24 hours, the number of mosquitoes at each site was recorded, and water samples were collected. These samples were filtered, followed by DNA extraction from the retained material. The bacterial communities will be profiled using 16S rRNA sequencing and compared across aggregated sites, non-aggregated sites, and controls. We expect that aggregated oviposition sites will have greater bacterial abundance or distinct bacterial signatures relative to non-aggregated sites. Such differences could suggest that mosquito site choice is influenced by microbial cues, creating environments more favorable for larval survival. Ultimately, this work could provide new insights into the ecological interactions driving mosquito oviposition behavior and identify potential microbial targets for novel mosquito population control strategies.

Samuel Silveus

Discipline: Biochemistry

Authors:

#1 Davion Murray

#2 Heather Coan

Aj Cansler

Abstract Name: Development of an in vitro model of wound healing in human embryonic kidney (HEK 293) cell cultures to test the impact of crude keratin on healing

Crude keratin is a processed form of keratin that contains alpha and gamma keratins. It is extracted from animal byproducts including feathers and hair. Current research provides evidence that keratin promotes wound healing by stimulating cellular migration and it can act as structural scaffolding for new cells. To identify the possible effectiveness of crude keratin to accelerate healing in a simulated wound environment, human embryonic kidney cells (HEK) 293 cells were subjected to different stressors. Previously described methods were used to simulate and measure wound healing of HEK293 cells: a scratch assay, heat shock, and transfection. The scratch assay was performed by dragging a pipette tip along the middle of the well to detach cells and create an in vitro wound. The plates were viewed with an Evos Fluorescence Microscope to measure the migration capabilities of the HEK 293 cells with and without crude keratin. Heat shock was performed to simulate stress to create a more accurate model of wound healing. HEK 293 cells that were subject to scratch assays were placed in a 45 °C water bath for predetermined times. The scratch assays showed signs of improved healing with crude keratin during the first 90 minutes. The healing factor returned to baseline after 90 minutes depicted by cell migration into the wound site. Heat shock experiments displayed no cell damage and had the highest range of variance of cell growth at the 60-minute mark. Future experiments will conduct interval checks on cell migration more frequently and for longer periods of time to obtain a more accurate picture of wound healing patterns.

Tiffany Simental

Discipline: Economics

Authors:

#1 Shuang Xu

#2 Ava Veselis

Abstract Name: What America Runs On: A Regression Analysis of the Economic Factors Influencing Coffee Prices in the United States

This study investigates the extent to which various economic factors have influenced the price of coffee in the United States between 2018 to 2024. Since the onset of COVID-19, there have been substantial price escalations in coffee, with pre-pandemic prices averaging \$1.41 and post-pandemic prices averaging \$2.32. While there are many ongoing discussions in economics about the factors influencing the price of commodities, more research is needed to bridge the gap in the existing literature on factors influencing coffee prices, as most articles are either a decade old or pre-pandemic and do not include a comprehensive analysis of influential variables. A multivariable linear regression was conducted for this research to establish a relationship between the dependent variable, coffee prices in America, and numerous independent variables, inflation, the exchange rate between USD and COP, job openings, trucking costs, the federal funds and unemployment rates, and oil prices. The analysis revealed that the Federal Funds Rate, inflation, oil prices, and the exchange rate between the U.S. dollar (USD) and the Colombian peso (COP) all had statistically significant effects on coffee prices. While each variable exhibited a positive relationship with coffee prices, the Federal Funds Rate exerted the most substantial influence, suggesting that monetary policy changes play a critical role in shaping global coffee market dynamics. The importance of this result lies in its contribution to the information policymakers can utilize for policies they can put in place to support or aid the coffee industry, as well as other importing farm industries.

Kathryn Simmons

Authors:

#1 Kathryn Simmons

#2 Dr. Ryan Curtis

#3 Dr. Corey McZeal

Abstract Name: Stigma and Placement Instability in U.S. Child Welfare Systems

Child welfare agencies across the United States rely on standardized behavioral and mental-health forms recorded in systems such as CATS and TRAILS to communicate information about foster youth when matching them to potential placements. These forms contain “checked boxes” indicating behavioral concerns or mental-health challenges, but they provide no narrative context. Once entered, these indicators cannot be removed, even if the behavior occurred years earlier or no longer reflects the youth’s current functioning. Because foster parents often make placement decisions based solely on the number or type of boxes checked, this documentation structure may unintentionally promote stigma and contribute to placement instability. I ask how do checkbox-based heuristics shape perceptions of foster youth, and how might added context reduce stigma and improve placement outcomes? Prior research documents stigma directed toward foster youth, little is known about how data systems and referral processes perpetuate these perceptions. I aim to fill that gap by examining how the lack of contextual information and the permanence of outdated history affects decision-making. Using a mixed-methods design, this study includes qualitative structured interviews with former foster youth and child welfare professionals to explore lived experiences with the checkbox system and its consequences. Additionally, a quantitative Qualtrics experiment in which participants review simulated placement forms and indicate whether they would be willing to live with the youth described. Participants will first view forms with varying numbers of checked boxes, followed by a second version that includes additional details or removes outdated history. I hypothesize that this added clarity will significantly reduce stigma, increase willingness to accept youth, and foster more developmentally informed decisions. Expected findings will demonstrate how seemingly neutral documentation tools can reproduce inequities, shape placement opportunities, and contribute to “hard-to-place” designations. These results offer actionable implications for reforming referral practices within child welfare systems.

Conler Simmons

Discipline: Computer Science

Authors:

#1 Steven Fernandes

Abstract Name: Binary Classification Model Performance Comparison: Evaluating the Accuracy of TabTransformers and Graph Neural Networks in Financial Fraud Detection

This abstract investigates how modern deep learning architectures can improve the accuracy and efficiency of fraud detection on highly structured tabular datasets. In the scientific literature, there remains difficulty in classifying financial fraud, as cross-feature interactions and rare positive labels render traditional models weak at tuning toward minority patterns. In an effort to address this performance gap, my project implements and evaluates two state-of-the-art approaches: the TabTransformer — a model developed by Google Research, fine-tuned for tabular datasets — and a Graph Neural Network that reframes transactions as formally relational structures. The TabTransformer utilizes attention mechanisms to learn consequential dependencies across categorical features in data, whilst simultaneously transforming continuous attributes. The TabTransformer architecture has demonstrated strong performance on imbalanced datasets, thanks to its ability to capture interactions that tree-based models often underserve. Similarly, GNN models transactions as functional nodes connected by attributes, enabling the system to identify community-level anomalies and relational fraud patterns that are not captured in row-wise modeling. The study will use the IEEE-Fraud dataset — a real, functional fraud dataset — to power the model training component for both approaches. They will be evaluated using AUC-ROC, precision, recall, and F1-score, with priority given to minority-class behavior. The aim of the study is not simply to determine which model yields the best performance, but to investigate the ‘why’ — particularly how the architectural differences yield the difference in classification. This research will add to the computing literature, contribute to ongoing conversations about the potential of deep learning for binary classification, and highlight practical methods for integrating transformer- and graph-based approaches into fraud detection systems.

Jaden Simpson

Discipline: Psychology

Authors:

Abstract Name: From Hypervigilance to Belonging: Examining Trauma-Responsive Teaching Approaches in College Learning Environments

The research investigates how trauma-informed teaching methods and faculty social-emotional learning training affect college students at Siena University by reducing their hypervigilance and improving their psychosocial adjustment. The survey results from 500 students show that psychological distress affects 38% of students who experience anxiety and 30% who experience depression and 80% who experience academic performance interference due to emotional difficulties yet only 11% of students seek help from their faculty members. The survey results show that students feel unsafe in their learning environment because they lack sufficient psychological and relational support. The study investigates how student hypervigilance and academic performance and help-seeking behavior relate to three independent variables which include trauma-informed awareness and faculty SEL competence and classroom safety perceptions. The research combines student focus groups with pre/post assessments and faculty training workshops to evaluate how trauma-responsive educational methods affect student mental health and academic success. The research investigates how better faculty emotional control and open communication and trauma-sensitive teaching methods affect

student alertness and their sense of community and academic involvement. The research findings will create a trauma-informed faculty resource model and establish institutional recommendations which can scale to different settings. The research outcomes match current national initiatives to establish wellness and equity and resilience frameworks throughout higher education institutions.

Jacob Simpson

Discipline: Anthropology and Archaeology

Authors:

#1 Bernard Means

Abstract Name: Neanderthals and their Exhibitions of Fine Art: Unpacking Neanderthal Art on the European Continent

In this poster presentation, I will examine and convey information from research literature on the topic of European artifacts made by Neanderthals (*Homo Neanderthalensis*) that were artistically motivated in their creation, and highlight what this may mean to us (*Homo Sapiens*) comparatively in terms of evolution, behavioral patterns, and cognitive abilities. In my findings, I will present the multiple media found to have been used by Neanderthals to create art symbolically relevant to their lives, and how these creations show us that Neanderthals may have had a much more impressive set of complex mental capacities than what most have previously believed. This newfound potential for what the mental capacity of Neanderthals may have been opens the door to more speculative research and work on recreations of life for these ancient humans and will increase the amount and accuracy of our understanding of the past environments' influence on this species, as well as the interactions of *Homo sapiens* and Neanderthals with each other's species in prehistoric Europe.

Kaili Simpson

MN - Minnesota State University - Moorhead

Discipline: Computer Science

Authors:

#1 Zachary Moore

Natoli Tesgera

Maya Sohail

Abstract Name: Evaluating AI-Driven 'Virtual Focus Groups' as a Tool for Social Science Research

Large Language Models (LLMs) continue to expand the range of tasks they can perform, yet their potential for generating qualitative, human-like insights remains underexplored. This project investigates whether LLM-driven "virtual focus groups" can serve as a preliminary research tool for social science and marketing studies at Minnesota State University Moorhead (MSUM). The goal is not to replace human subjects, but to assess whether AI agents, with carefully assigned demographic and personality attributes, can provide structured, internally consistent responses that help researchers refine interview prompts, anticipate divergent viewpoints, and prototype discussion scenarios before conducting in-person studies. To support this investigation, we developed a multi-agent system using Python, LangChain, LangGraph, and LMStudio for local inference. These tools allow us to instantiate several AI agents, each defined by a specific persona, and orchestrate their interactions through a deterministic discussion flowchart. LangGraph ensures strict turn-taking and predictable conversation transitions, while LangChain provides memory components, prompt

templates, and agent tools necessary for constructing realistic dialogue. This design moves beyond traditional prompt engineering by enforcing structured interaction rules that mimic the procedural dynamics of human focus groups. Preliminary observations indicate that the agents maintain coherent viewpoints and demonstrate distinguishable behavioral patterns across personas. These early results suggest that LLM-based focus groups may provide value as a rapid, low-cost method for testing research questions, surfacing thematic directions, and identifying potential challenges before engaging human participants. This work contributes to emerging conversations about how AI might support, not substitute, qualitative research by offering a controlled environment for exploring discussion dynamics in advance.

Adison Simpson

Discipline: History

Authors:

Abstract Name: How Superman Couldn't End the War: Nazi Prevalence in Superhero Comics

This research presentation examines the role Superman had in American propaganda against Nazi Germany leading up to and during World War II (1938-1945). In the realm of comic books, Superman is seen as a god among men, with the ability to take down superpowers in a way no mortal could. Jewish creators Jerry Siegel and Joe Shuster designed Superman as a response to growing antisemitism in Europe, representing the true power a Jewish man could hold, despite not being a Jewish character in the canon. However, Superman could not directly take down Hitler or the Nazis in the comics while continuing to positively promote the war effort as a growing symbol in American culture. Instead, publisher National Allied Publications, which would go on to become DC Comics, opted to use the character to encourage its American audience to support the war effort and the soldiers overseas, through comic strips like "Superman's Service for Servicemen." This historical work examines Superman-titled comics from this period alongside sources evaluating the history of the character in pop culture to demonstrate how Superman's character was utilized during World War II as an example of how American icons can be used to persuade public opinion and create impact during conflict.

Amara Sims

Discipline: Architecture, Construction Management, and Interior Design

Authors:

#1 Amara Sims

#2 Namrata Dhobekar

#3 Suzanne Frasier

Abstract Name: Case study of Chain link joinery

This research aims to study chain link joinery to explain its applicability in interior spaces at different scales. The use of chain links in creating various pieces of jewelry dates back centuries in Egyptian and Mesopotamian cultures. This type of joinery originated from the use of metal loops that are interconnected in different forms of jewelry. The use of chains in jewelry dates back in history and has significance in terms of symbolism and flexibility, and ornamentation. This paper seeks to identify the underlying system in the use of metal loops or chains. The study aims to investigate the applicability of chain link joinery from jewelry to architecture. With a methodology that examines how it can be applied at multiple scales from artifact level to enclosure, personal space to social space, this research documents the process diagrammatically and visually by studying plans and sections of the project. The project examines the levels of interlocking motion and

modularity in the joinery structure from three different levels of project scale: from object scale through modeling of an enclosure scale up through analysis of the spaces of different sizes. These levels demonstrate how the logic of connection and flexibility in the chain link system translates forms in relation to structure. This research demonstrates that the chain link jewelry joinery can be successfully transferred from the craft model to the larger-scale environment of interior spaces through the principles of repetition, connection, and modularity. The plans and sections create a rhythmic spatial connection through the arrangement of wall placement in spaces. The periodic interconnection system of joinery translates into larger-scale applications and provides spatial configurations allowing ornamentation and functional clarity in harmony. This research concludes that transforming jewelry techniques into interior architecture broadens the dialogue between craft and space.

Anastasia Sinclair

Discipline: History

Authors:

#1 Anastasia Sinclair

Abstract Name: Caswell County on Trial: Race, Education, and Public Opinion in the Battle for Desegregation

Caswell County, located northeast of Greensboro, North Carolina, has a long, complex history clouded by pungent racial tension. Despite its historically strong African American presence in the area, the county's main city, Yanceyville, was depicted in the Depression-era Federal Writers' Project (FSA) and Works Progress Administration (WPA) as a white supremacist town, vehemently against civil rights for Black citizens. In 1958, and three years after the US Supreme Court demanded public schools desegregate with "all deliberate speed," Judge Edwin Stanley in *Jeffers v. Whitley* (1958) ruled that the Caswell County Board of Education fully controlled the speed of desegregation in their school district. In 1961, he further ruled in *Jeffers v. Whitley* (1961) that he could not enforce wholesale desegregation, despite admitting that racial discrimination continued within the county. The National Association for the Advancement of Colored People (NAACP) used these cases to prove integration was being slowed and sometimes blocked by legal procedures. My study explores the desegregation process in Caswell using NAACP records and examining the community's tension-filled history through interviews gathered for the FSA and WPA. I will inspect oral histories of Caswell's Black community, and compare and contrast Black residents' lived experiences with the county citizens' broad public opinions about desegregation during the 1950s and 1960s. My work will also reveal why the NAACP decided to support these cases in Caswell County and showcase the influence of public opinion on the issue of integration in North Carolina. By divulging into this "failure" of North Carolina education history, my project underscores the importance of telling the most complete stories in Black communities, allowing the exploration of race relations to take on a new level of complexity in the image of integration.

Shivika Singh

Discipline: Business

Authors:

#1 Shivika Singh

Abstract Name: AI-Driven Predictive Analysis of Airline Profitability Under Macroeconomic Trends and Sustainable Fuel Adoption

This present study explores how AI-enhanced predictive analysis can support strategic airline profitability planning under changing macroeconomic and sustainability conditions. The research introduces a conceptual decision-support framework: the Hybrid Predictive-Generative Scenario Engine (HPGSE) which integrates key economic indicators such as GDP growth, inflation, and fuel price volatility with sustainable aviation fuel (SAF) adoption while combining generative and predictive AI. Scenario-based analysis of optimistic, moderate, and adverse market environments, the framework illustrates how AI-generated insights can guide airline management decisions related to profitability, cost optimization, and sustainability investment.

Dev Singh

Discipline: Computer Science

Authors:

#1 Dev Singh

Rong Feng

Abstract Name: Learning Verified Compiler Optimization Heuristics for Lazification using a Code-Centric LLM

Compiler optimizations have long relied on handcrafted heuristics that often fail to generalize across programs or architectures. In this work, we ask whether a large language model (LLM) can learn verified optimization behavior for lazification, the transformation that converts eager call-by-value evaluation into deferred call-by-need semantics in C. We fine-tune a code-centric LLM on transformations produced by the Wyvern optimizer and integrate Alive2 into a feedback loop that enforces semantic equivalence for every generated rewrite. On the LLVM test suite, the model tracks Wyvern's optimization quality closely but applies fewer lazifications overall: roughly 76% of the benchmarks show a reduced transformation scope with slower overall runtimes, while about 9.8% achieve similar or modestly faster performance. No instance of over-lazification was observed. Structural analysis points to a cautious, memory-stable optimization style characterized by increased load and store operations but stable control flow, reflecting a preference for semantic safety over aggressiveness. Together, these results suggest that verified learning can support adaptive, correctness-preserving compiler systems grounded in formal guarantees.

Raman Ghotra Singh

Discipline: Biology

Authors:

#1 Wan Ching Chan

#2 Man Long Kwok

#3 Marlen Gonzalez

#4 Justin Richner

#5 Yulia Komarova

Abstract Name: VT-109 Restores Alveolar Capillary Barrier after COVID-19 Related Lung Injury in Preclinical Models

Severe COVID-19 pneumonia causes lasting damage to the alveolar epithelium, leading to disruption of the alveolar-capillary barrier and pulmonary edema. The goal of this study was to determine whether VT-109, an allosteric inhibitor of end-binding protein 3 (EB3) that blocks pathological calcium signaling in endothelial

cells and stabilizes VE-cadherin junctions, can restore lung vascular integrity and support epithelial repair following COVID-19-related lung injury. Using preclinical models of SARS-CoV-2 pneumonia, we assessed pulmonary vascular leakage, lung edema, and structural injury to both endothelial and epithelial barriers. VT-109 treatment significantly reduced albumin extravasation, indicating restoration of endothelial barrier function. Importantly, VT-109 also promoted regeneration of damaged alveolar epithelial cells, resulting in improved lung structure and function. Mechanistically, VT-109 inhibited calcium-dependent NFAT/NFκB inflammatory signaling while activating the FOXM1-dependent regenerative program in endothelial cells, leading to reannealing of VE-cadherin junctions. Consistent with these findings, studies in a nonhuman primate model of COVID-19 demonstrated that VT-109 rapidly restored the pulmonary endothelial barrier, as reflected by reduced protein levels in bronchoalveolar lavage fluid. Together, these results identify endothelial calcium signaling as a key regulator of lung barrier dysfunction in COVID-19 and establish VT-109 as a promising therapeutic candidate capable of accelerating recovery by promoting vascular repair. This work was supported by The Assistant Secretary of Defense for Health Affairs, endorsed by the Department of Defense, in the amount of \$5,860,641, through the Peer Reviewed Medical Research Program under Award No. W81XWH-21-1-0639. Opinions, interpretations, conclusions, and recommendations are those of the author and are not necessarily endorsed by the Department of Defense. In conducting research using animals, the investigators adhere to the laws of the United States and regulations of the Department of Agriculture.

Sanjana Singh

Discipline: Engineering

Authors:

#1 Sanjana Singh

#2 Stephen Mederios

Stephen Medeiros

Abstract Name: Real-Time Sensor System for Early Onboard Detection of Weather Phenomena

General Aviation currently lacks an onboard sensing system that alerts pilots to hazardous weather directly ahead of the aircraft, particularly microbursts and clear-air turbulence. This project introduces an aircraft-mounted detection pod that fuses LiDAR, automotive radar, and GNSS timing to estimate eddy dissipation and related features for real-time severity classification. A ROS2-based processing stack, coupled with Bayesian synchronization, aligns the asynchronous LiDAR and radar streams to the GNSS pulse-per-second signal, feeding a Random Forest model for classification. The aerodynamic fairing, designed in Fusion 360, maintains structural integrity in harsh environments and high airspeeds while preserving each sensor's field of view. The electrical system incorporates EMI/EMC-filtered power rails, and avionics integration supports existing cockpit interfaces for presenting turbulence labels to the pilot. Using mock data spanning four classes (none, light, moderate, severe), the current model achieves 67% accuracy and remains stable after applying hysteresis to suppress noise. Additionally, in-range buckets, derived from fused EDR-like metrics, further strengthen classification consistency. The full runtime stack operates on general-aviation-friendly hardware, providing timely, pilot-facing information that complements conventional weather products rather than replacing them, enabling improved in-flight awareness and decision-making. Prototype tests validate the system's GNSS-based synchronization, EMI robustness, and low-latency behavior, which aligns with a pilot's scan workload. The pod's modular design allows sensor swaps, bench testing, and maintenance, while its data interface enables seamless integration with moving maps, traffic overlays, and post-flight analysis tools. This study outlines a practical pathway toward real-time turbulence awareness in GA by combining off-the-shelf sensors, disciplined timing, and machine-learning algorithms within an aerodynamically efficient enclosure. Future work focuses on refining class boundaries and transitioning the system toward a scalable network capable of continuously feeding a real-time turbulence and hazard map for flight operations.

Kabir Singh

Discipline: Communications

Authors:

Julian Lau

Hallel Gerber

Abstract Name: Mitigating Knowledge Drain: A Case Study in Optimizing Workflow and Training in a High-Turnover, International Peer-Reviewed Undergraduate Science Academic Journal

Student-led organizations are dynamic hubs of experiential learning but are chronically plagued by "knowledge drain"—the loss of institutional memory and operational expertise due to high annual personnel turnover. This challenge is particularly acute for organizations like the Journal of Young Investigators (JYI), an international peer-reviewed undergraduate academic journal, where workflow consistency, scholarly rigor, and reasonable time-bound progress are paramount. This project sought to address the systemic inefficiencies resulting from this turnover by designing, implementing, and evaluating a multi-faceted suite of operational interventions. A longitudinal, single-organization case study was conducted over one year [January 2025-January 2026], with interventions implemented halfway through the year. Baseline metrics were established by analyzing the existing production workflow, including manuscript processing time and editor onboarding duration. Subsequently, a multi-part intervention was rolled out, including a revised hiring process, a modular asynchronous onboarding system, a formalized training program, and a transparent, Kanban-style workflow management board. The implementation of these systems yielded significant quantitative and qualitative improvements, including a 57% reduction in manuscript processing time and an average 47% decrease in the time required for a rejection or acceptance decision to be issued. Post-intervention conversations with staff members showed improved role clarity and more efficient transition periods for new hires. This systematic approach effectively mitigates the negative impacts of high turnover and offers a robust, transferable framework that can be adapted by other student-run initiatives to foster sustainability and operational excellence.

Shubhra Singhal

Discipline: Engineering

Authors:

#1 Chung- Hao Lee

#2 Zachary Molander

#3 Ashley Taepakdee

#4 Maedeh Makki

#5 Samuel Au

Abstract Name: Investigation of the Time Dependent Mechanical Properties Due to Elastin Degradations in Porcine Mitral Valve Anterior Leaflets (MVAL)

Mitral valve degeneration is a common age-related condition that progressively impairs cardiac function by reducing the flexibility and structural integrity of the valve leaflets. The mitral valve regulates blood flow from the left atrium to the left ventricle, and its dysfunction can lead to regurgitation, a condition in which the valve fails to close fully and allows backward flow into the atrium. A key contributor to this degeneration is the gradual breakdown of elastin, an extracellular matrix (ECM) protein that enables the valve leaflets to stretch and recoil during each heartbeat. As elastin deteriorates, mechanical loading shifts to stiffer collagen fibers, which can alter leaflet motion and contribute to disorders such as mitral valve prolapse. Previous research has characterized tissue behavior after complete or near-complete removal of elastin, but aging occurs as a gradual process rather than an abrupt loss of ECM components. As a result, little is known about

how progressive elastin degradation affects the mechanical properties of mitral valve tissue over time. This project addresses this gap by quantifying tissue-level mechanical changes in porcine mitral valve anterior leaflets following controlled, stepwise degradation of elastin. The study employs three methods: (i) biaxial tension and stress-relaxation testing of untreated leaflet samples to establish baseline properties, (ii) enzymatic treatment at defined time intervals to selectively degrade elastin, and (iii) repeated biaxial mechanical testing after each degradation stage. By correlating changes in mechanical response with the time course of elastin loss, this work aims to clarify how aging-like ECM remodeling alters valve function. These findings are expected to improve understanding of how degenerative processes develop and may ultimately inform more effective surgical repair strategies and computational models of valve mechanics.

Jayla Singleton

Discipline: Chemistry

Authors:

#1 Adrianna Arroyo Plaza

#2 Jemma Booth

#3 Michael Beck

Abstract Name: Design and Synthesis of Human Carboxylesterase 1 (CES1)-Specific Fluorogenic Chemical Tools Using Self-Immolative Linkers

Human carboxylesterases (CESs) are serine hydrolases that play key roles in the metabolism of drugs. One form, CES1, in particular is important in first pass metabolism of orally delivered drugs, as it is responsible for over 80% of the total hydrolytic activity in the liver. Despite the known importance of CES1, methods to study CES1 activity are limited. Our group has sought to address this by developing fluorogenic chemical tools that can report on CES1 activity in live cells. These current generation chemical tools involve directly linking the substrate to the fluorophore scaffold. The work presented here seeks to use self-immolative linkers to move the substrate away from the fluorophore, potentially increasing stability and allowing for a modular approach to expanding fluorophores that could be used to study CES1. Following successful synthesis and characterization by ¹H and ¹³C NMR, the probe will be evaluated for suitability for use in live cells to study CES1. Synthesizing efficient probes for CES1 detection would introduce a helpful diagnostic tool for analyzing activity in cellular samples.

Sriya Sirigireddy

Discipline: Biology

Authors:

#1 Nicholas Zhang

#2 Ahmet Coskun

Lakshana Ramanan

Abstract Name: Spatial Omics Reveal Epigenetic and Dietary Modulation of ECM Remodeling in Liver Fibrosis

Chronic liver injury drives liver fibrosis, a progressive disease shaped by extracellular matrix (ECM) accumulation and dysregulation of epigenetic factors. Spatial omics-based research identifies key regulators but lacks spatial detail to capture the cell-protein interactions. This study employs computational analysis and immunofluorescence to identify 10 molecular markers across four mouse liver conditions: wild-type regular,

wild-type high-fat, fibrosis regular, and fibrosis high-fat. Pixel classification revealed phenotypic heterogeneity, with expression of ECM proteins, pan-cytokeratin, and α SMA in diseased liver tissues. Colocalization and correlation presented strong intracellular marker associations with variable extracellular interactions. Proximity mapping uncovered methylation-dependent patterns, where high methylation promoted proximity to fibrotic catalysts such as fibronectin and α SMA. High-fat fibrotic samples displayed increased VCAM-1 and pan-cytokeratin, associating diet with exacerbated injury. These results highlight how spatial omics integrate cellular interactions, ECM remodeling, and epigenetics to better understand liver fibrotic progression.

Calvin Sissel

Discipline: Engineering

Authors:

#1 Ian Janusz

#2 Ryan Muller

#3 Mahdi Vaezi

Abstract Name: Upgrading Wheat Straw Waste into Functional Fillers for Bio-based Polymer Composites

Wheat straw is an abundant agricultural residue that is typically underutilized because it contributes little to soil fertility and has almost no established market value. At the NIU Bioplastics Lab we explore wheat straw as a sustainable reinforcing and filler phase in biologically based polymers in order to upgrade this waste stream and reduce dependence on petroleum based plastics. We compounded ground wheat straw with poly methyl methacrylate (PMMA) and polybutylene adipate terephthalate (PBAT) at weight fractions of 30 and 50 percent and at two particle size ranges, below 250 micrometer and between 700 and 1440 micrometer. Before compounding, wheat straw was subjected to sodium hydroxide pretreatment, and the process conditions were systematically adjusted to minimize time and energy while maximizing interfacial adhesion. Treated straw and polymer were tumble mixed, melt compounded by extrusion, and then injection molded into specimens suitable for mechanical testing. Tensile tests show that adding 30 percent wheat straw in the 700 to 1440 micrometer range increases the ultimate tensile strength of PMMA from 27.0 to 37.5 MPa and of PBAT from 5.9 to 9.3 MPa. The modulus of elasticity of PBAT rises from 22 to 300 MPa, indicating substantial stiffening, while the modulus of PMMA decreases from 2.38 to 1.86 GPa, reflecting a tradeoff between strength and stiffness that guides further formulation work. Overall, our results demonstrate that properly pretreated wheat straw can significantly enhance the performance of PBAT and modify the mechanical response of PMMA, while valorizing an agricultural byproduct. This work supports the development of wheat straw reinforced biocomposites as promising candidates for partially renewable, mechanically robust plastic products.

Rokia Sissoko

Discipline: Engineering

Authors:

Abstract Name: Removing "forever chemicals" (PFAS) from drinking water by filtration

Everyone should trust that their drinking water is clean. Per- and polyfluoroalkyl substances (PFAS), or "forever chemicals," are persistent pollutants used in products like non-stick cookware and firefighting foam. Their unique fluorinated structures allow them to persist in soil, groundwater, and drinking water systems

worldwide. They resist conventional water treatment and accumulate in the body, posing long-term health risks, such as cancer and developmental delays. Modern techniques for the removal of PFAS use anion-exchange resins (AER), which capture PFAS molecules through electrostatic attraction. To determine if alkyl length in amine-functionalized resins impacts PFAS capture, four ammoniated resins were prepared with alkyl lengths of one to four. Different bottles of ultrapure water were spiked with a representative mixture of three types of PFAS preceding the addition of each AER at a sorbent dose of 25mg/L. Following a three-day treatment of each resin, the samples were filtered to separate the resin from the solution. Solutions were analyzed using liquid chromatography–mass spectrometry (LC-MS) to quantify residual PFAS concentrations. An untreated control sample was included to ensure changes in concentration resulted solely from sorbents. Triethylamine-functionalized AERs showed the highest values for average percent capture of PFAS, followed by tripropylamine, tributylamine, and trimethylamine. AER selectivity for PFAS was greatest for PFBA, followed by PFOA and PFBS. Understanding structure–function relationships in AERs can inform the design of novel sorbents. By examining AER selectivity, these methods could be applied in large-scale water treatment plants to enhance PFAS removal and improve global drinking water safety.

Tiffany Sites

Discipline: Music

Authors:

#1 Ishika Agarwal

#2 Hari Sampathkumar

Abstract Name: The Fusion of Indian Music and American Pop

The purpose of this project was to research different areas of Indian music - from the instrumentation and music theory to the cultural significance - and fuse it with American popular music, creating a modern and unique song appealing to various listeners. Being open to education and collaboration with other cultures encourages growth as a musician and presents the opportunity to explore new musical frontiers in the modern world. By studying the three main genres in Indian music: Hindustani classical, Rajasthani folk, and modern Bollywood, the various styles of Indian music were understood and interpreted in a unique way. Researching different types of Indian instruments allowed the instruments to be replicated or a similar sound to be recreated in the fusion piece. The cultural significance of specific types of Indian music were also taken into consideration and provided context for the song. For example, themes in folk music are often related to love so this theme was used as the main inspiration of the fusion piece. The form of Indian songs was also important. Depending on the genre, the song was structured in a specific way. For example, classical Hindustani music is broken into three sections: an introduction, the addition of percussion, and harmonic and rhythmic acceleration. This three-layer form was combined with the ABABCB song form (verse, chorus, bridge) to create the structure of the fusion piece. The process of creating the song strengthened technical skills while the research expanded appreciation of Indian culture. Furthermore, collaboration with Indian musicians and native-Hindi speakers provided authenticity and accuracy within the piece, especially in terms of foreign language pronunciation. The expected result of combining these areas of research with current skills in music production was the creation of an Indian-American pop song easily digestible for all types of listeners.

Loghan Sivananda Raj

Discipline: Chemistry

Authors:

#1 Aaron Monte
#2 Matthias Murphy
Sydney Larsen

Abstract Name: Synthesis of Novel Anti-Melanoma Drug, A-11

Melanoma is one of the most aggressive forms of skin cancer and continues to pose a rising global challenge because it spreads quickly and has limited effective treatments. Natural products have emerged as valuable sources of new therapeutic leads. Several novel molecules derived from *Comptonia peregrina* (Sweet Fern), a traditional medicinal plant used by the Ojibwe people of Wisconsin, has been shown to possess skin lightening, anti-parasitic, anti-inflammatory and anti-tumor properties. Among the derivatives is A11, a patented molecule that inhibits melanin formation and slows melanoma cell growth. Previous biological studies demonstrated that A11 suppresses tumor development in melanoma-infected zebrafish embryos more effectively and with a drastically lower toxicity than FDA-approved drugs such as cobimetinib and dacarbazine. The goal of this research is to reproduce A11 through organic synthesis in gram-scale quantities to support further biological and pharmacological evaluation. The project focuses on improving each step in a multistep synthesis that modifies specific functional groups until the final A11 structure is achieved. Recent progress includes successful oxidation of the starting alcohol to aldehyde, verified by NMR spectroscopy, with yields improving from 17.1 percent to 35 percent after successive optimization trials. Optimization of the aldehyde synthesis displays a promising pathway toward efficient A11 production and provides valuable insight for improving later steps in the route. Completion of this work will enable preclinical testing, strengthen the compound's existing patent, and may attract pharmaceutical collaboration for large-scale production. This research aims to advance A11 as a safer and more potent anti-melanoma agent while highlighting the medicinal potential of naturally derived compounds in modern drug discovery.

Kaitlyn Sjoblom

Discipline: Psychology

Authors:
#1 Kaitlyn Sjoblom

Abstract Name: Does the Use of Jargon Affect Perceptions of Psychotherapists?

Psychotherapy theorists have cautioned that psychotherapist use of psychological jargon during treatment can lead to client confusion, reduced therapeutic connection, or poor perceptions of the therapist. Existing research assessing this issue has reported correlations between therapist use of jargon and client perceptions of the therapist. However, given the nonexperimental nature of these findings, it is unclear whether it was jargon use that led to differences in perceptions of the therapist. The aim of the present study is to use a randomized controlled design to assess the potential causal impact on client perceptions of therapist use of jargon. In this study, participants recruited from undergraduate psychology courses will be randomly assigned to listen to two sets of brief audio recordings, with each set of recordings emulating a therapist speaking during treatment sessions. In one set of these recordings the therapist employs technical or clinical jargon, whereas in the other set of recordings the therapist explains concepts in plain language. For half the participants, the recordings are of male therapists; for the other half, the recordings are of female therapists. Following listening to a set of recordings, participants will be asked to judge therapist empathy, the likely therapeutic alliance, and the perceived credibility of the treatment. Results will be analyzed by a language ' therapist sex analysis of variance, allowing for an assessment of the use of jargon and whether the effect of jargon depends on the sex of the therapist. If judgments of the therapist vary depending on the use of jargon, the study findings would provide evidence-based guidance for the language psychotherapists should consider using during treatment.

Zoe Skarupa

Discipline: Anthropology and Archaeology

Authors:

#1 Z Skarupa

Abstract Name: Cracked! An Investigation Into Bone Fracture Patterns

Forensic anthropology plays a critical role in the justice system by interpreting skeletal injuries to reconstruct violent events. However, a significant challenge remains in scientifically linking specific bone fractures to the exact weapon used, a necessity for admissible court evidence. This ongoing research investigates the fundamental feasibility of this correlation, asking whether weapon types can be positively and reliably identified based solely on fracture patterns. The central hypothesis is that bone fracture patterns are replicable under controlled conditions and correlate predictably to variations in weapon type and velocity. To test this, the study utilizes a modified baseball pitching machine to deliver impacts to porcine femurs, selected as a human analog due to the comparable hardness of their cortical bone and for ethical considerations. Four weapon profiles were tested—a claw hammer, dowel rod, crowbar, and hatchet—impacting at speeds of 22, 33, and 44 mph. The methodology involves precise measurement of bone dimensions relative to fracture length, width, and type, with future microscopic analysis planned to identify micro-trauma. Expected results anticipate discernible statistical differences in fracture patterns across specific combinations of speed and weapon. Ultimately, this study aims to provide the necessary proof of concept that weapons leave distinct, reproducible signatures on bone, serving as a foundational step for future forensic interpretation in criminal trials.

Jackie Skeeters

Discipline: Architecture, Construction Management, and Interior Design

Authors:

#1 Jennifer Meakins

Abstract Name: Reuse Room: Making Design Education More Sustainable and Equitable

Design students' curriculum is very different from a traditional major, leading to different challenges. Traditional students would generally have requirements like written papers, tests, and online assignments, while design students are often given assignments that result in physical projects, like models made unconventional materials, which need to be purchased. Because of this, a design student's curriculum is not cheap. Currently, students at the University of Kentucky are required to pay a mandatory fee of \$696 each semester, but students in a design program have an additional studio fee of \$686. Another issue is deciding what to do with the materials after the projects are complete. With materials often packaged in bulk and issues storing the remaining materials, this results in a lot of the material ending up in the waste stream or being improperly recycled. This begs the question of what can be done to lighten both the financial load and materials in the waste stream. A potential solution, which this project aims to explore, is a Reuse Room in the Gray Design Building. The first phase of the project is researching different existing centers in and around Lexington, which would help to understand how they run and what needs to be implemented in the Gray Design Building. The second phase would be working with both the faculty and student council in the College of Design to help plan and create a space in our building. The final phase would be the creation of this space. It would be executed with students and faculty in mind, dedicating the area to the offloading and obtaining of materials. It would also help to build a more conscious and equitable community in the design building. Ultimately, this could inform design education to be more sustainable and attainable, with less financial barriers.

Jacob Skinner

Discipline: Physics and Astronomy

Authors:

#1 Sachith Dissanayake

Abstract Name: Synthesis and Investigation of Superconducting Properties of High Entropy Er123 Cuprate Ceramics

The RE123 (RE=rare earth element) compound is a common form of high-temperature superconducting (HTSC) cuprate ceramic with chemical formula REBa₂Cu₃O_{7-δ}. This compound makes an excellent superconductor due to its high critical temperature (T_c) in the low 90 Kelvin range, its high critical current density (J_c), stability, non-toxicity, and ease of synthesis. In this study, we aimed to investigate the effects of superconducting properties of ErBa₂Cu₃O_{7-δ} when doped with 4 other RE ions of varying ionic radius. Samples of high-entropy(HE) oxide-type ErBa₂Cu₃O_{7-δ} superconductors are prepared systematically using the solid-state reaction (SSR) method, and the sintering parameters for phase formation are determined. The crystal structure of the High Entropy-doped ErBa₂Cu₃O_{7-δ} superconductors investigated. We will discuss the superconducting properties of these materials using DC magnetization and compare their critical temperature (T_c), critical field (H_c), and critical current density (J_c). We determined that with increasing orthorhombicity, we saw an increase in T_c, H_c, and J_c. We plan to investigate this relationship further with more acute doping on the RE site.

Niko Skoulidakis

Discipline: Biology

Authors:

Abstract Name: Obesity-Driven CNV and Gene Expression Changes in Danio rerio

Copy number variants have been associated with obesity linked, liver specific diseases such as NAFLD and Type 2 diabetes. However, obesity has never been investigated as a potential cause of copy number variant formation. Danio rerio (zebrafish) was used to generate a model of human obesity. Seventy-percent of zebrafish genes are similar to human genes with 84% of disease associated genes being present in zebrafish. Over the span of 6-8 weeks, zebrafish were fed an excessive diet of artemia to induce obesity, while control fish were fed normal diets. DNA and RNA were extracted from liver to investigate CNVs and expression differences in obese fish. RNA sequencing of zebrafish livers showed differential expression in immune and stress mechanisms including downregulation of the tumor suppressor IFI44L and overexpression of hemoglobin and C-Type lectin genes. Copy number variation was examined one mb upstream and downstream of gene transcription start sites to determine overlap with genes and direct and indirect effects. An eQTL using Spearman Rank Correlation was run to analyze associations between copy number variance and gene expression to determine CNV effects on gene expression in obese and normal fish. Together, these findings demonstrate that diet-induced obesity in zebrafish leads to metabolic suppression, immune imbalance, and altered epigenetic regulation patterns consistent with human obesity. This work reinforces the value of zebrafish as a translational model for understanding the molecular pathophysiology of obesity and its associated diseases.

Diana Slavich

Discipline: Mathematics

Authors:

#1 Andrei Ludu

Denise Lesnichi

Ian Holland

Abstract Name: Self-Organized Oscillatory Dynamics of Liquid Nitrogen Bridges in Leidenfrost State

We report the discovery of a previously unknown nonlinear phenomenon: self-sustained periodic oscillations in cryogenic liquid bridges under Leidenfrost conditions. When liquid nitrogen is confined between shallow toroidal boundaries on a heated substrate, it exhibits remarkable dynamics—periodic shape oscillations, spontaneous symmetry breaking, and complete self-organized cycles of bridge expansion, bubble nucleation, splitting, and reconstitution. This discovery represents a new class of interfacial instabilities in evaporating systems. Our experimental platform combines precision temperature control with high-speed imaging and particle image velocimetry (PIV), capturing the full spatiotemporal evolution of these complex phenomena. The high-speed movies reveal intricate vortex structures and traveling waves that drive the oscillatory behavior through thermo-mechanical coupling between continuous evaporation, vapor flow dynamics, and capillary pressure gradients. We developed a complete mathematical physics model employing nonlinear differential geometry for capillary pressure calculations and lubrication approximation for vapor layer dynamics. The model reveals soliton-like structures governed by coupled nonlinear partial differential equations, successfully predicting the observed oscillation frequencies and instability thresholds. The agreement between theory and experiment validates our framework for describing this emergent behavior. This isolated Leidenfrost environment provides a unique testbed for studying interfacial instabilities with applications spanning aerospace thermal management, microelectronics cooling, microfluidic systems, and potentially biological pattern formation, as the dynamics exhibit striking similarities to cytokinesis, a cell division process that remains poorly understood despite recent observations of similar oscillations in cells with defects.

Shawn Slaymaker

Discipline: Biology

Authors:

#1 Jeffrey Essner

#2 Renu Srivastava

#3 Astha Tuladhar

#4 Elizabeth Wunderlich

#5 Evan Zeka

#6 Boren Brooklyn

Abstract Name: Following Collagen Deposition During Zebrafish Development Using CRISPR-mediated Integration

Collagen IV (Col4a1) is a key extracellular matrix protein whose localization informs its role during vascular development and function. Using CRISPR/Cas9-mediated fluorescent protein tagging in zebrafish (*Danio rerio*), we integrated the Venus reporter into the Col4a1 locus via plasmid injection at the single-cell stage.

Using fluorescent microscopy, we screened embryos at 48 hours post-fertilization and observed the expression of Col4a1-venus fusion. We observed Col4a1-venus deposition around muscle cells and blood vessels during early development, highlighting its contribution to extracellular matrix organization. Current efforts focus on isolating a stable transgenic line to track Col4a1 dynamics during heart development and regeneration. This approach establishes a platform for visualizing collagen IV in vivo and advancing our understanding of its role in development and regeneration.

Atticus Slosson

Discipline: Chemistry

Authors:

#1 Atticus Slosson

#2 Jackson Steiner

#3 Lior Fisher

#4 Kristen Skogerboe

Jackson Steiner

Abstract Name: Development of a Method for Selective Retention of Fragrance Components on Activated Carbon: Implications for Volatile Organic Compound Preservation

Volatile organic compounds (VOCs) are key components of fragrance formulations and personal care products. They can serve as valuable chemical signatures in forensic investigations involving clothing, personal items, and environmental residues. However, their high volatility and differential adsorption behavior present substantial challenges for reliable evidence of collection, transport, and downstream analysis. Traditional sampling approaches, such as solid-phase microextraction (SPME), offer high sensitivity but require specialized equipment, rapid deployment, and technical expertise. These limitations have increased interest in cost-effective and field-deployable alternatives, that can offer a similar level of reliability to current testing standards, leading to this investigation of activated carbon, which is used in arson investigations but not explored in fragrance-related VOC sampling. This research aims to evaluate the use of active carbon strips as a more cost-effective alternative to capture VOCs associated with clothing evidence. This study assessed the selective retention and preservation of fragrance-derived VOCs on activated carbon to better understand the influence of sampling media on volatile evidence. Activated carbon strips were exposed to cotton knit fabric samples treated with commercial fragrances under controlled laboratory conditions. VOCs were eluted from the carbon strips using solvent and analyzed by direct injection into a gas chromatography–mass spectrometry (GC–MS) system. Resulting chromatograms were compared with direct injections of 1-10 diluted fragrance standards, demonstrating that this method enables capture of fragrance compounds. This work contributes to the development of more accessible and reliable GC–MS based methodologies for preserving and analyzing VOC evidence, particularly for identifying fragrance components in trace forensic samples such as clothing fibers, packaging materials, and environmental residues.

Ashley Smalley

Discipline: Engineering

Authors:

#1 Ashley Smalley

#2 Soumya Srivastava

#3 Sai Deepika Reddy Yaram

Abstract Name: Assessing Xurography as a Low-Cost Fabrication Technology for Dielectric Spectroscopy

Microfluidic platforms provide controlled environments for manipulating biological cells and are often paired with dielectrophoresis (DEP), a technique that generates forces on polarizable particles in nonuniform electric fields. The direction and magnitude of DEP depend on cellular electrical properties, suspending medium, and the applied AC frequency. The point at which the DEP force becomes zero, the crossover frequency, serves as an indicator of the cell's dielectric behavior and can reflect underlying physiological conditions, offering potential options in diagnostic applications. Despite the value of DEP-enabled devices, many institutions lack access to conventional microfabrication due to its cost and equipment requirements. This work explores Xurography as a low-cost alternative capable of producing microdevices suitable for dielectric characterization. Microchannel layouts were designed and cut from laminating films with a CAMEO cutter, layered with platinum electrodes, and sealed via thermal lamination. To validate our technology, packed red blood cells suspended in sugar solutions at varying conductivities were introduced into these devices, and a 10 Vpp signal was applied across 60–80 μm electrode gaps while the AC frequency was incrementally adjusted. Visual assessment of the transition between positive and negative DEP enabled determination of the first crossover frequency. These measurements will be used to evaluate the reproducibility and reliability of Xurography-fabricated devices, providing insight into whether this fabrication method can support accessible, cell-focused microfluidic research in low-resource environments.

YiLi Smedley

Discipline: Gender, Ethnicity, Diversity, or Cultural Studies

Authors:

#1 YiLi Smedley

Abstract Name: The Evolution of Tea's Influence in Chinese Culture: Religious, Philosophical, and Artistic Dimensions from Antiquity to the Global Era

Camellia sinensis, commonly known as tea, has been a cornerstone of cultural development in China, shaping religious beliefs, artistic expression, and social norms from China's ancient past to the present, where its impact can still be found in every country it inhabits. Past research primarily explored tea's economic, agricultural, biological, and religious contributions; its more holistic cultural significance has received less thorough attention. This failure has caused tea's infiltration in every aspect of Chinese life to remain in the shadows. I aim to address this gap with historical documentation such as ancient Chinese texts and drawings, linguistics, and cultural anthropology, as well as archaeological findings and trade route records to trace tea's evolution from its mythic discovery to its national popularity. Historical texts are indicative of tea's ability to set and change norms of refinement, mindfulness, entertainment, and social connection, particularly in the Tang and Song Dynasties. More recent sources encapsulate tea's role in modern China in comparison to the past, where it was a symbol of status and prestige amongst the elites. Now, tea has become a common commodity that unites instead of divides, with each generation making it their own. As a universal bridge, tea has traveled from China to countries around the world. From the formal Japanese Tea Ceremony to the more casual British Afternoon Tea, new ways of enjoyment tailor the tea experience to reflect each country's own unique society, leaving behind its pleasant aftertaste on the palates of all who have been satisfied. Thus, tea remains both widely accessible and enduringly significant as a subject of cultural engagement and study, as understanding its role in Chinese culture provides insight into the historical and social foundations of customs and norms that may otherwise appear unusual or arbitrary. This, in turn, fosters greater cross-cultural understanding and appreciation.

Ethan Smith

Discipline: English and Literature

Authors:

Abstract Name: Domination in the Shadows

Domination in the Shadows Name: Ethan Smith Major Department(s): Philosophy (Psychology & Creative Writing minors) Project Abstract My capstone research in PAR 400 philosophy of democracy and power examines domination, wealth inequality, and freedom in modern society. Reading from Jeffrey Winters and Alex Gourevitch, I argue that capitalism hides domination through wealth defense and structural inequality, much like Plato's Allegory of the Cave conceals with shadows. I am requesting a CHSSA Research Grant to present this project at a regional philosophy conference, submit it for undergraduate publication, and study historical sites abroad in Greece. This support will expand my paper and prepare me for graduate-level research. Research Project Description My research develops from my PAR 400 capstone seminar, where I examine the relationship between domination and freedom in politics. Winters argues that modern democracies are structured by "wealth defense," where elites consolidate resources to preserve power. Gourevitch extends this by showing how structural domination persists even without overt coercion. I connect these analyses to Plato's Allegory of the Cave, where individuals mistake shadows for truth. This metaphor highlights how systemic domination today can obscure genuine and true freedom by presenting inequality as natural or inevitable. I will adapt the essay into a presentation for the North Carolina Undergraduate Research Conference (NCURC). I plan to produce a companion creative nonfiction essay that integrates travel experiences in Greece with philosophical reflection, linking Socratic sites to modern debates on domination.

Hunter Smith

Discipline: Biology

Authors:

- #1 Hunter Smith
- #2 Kylie Tenhouse
- #3 Abhinav Yenduri
- #4 Erica Holliday
- #5 Kawsar Chowdhury
- #6 Vishnu Suppiramaniam

Abstract Name: Sigma-1 Receptor Potentiates Synaptic Glutamate (NMDA) Receptor Channel Activity

Background: The α -amino-3-hydroxy-5-methyl-4-isoxazole propionic acid (AMPA) and N-methyl-D-aspartate (NMDA) types of glutamate receptors are central mediators of excitatory neurotransmission and are essential for synaptic plasticity mechanisms required for learning and memory formation. Precise regulation of NMDA receptor (NMDAR) function is critical for maintaining neuronal communication and cognitive stability. The sigma-1 receptor (σ 1R), an endoplasmic reticulum chaperone enriched at mitochondria-associated membranes, has been implicated in modulating glutamatergic neurotransmission and cognitive processes. The σ 1R activation enhances glutamate release and promotes long-term potentiation (LTP), a cellular model of memory. However, its direct impact on synaptic NMDA receptor channel function remains not fully elucidated. We hypothesize that σ 1R serves as a positive modulator of synaptic NMDA receptor function, thereby supporting enhanced synaptic plasticity and memory processes. Methods: Single-channel electrophysiological recordings were performed on hippocampal synaptosomal NMDARs using artificial bilayers and patch-clamp electrophysiology to assess channel properties, including open probability, conductance, and interactive channel gating, under control conditions and following σ 1R agonist treatment. Results: σ 1R activation significantly increased NMDAR mean open probability and enhanced interactive channel gating. These changes are consistent with improved synaptic efficacy and facilitation of plasticity

mechanisms in the presence of σ 1R agonist. Conclusion: These findings demonstrate that σ 1R activation positively modulates synaptic NMDA receptor channel function, suggesting a mechanistic link between σ 1R signaling and enhanced synaptic plasticity. Thus σ 1R represents a promising therapeutic target for mitigating cognitive decline and neurodegenerative disorders by modulating glutamatergic neurotransmission.

Sadie Smith

Discipline: Nursing and Public Health

Authors:

#1 Katherine Morgan

#2 Jennifer Smith

Abstract Name: Think bright colored food: A Qualitative Study of People Living with ALS Who Followed the MIND Diet in a 7-Week Pilot Study

Nutritional deficits are a problem for those with ALS (Amyotrophic Lateral Sclerosis) as their disease progresses. For people with ALS (pALS), adequate nutrition to support the body is extremely important. ALS is a disease that causes weight loss and muscle wasting. An important aspect of adequate nutrition is the individual's attitude towards diet. If the individual does not value the importance of diet and the types of foods that support their body, then they will likely not achieve proper nutrition. This study aims to identify the attitudes of those with ALS in adhering to a neuroprotective nutritional pattern called the Mediterranean-DASH Intervention for Neurodegenerative Delay (MIND) diet. Participants included 11 pALS who followed the MIND diet for 7 weeks. Using open-ended survey questions each week, participants were asked about their experience following the diet. Their responses were coded, and common themes were identified as follows: physical barriers to preparing foods, symptoms impacting food consumption, and the importance of support. These trends show common challenges faced in this population in following the diet and commonly held attitudes. These results can be used to help address the challenges and improve outcomes of pALS in eating well.

Sanaa Smith

Discipline: Sociology

Authors:

Abstract Name: Faith On Display: Investigating Religious Discrimination in the Hiring Process

This study investigates whether wearing a visible religious symbol affects perceptions and suitability of an applicant's qualifications during the hiring process. The research addresses the ongoing issue of religious discrimination in employment settings and its implications for fair and unbiased hiring practices. Using the online platform Qualtrics, 150 participants reviewed a job description for an Engineering-in-Training position and evaluated two applicant headshots and résumés presented as, Applicant A and Applicant B. Applicant A, who was randomly assigned to wear a necklace pendant featuring a Cross, Star of David, the word "Allah" in Arabic, or no symbol, and Applicant B, who wore no symbol. Participants rated each applicant's suitability for the role, indicated their hiring preference, and provided reasoning for their decisions. Based on previous literature, it was hypothesized that applicants displaying Christian symbols, such as a Cross, would be evaluated more favorably and viewed as a better fit for the position than those wearing non-Christian symbols. It was also expected that individuals would be less willing to wear visible religious symbols to an interview if they believed doing so could reduce their likelihood of being hired or viewed fairly. Preliminary

results suggest that wearing a religious symbol does not significantly influence hiring outcomes. Instead, participants emphasized applicants' résumés and qualifications as the primary factors guiding their decisions. These findings indicate that, within this sample, visible religious symbols may not disadvantage applicants as strongly as previous research has suggested, underscoring the importance of continued research on subtle forms of religious bias in professional contexts.

Abby Smith

Discipline: Theatre/Drama

Authors:

Abstract Name: The Muny: A Unique, Audience-Centered Experience

The Muny of St. Louis, Missouri (1919-), is an extremely unique theater, not just for being the oldest and largest musical outdoor theater in the United States, but also because of its mission. According to Gabe Hartwig, the Muny's Communications and Public Relations Manager, their goal is "to enrich lives by producing exceptional musical theatre, accessible to all, continuing its remarkable tradition in Forest Park." The employees want to share live theatre in a way that allows all kinds of audiences to see it. There are no exclusive or superiority factors at play, just showcasing theatre for the audience, their number one focus. There is no emphasis on ticket sales or aesthetics, but instead on the audience and their experience. This is done in multiple ways, but the main reasons I will discuss are the free seats they offer, relatively inexpensive tickets and season passes, and constantly renovating and updating the space to improve the audience's satisfaction. I plan to demonstrate this using a variety of sources, but specifically articles detailing different renovations, quotes from the staff, including an interview with a current staff member, and the overall experience the theater provides. I will also utilize the Muny's docuseries, Moments, which touches on everything one should know about this unique theater. In addition to those, there will be smaller, yet still impactful mentions of ways that the Muny is so unique, such as revising/rewriting popular Broadway shows so their specific audience gets a one-of-a-kind experience. Ultimately, I plan to discuss the Muny's profound understanding of the concept and purpose of live theatre and their execution of it; prioritizing the audience above all else.

Dana Smith

Discipline: Engineering

Authors:

#1 Mojtaba Jafarian Abyaneh

#2 Jinwoo Jang

Abstract Name: Validating Digital Twins: How Photorealistic 3D Map Tiles and OpenStreetMaps Perform in Airflow Simulation

Developing an intricate, geographically precise, and immersive digital depiction of actual streetscapes is crucial for progressing human-focused infrastructure design. This research builds upon an earlier project that integrated a cross-platform workflow, utilizing Photorealistic 3D Tiles (P3DT), OpenStreetMap (OSM), Blender, and Unity to generate a geographically aligned digital twin for traffic and agent-based simulations. The primary focus of the present study is on implementing rigorous geometric validation for this previously developed digital twin. This research conducts an in-depth comparison between a complex building model derived from P3DT and a generalized semantic model derived from OSM within a Computational Fluid

Dynamics (CFD) simulation framework. The methodology involves experimenting with these distinct geometries within the cloud-based environment known as SimScale. On this platform, the models are subjected to Lattice Boltzmann Method (LBM) simulations to examine airflow dynamics, thereby ensuring the accuracy of the data source based on the simulation outcomes. This project validates the application of P3DT in LBM modeling, successfully connecting visual realism with reliable, high-fidelity technical evaluation. This research establishes a foundational engineering-based approach to urban development that emphasizes environmental factors, including wind flow patterns, pedestrian comfort, and hurricane impact analysis.

BREANNA SMITH

Discipline: Architecture, Construction Management, and Interior Design

Authors:

Abstract Name: Agape Sanctuary: A Center for Rest, Reflection & Reconnection

Constant pressure to stay busy can drain and distract from peace, leaving little space for spiritual reflections. This project aims to help guests disconnect from their daily routines, ground themselves in the present, and engage with the Lord in meaningful ways. The facility is designed for individuals who are open to fellowship and deepening their spiritual relationship. Gallup reports that 68 percent of Americans identify as Christian, while weekly service attendance continues to decline, and public spaces dedicated to fellowship with the Lord outside church settings remain limited. A communal sanctuary offers a purposeful solution by providing a place to seek God's presence and restore well-being through supportive amenities beyond the traditional church environment. This approach aligns with place attachment theory, which describes the emotional bond individuals form with physical environments, and how people connect and feel a sense of belonging to places. Research methods include reviewing case studies on spiritual architecture, interviewing regular and infrequent churchgoers, observing interior environments during site visits, and analyzing the project site to understand its scale and context. This facility proposes lodging and a range of amenities, including fine dining, a music hall, fitness and spa, a retail shop, and a nature-inspired sanctuary. Natural elements throughout the indoor and outdoor environments, along with integrated ponds, support mental wellness and reflect attention restoration theory, which explains how nature helps restore focus and reduce cognitive fatigue. A dedicated sanctuary building offers space for prayer, meditation, and spiritual connection. Together, these features create a restorative setting for guests seeking spiritual and personal renewal.

Ryan Smith

Discipline: Environmental Science and Sustainability

Authors:

#1 Ravi Sankar

Abstract Name: Examining The Kyanite Mining Corporations Land Use Change and Mine Reclamation

The Kyanite Mine, located in Buckingham County, Virginia is one of the largest kyanite deposits in the United States. Over its history, Kyanite Mine Corporation has been recognized for its environmental stewardship efforts and success in reclamation. This study employed the use of remote sensing methods to evaluate the surface water quality of tailing ponds and the land use changes at the Kyanite Mine. Landsat imagery obtained from the USGS' Earth Explorer program were used to assess vegetation health and surface water quality over a 35-year period using the The Normalized Difference Vegetation Index (NDVI),

Normalized Difference Water Index (NDWI) and a novel machine learning algorithm that was used to evaluate land use and land cover change. The NDVI and NDWI analyses for 1990 and 2025 reveal substantial improvements in both vegetation condition and surface water characteristics across the study area. NDVI values increased from 0.35 in 1990 to 0.59 in 2025, indicating a marked enhancement in vegetation density and overall ecosystem health over the 35-year period. Parallel increases in NDWI suggest that surface water bodies have become more persistent and hydrologically stable, reflecting improved water availability or quality. Together, these trends point to long-term positive environmental change and highlight the effectiveness of remote sensing indices for monitoring landscape-scale ecological dynamics at the Kyanite Mine.

Carrie Smith

Discipline: Biology

Authors:

#1 Katie Marlow

#2 Zhangli Su

Abstract Name: Developing a dTAG-Based Degradation System for the tRNA Methyltransferase TRMT10B

Modifications to tRNA often impact tRNA stability and function. Defects in tRNA modifications have been associated with different human diseases, including developmental disorders, metabolic disorders, and cancers. Members of the Trm10 family are tRNA N1-methyltransferases that modify purines at position 9, and mutations in TRMT10A and TRMT10C have been linked to impaired brain development and mitochondrial dysfunction, respectively. The addition of N1-methyladenosine at position 9 in tRNAs (m1A9) is catalyzed by the tRNA methyltransferase, TRMT10B. Compared to other enzymes in the Trm10 family, TRMT10B has been significantly understudied, including its mechanism, substrate specificity, and general cellular effects. Interestingly, high TRMT10B expression is associated with favorable patient outcome in several cancer types. TRMT10B is endogenously expressed in a range of cell lines, including HEK293T cells. Our system to study this enzyme incorporates the dTAG design, which attaches a small tag (FKBP12F36V) to a protein of interest, allowing rapid and reversible loss of that protein upon addition of a dTAG degrader molecule. Our objective is to generate a TRMT10B degradation cell line using the dTAG system to understand the impact of TRMT10B on translation and tRNA stability. Using Gateway cloning, we inserted TRMT10B into a dTAG vector and transiently transfected the FKBP12F36V-HA-TRMT10B-containing plasmid into HEK293T mammalian cells. Subsequently, we confirmed the expression of the fusion protein using western blotting with antibodies targeting the HA tag and TRMT10B. Probing with both HA and TRMT10B antibodies produced a strong band at approximately 58 kDa, validating the successful expression of the fusion protein. Ongoing experiments are aimed at confirming the degradation of TRMT10B by dTAG with western blotting and analyzing translational changes with puromycin labeling. Establishing this dTAG-based TRMT10B degradation system will provide a tool to study the impact of TRMT10B on tRNA stability and cellular processes to better characterize an understudied tRNA methyltransferase.

Lauren Smith

Discipline: Social Work and Human Services

Authors:

Abstract Name: The Effects of Live versus Recorded Music on the Engagement of Adults with Intellectual Disabilities in Music Therapy

For decades, music therapists have utilized music interventions to assist individuals with disabilities in achieving non-musical goals, including behavioral regulation, communication, motor control, cognitive skills, emotional expression, and social skills. While a large body of research in music therapy concerns children with intellectual and developmental disabilities (IDD), few studies focus on adults with IDD. In addition to research, this population is often excluded from healthcare benefits, public education, and community services. The purpose of this observational study was to examine the engagement levels of adults with IDD during active music-making interventions to determine if the presentation of music, live or recorded, changes these levels. A board-certified music therapist performed active music-making interventions using either live or recorded music for participants ($n = 178$) in a summer camp program for people with IDD. Participant engagement was operationally defined and recorded as active, passive, or not engaged using a time-sampling methodology. A two-sample independent χ^2 test was utilized to examine the difference in engagement of participants during music therapy interventions between live and recorded music presentation style. An overall significant difference was found, $\chi^2(2, 796) = 30.58, p < .0001, V = .196$. Post hoc 2x2 contingency table χ^2 tests were significant ($p < .04$). Descriptive results showed that while active engagement levels remained similar for both modalities, live music interventions produced higher levels of passive engagement and held participants' engagement for a longer duration than recorded music interventions. These data provide applicable insights for clinical care informing intervention development and implementation for music therapists and other care professionals as they seek to engage adults with IDD and provide effective services.

Lindsay Smith

Discipline: Psychology

Authors:

#1 Kai Wakeman

Abstract Name: Insecure Attachment: Implications for OCPD Features among University Students

Background: Obsessive-compulsive personality disorder (OCPD) is characterized by preoccupations with orderliness, perfectionism, and control, all of which reduce flexibility, openness, and efficiency. Bowlby's attachment theory suggests that personality disorders (PDs) can result from childhood deprivation of care or instability in the relationship with a primary caregiver. Specifically, attachment issues (i.e., insecure avoidant attachment) are considered to be a salient etiological factor in the development of OCPD. This study aims to expand on the relationship between adult attachment styles and OCPD features and symptoms. Method: The sample consisted of 317 undergraduate students from a mid-Atlantic liberal arts university ($n = 232$ females and $n = 85$ males; mean age = 19.32 years, $SD = 1.33$). Participants completed an online survey containing demographic questions, the Pathological Obsessive-Compulsive Personality Scale (POPS) to assess maladaptive obsessive-compulsive traits, and a forced-choice measure of adult attachment styles (Secure, Avoidant, Anxious-Ambivalent). Results: A series of 2 (biological sex) x 3 (adult attachment style) factorial ANOVAs assessed the effects of biological sex and attachment style on POPS total and subscale scores. Significant main effects were found for biological sex on Emotional Over-Control ($p = 0.007$), Maladaptive Perfectionism ($p = 0.036$), and Difficulty with Change ($p = 0.004$). Significant main effects for adult attachment style were found on the POPS total score ($p < 0.001$) and the following subscales: Rigidity ($p < 0.001$), Emotional Over-Control ($p < 0.001$), Maladaptive Perfectionism ($p < 0.001$), Reluctance to Delegate ($p < 0.001$), and Difficulty with Change ($p = 0.014$). Discussion: The findings support previous research linking OCPD to high attachment avoidance. Specifically, participants with an Avoidant attachment style scored higher on all POPS subscales compared to those with a Secure attachment style. Future research with a more diverse sample could provide further insights into the relationship between attachment and OCPD features.

Nicolas Smith

Discipline: Chemistry

Authors:

#1 Nicolas Smith
#2 Suemy Valenzuela,
#3 Davia Hudson-Holness
#4 Jessica Pierre Toussaint
#5 Jason Mendoza
Suemy Valenzuela

Abstract Name: The Effects of Light Wavelength on the Growth of Lettuce (*Lactuca sativa*) Cultivated in Martian Regolith

As space missions progress toward Martian exploration, developing reliable methods for producing fresh food in extraterrestrial environments has become increasingly important. Martian regolith presents major challenges for plant cultivation because of its high alkalinity, poor water retention, nutrient deficiencies, and the presence of perchlorates. Lettuce has been shown to be a strong candidate crop for space agriculture because of its rapid growth cycle, nutritional value, and successful performance in controlled-environment studies. Light quality is a major environmental variable influencing plant development, particularly in artificial growth systems required for space exploration. This study aims to investigate how different wavelengths of light such as full-spectrum, red (~660 nm), blue (~450 nm), and combined red/blue light will affect the growth and physiological responses of butterhead lettuce (*Lactuca sativa*) cultivated in a Martian regolith simulant amended with topsoil, perlite, and worm castings. Plants will be grown under controlled temperature and humidity conditions, with identical soil composition, watering schedules, and photoperiods across all treatments. Growth will be evaluated through weekly measurements of plant height, leaf number, leaf surface area, soil pH, electrical conductivity and chlorophyll content. At harvest, fresh and dry biomass will be recorded. Statistical analysis will compare mean growth responses among treatments to determine whether specific wavelengths improve plant performance in modified regolith. Data collection is ongoing, so results are still forthcoming. However, based on previous research, it is anticipated that combined red and blue wavelengths will promote higher biomass accumulation and chlorophyll development than single-wavelength treatments or full-spectrum controls. Findings from this study may inform future controlled-environment strategies for producing nutritious, reliable crops on Mars.

Lindsay Smith

Discipline: Psychology

Authors:

#1 Kai Wakeman

Abstract Name: The Influence of Self-Esteem and Adult Attachment Styles in BDD Symptoms and Severity in a Non-Clinical Sample

Background: Body dysmorphic disorder (BDD) is a disorder that is characterized by a preoccupation with an imagined or slight defect in appearance. The associated preoccupation with appearance flaws usually focuses on the face or head, but can be related to other body areas/parts as well. A key issue is how strongly the negative evaluation in the physical appearance domain associated with BDD is accompanied by low self-esteem and general feelings of unworthiness. It has been suggested that the psychopathological process in BDD may depend on the mode of attachment—specifically insecure attachment. Therefore, a key aim of this study was to assess the effects of self-esteem and attachment styles on self-reported frequency/severity of

BDD symptoms. Method: The sample consisted of 206 undergraduate students (n = 151 females and n = 55 males), with a mean age of 19.19 years (SD = 1.29). Measures included: Demographic items; the 61-item Body Dysmorphic Disorder Symptom Scale (BDD-SS); the 10-item Rosenberg Self-Esteem Scale (RSES; Self-Report Version); and a four-group model of adult attachment styles. Results: Two 2 (biological sex) x 2 (self-esteem low vs. high) x 4 (attachment style) factorial ANOVAs were performed to assess the influence of self-esteem (low vs. high) and attachment styles on BDD-SS symptom and severity scores. For BDD-SS symptom scores, all main effects were significant (p's < 0.05). For BDD-SS severity scores, there were significant main effects for self-esteem and attachment style (p's < 0.001). Discussion: Consistent with previously published studies, data from this study also demonstrate that low self-esteem is related to BDD. Moreover, this study further suggests that BDD symptomatology perhaps impacts self-esteem more strongly in women. Similar to other studies, these data suggest that both Secure and Dismissive attachment styles are associated with a more positive body image compared to Preoccupied and Fearful attachment styles.

Joshua Smith

Discipline: Engineering

Authors:

#1 Bianca Santana

#2 Ritu Raj

#3 Matthew Kwan

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Abstract Name: Microrobot-Assisted Delivery of Circular RNA-Lipid Nanoparticles for Lung-Associated Diseases

Respiratory diseases are more prevalent than ever, driving high demand for new therapies, but thick airway mucus is a major barrier that traps particles and inhibits pulmonary drug delivery. To overcome this problem, we developed biodegradable magnetic microrobots (μ bots) that swim in viscous environments under a rotating magnetic field. These μ bots can guide lipid nanoparticles (LNPs) loaded with circular RNA through complex fluids, presenting a promising strategy for enhanced drug delivery in the lungs. Biodegradable μ bots with differing shapes were fabricated with contact photolithography using poly(β -amino ester) and a photoinitiator. Magnetic field-responsiveness was introduced by embedding superparamagnetic iron oxide nanoparticles (SPIONs) into the μ bots or coating them with an iron film using electron-beam evaporation. LNPs containing circular RNA were subsequently attached. We assessed μ bot behavior in mucus-like fluids along with in vitro payload release, transfection, biocompatibility, and biodegradability. Magnetic μ bots swim in precise trajectories under rotating fields, demonstrating velocities dependent on their environment. Based on our design, we expect LNP- μ bots to remain stable during μ bot actuation, enabling payload release only at the desired target. We also anticipate that degradation of the μ bots can be adjusted by tuning the diacrylate-to-amine molar ratio in the resin, while retaining biocompatibility in vitro. LNP composition is being optimized to enhance μ bot attachment, and successful cell transfection with circular RNA within an acceptable cell viability range was accomplished in vitro. Finally, extended protein translation with circular RNA compared to linear messenger RNA was demonstrated in vitro. By optimizing LNP movement through complex environments and demonstrating sustained protein expression with circular RNA, this system offers a promising path toward more effective gene therapies for lung disease.

Anton Smith

Discipline: Biology

Authors:

#1 Amy Groth

Abstract Name: Creation of an Enhanced Germline-Specific RNAi Strain in *C. elegans*

In order to study the function and expression of the *odd-2* gene in the germline of *Caenorhabditis elegans*, we have been working to create a germline-specific RNA interference (RNAi) strain. We crossed the DCL569 and WM171 strains to create a new strain with a *rde-1* loss of function mutation, a germline-specific *sun-1P::rde-1* insertion, and an *eri-5* mutation that increases RNAi sensitivity. In this new strain, RNAi should only work in the germline, and the effect should be enhanced over the DCL569 strain alone. Genotyping was done via PCR. Primer optimization was successful for *rde-1*, *sun-1P::rde-1*, and *eri-5* mutant primers. However, after various PCR techniques and primer combinations to detect the *eri-5* wildtype (WT) sequence produced a positive band in the mutant strain, the WM171 strain was deemed problematic. After the possibility of contamination had been accounted for, Sanger sequencing was utilized. The sequencing confirmed the presence of the *eri-5* deletion in the WM171 strain but also revealed WT sequence when the WT primers were used. This suggests that there could be rearrangement that occurred during mutagenesis, unreported balancers, or heterozygosity occurring in the WM171 strain we received. Because the *eri-5* mutation could not be confirmed to be homozygous in the new strain, it cannot yet be considered a fully functioning enhanced germline-specific RNAi strain. Future directions include using long read nanopore sequencing to sequence the DNA to look at specifically where the WT sequence is. Another approach would be to use multigenerational genotyping techniques to check for the presence of homozygous *eri-5* mutant individuals within the strain. The construction of this strain will allow for greater ability to study germline-related genes in the future.

Samuel Smith

Discipline: Biology

Authors:

#1 Quin Goodson

#2 Jannatul Ferdoush

Abstract Name: Unveiling ADCY3 as a Central Olfactory-Related Biomarker Gene and Potential Therapeutic Target in Kidney and Colorectal Cancers

Olfactory genes, usually studied for their role in smell, are increasingly linked to cancer signaling. This project examined whether a shared olfactory-related hub gene connects kidney and colorectal cancers and whether it could be drug-targetable. Public GEO datasets for renal cell carcinoma and colorectal cancer were analyzed against a set of 489 olfactory/cilia genes. Differential expression, protein-protein interaction mapping, and network-ranking identified a 12-gene olfactory signature common to both cancers, with ADCY3 (Adenylyl Cyclase 3) emerging as the top hub gene across all analyses. External cancer portals confirmed that ADCY3 is broadly overexpressed in both tumor types, though not predictive of overall survival. Drug-repurposing screens using an FDA-approved drug database highlighted three cannabinoid small molecules, rimonabant, cannabidiol, and dronabinol, as ADCY3-linked candidates. Molecular docking and ADME-tox predictions indicated favorable binding and acceptable oral drug-likeness and safety profiles. Overall, the study identifies ADCY3 as a conserved olfactory-related hub gene in kidney and colorectal cancers and suggests that these existing cannabinoid drugs warrant future experimental testing as potential ADCY3-targeting therapies.

Ben Smith

Discipline: Chemistry

Authors:

#1 Dr. Jerry LaRue

Ryan Lin

Abstract Name: Heterogeneous Catalysis: Methanol Decomposition on Platinum

Catalysts play a substantial role within the chemical industry, as their ability to conserve energy and increase the efficiency of chemical reactions makes them a vital component of modern science and technology. Platinum is a great example of this: its use in catalytic converters is what makes it possible for motor vehicles to run without expelling poisonous gases. While much is known about the capabilities of catalysts, there is a poor understanding of their fundamental chemistry. Studying how metals like platinum interact with common industrial materials will develop this understanding, allowing for greater efficiency and effectiveness. A common industrial chemical is methanol, as it is often seen as a reactant, product, and intermediate in industrial processes. It is a very simple molecule with common atomic bonds, which makes it a strong candidate for studying its interaction with platinum. When exposed to platinum, methanol decomposes to form carbon monoxide; however, little is known about the intermediates that form and the kinetics behind this reaction. To study this, a platinum crystal was placed in an ultra-high vacuum chamber, the surface was atomically cleaned to remove surface contamination, and it was exposed to methanol gas. Temperature-programmed desorption and sum-frequency generation spectroscopy were then used to determine what products are formed during this reaction. The data collected using these methods indicates that the methanol decomposes to form a methoxy intermediate, which then rapidly dehydrogenates to form products of hydrogen and carbon monoxide. This insight greatly improves our knowledge of catalyst functionality for future applications.

Aaliyah Smith-Debnam

Discipline: Anthropology and Archaeology

Authors:

Abstract Name: It's Only Politics, and What's That Got to Do With Us?: Cabaret and the Danger of Political Apathy

This paper examines the narrative of Cabaret in its entirety, analyzing its literary origins with the works of Christopher Isherwood, film adaptation at the hand of Bob Fosse, and multitude of theatre revivals (Isherwood, 1945, Kander, 1966). By utilizing an interpretive, comparative, and text-centered approach drawing from anthropology and cultural studies, each rendition of Cabaret is treated as a cultural artifact that reflects the socio-political ideologies of the people and the nations that are being represented. Specific characters in Cabaret, such as the Emcee, Clifford Bradshaw, and Sally Bowles, are used as individual case studies for the various ways in which people comprehend and cope with the rise of authoritarian fascism. In analyzing the story and the contexts in which it is being told the research argues that the novel/movie/play reveals the catastrophic consequences of political apathy both in Weimar Germany and in the modern day (Grey, 2024). This research analyzes the different character's responses to rising fascism in Germany in the late 1920s and early 1930s, and connects these responses to the contemporary politics of the United States. Specifically, the research examines how quickly the contested morals of political extremists in power become normalized, accepted, and eventually embraced by the citizens who once condemned them the second that those very people turn apathetic towards the injustices of rising fascism. As this apathy eventually results in the collapse of the Weimar Republic, this analysis offers a cautionary tale for the future of the U.S.

Kyle Smoak

Discipline: Psychology

Authors:

#1 Kyle Smoak

#2 Alexandra Byrd-Mills

#3 Michelle Phillips-Meek

#4 Scott Meek

Alexandra Byrd-Mills

Abstract Name: Your Brain on Grades: Neural Sensitivity to Graded Academic Feedback

Feedback-related negativity (FRN) is a fronto-central event-related potential (ERP) that emerges approximately 200–300 ms after feedback and is commonly associated with detecting outcomes that deviate from expectations. This component is typically followed by a P3 waveform (300–400 ms), which has been linked to reward processing and exhibits a centro-parietal distribution. The present study examined FRN and P3 responses using a novel three-tiered feedback paradigm that expanded traditional correct/incorrect feedback to include a “critically incorrect” category modeled after academic evaluations. Undergraduate participants completed a time-estimation task in which they attempted to indicate when one second had elapsed. Feedback was provided based on degree of inaccuracy in the form of academic letter grades (A+, C+, or F). Task difficulty was adaptively adjusted to ensure exposure to a range of feedback outcomes. ERPs were analyzed from a fronto-central region of interest (ROI) combining Fz and FCz for the FRN, and a parieto-occipital ROI combining Pz and POz for the P3. Planned comparisons examined differences between correct (A+) and incorrect (C+ and F combined) feedback, as well as between incorrect (C+) and critically incorrect (F) feedback. Incorrect feedback elicited a more negative FRN than correct feedback at the fronto-central ROI, and critically incorrect feedback generated a significantly more negative FRN than incorrect feedback. At the parieto-occipital ROI, correct feedback demonstrated a larger P3 amplitude than incorrect feedback, while no difference was found between incorrect and critically incorrect outcomes. These findings suggest that the FRN tracks graded levels of feedback deviation, whereas the P3 may primarily distinguish positive from non-positive outcomes. Future research will investigate how expectations and individual differences, such as susceptibility to stereotype threat, modulate neural responses to graded feedback.

Kieran Snavelly

Discipline: Anthropology and Archaeology

Authors:

#1 Kieran Snavelly

Abstract Name: Living and Making a Living in Philadelphia During the Constitutional Convention

“Living and Making a Living in Philadelphia During the Constitutional Convention” is an exhibit that will be made in collaboration with the Virtual Curation Laboratory (VCL) at Virginia Commonwealth University (VCU) under the direction of VCU Anthropology Professor Dr. Bernard Means, who is the director of the VCL. Through artifacts excavated from the National Constitution Center (NCC) site in Philadelphia, my exhibit makes connections between real objects and the realities of daily life and labor for Philadelphians around the time of the U.S. Constitution’s signing. Each object showcased in this exhibit is a morphologically accurate replica of an artifact made possible through 3-D scanning and 3-D printing technology courtesy of

the VCL. By incorporating tactile elements into this exhibit, I demonstrate their educational capacity to engage audiences, enhance learning outcomes, and increase accessibility to visually impaired individuals.

Emma Snead

Discipline: Biology

Authors:
Jackson Geeslin

Abstract Name: Environmental Pollutants and Pathogen Behavior: The Role of Microplastics on *Batrachochytrium dendrobatidis*

Amphibian populations are declining due to multiple environmental stressors including pollution and infectious pathogens. The most devastating pathogen is *Batrachochytrium dendrobatidis* (Bd), a fungus that infects amphibian skin disrupting electrolyte balance and leading to cardiac arrest. Meanwhile, microplastics (plastics smaller than 5 millimeters) are widespread pollutants in water systems and biological tissues. Although microplastics are known to alter amphibian development and physiology, their effects on pathogens such as Bd remain poorly understood. This study investigates how microplastics influence Bd growth, gene expression, and virulence. Two common polymers, polyethylene and polystyrene, were introduced into two strains of Bd culture. Growth was quantified using hemocytometer counts and optical density measurements. Polyethylene increased zoospore production and fungal growth, whereas polystyrene had minimal impact. The fungus appears to integrate the microplastics into its biofilm-like structures as observed through Scanning Electron Microscopy. Microplastics may also alter Bd virulence. Virulence can be assessed through enzyme activity and adhesion proteins important for host infection. After culturing the zoospore and zoosporangium stages with the API ZYM test strips, zoospores produced more enzymes than zoosporangia cells in the presence of plastics, but plastics decreased enzyme production (8/16 enzymes decreased). After allowing zoospores time to adhere to skin-based molecules, neither plastic interfered with Bd attachment as measured with the XTT assay, but may provide a competitive location to attach. Gene expression analysis using qPCR and primers specific for enzymes and adhesion factors is being conducted to verify test results. Finally, growth of the fungus with plastics and amphotericin B revealed inherent resistance across strains regardless of microplastic exposure. Future work will test alternative antifungal agents and additional stress conditions. By integrating environmental biology and genetics, this research aims to clarify how pollution influences pathogen behavior, offering insight into the complex interplay between contaminants and disease that threatens amphibian survival.

Cameron Snelbaker

Discipline: Chemistry

Authors:

#1 Lauren Toote

Abstract Name: Development of a Nanoparticle-based Lateral Flow Assay for the Detection of Mercury in Drinking Water

Heavy metals have lived in the Earth's crust for millennia, but in more recent years their extraction has increased. Smartphone production has led to an increase in small-scale gold mining globally, which produces mercury pollution. Furthermore, burning fossil fuels has increased mercury pollution in the atmosphere. Through atmospheric deposition, mercury can fall into waterways through precipitation. Once in waterways, inorganic mercury salts can form (Hg^{2+}), which can be detrimental to human health. When ingested, Hg^{2+} can cause gastrointestinal effects such as vomiting and abdominal pain. The current EPA restrictions limit the concentration of mercury to 2 ppb for drinking water; however, water sources do not always meet this criterion. Testing for mercury is done with instrumentation such as inductively coupled plasma optical emission spectroscopy or cold vapor atomic absorbance spectroscopy, that are not available and/or affordable for many. Our goal is to create a simple inexpensive paper-based lateral flow assay (LFA) to make heavy metal testing accessible to the public. Lateral flow assays are rapid tests (5-30 mins) used to detect or quantify analytes. Each LFA has a control line, which ensures the test's functionality, and a test line(s), which indicates the presence of the analyte(s). In this work, a control line composed of pH sensitive nanoparticles is used. The control line consists of nanoparticles synthesized from Neutral Red, poly (styrene-co-maleic acid) (PSMA), and polyvinyl alcohol (PVA). The test line is composed of nanoparticles synthesized from Rhodamine B, poly (styrene-co-maleic acid) (PSMA), and polyvinyl alcohol (PVA). These nanoparticles were characterized by using Dynamic Light Scattering (DLS), to confirm nanoparticle formation, and UV-Vis spectroscopy, to verify a colorimetric response. After validation, nanoparticles were incorporated onto a nitrocellulose lateral flow strip. The sensitivity and specificity of the tests were optimized for future use as an affordable option for testing drinking water.

Abigail Sneve

Discipline: Computer Science

Authors:

#1 Abigail Sneve

Abstract Name: Deep Learning-Driven Predictive Analytics Model Development for SQL Injection Detection in Cyber Space

SQL injection attacks remain one of the most critical threats to data security, often resulting in severe breaches and financial losses. Proactive detection of these attacks is essential for safeguarding database systems and reducing organizational risk. This research introduces an AI-driven predictive analysis model designed to identify SQL injection attempts before they compromise data integrity. To achieve this, a hybrid deep learning architecture is proposed that is combining one-dimensional Convolutional Neural Networks (1D CNN) and Recurrent Neural Networks (RNN). The proposed model has been implemented and tested on the Python platform. The model has trained on an open-source dataset that contains over 2,44,100 SQL queries for both injection and benign cases, ensuring comprehensive coverage of attack patterns. Local query patterns are captured through a 1D convolutional layer with max pooling, while sequence-dependent features are learned via a recurrent layer. Word embedding techniques further enhance the representation of SQL

statements, enabling the model to process structural and semantic information effectively. Evaluation results demonstrate strong performance, with a training accuracy of 92.31% and validation accuracy of 92.21%, alongside a validation loss of 0.1799 after five epochs. These outcomes confirm the model's ability to reliably distinguish between malicious and benign queries. Planned refinements, including hyperparameter tuning and architectural adjustments, aim to further improve accuracy and robustness. By enabling early detection of SQL injection attacks, this approach contributes to reducing data breach risks and strengthening overall cybersecurity resilience. Future work will focus on real-time deployment and extending the framework to other injection-based vulnerabilities.

Madelyn Snow

Discipline: Biology

Authors:

Abstract Name: The Mediterranean Diet and Premature Birth: The Interplay Between Proinflammatory Cytokines and 11 β -Hydroxysteroid Dehydrogenase 2

With an aim to determine the mechanism by which the Mediterranean Diet (MD) decreases the risk of premature birth, this study examines the relationship between proinflammatory cytokines, 11 β -Hydroxysteroid Dehydrogenase 2 (11 β -HSD2), and cortisol. Adherence to the MD decreases both cortisol levels and the risk of premature birth, while high cortisol levels are linked to increased risk of premature birth. Increased levels of proinflammatory cytokines TNF- α , IL-1 β , and IL-6 inhibit 11 β -HSD2 activation, increasing fetal cortisol exposure and subsequently raising premature birth risk. The MD may lower increases in proinflammatory cytokines, therefore explaining how MD adherence lowers the risk of premature birth. A literature review was conducted to examine the correlation between the MD and proinflammatory cytokine levels. Flor-Aleman et al. found that TNF- α levels decreased at the 34th gestational week with higher MD adherence, while Ramon Estruch found that IL-6 levels decreased with MD adherence supplemented with mixed nuts and olive oil. Additionally, Koelman et al.'s systematic review of MD adherence revealed that TNF- α , IL-1 β , and IL-6 concentrations significantly decreased. Synthesis of these results suggests that the MD's ability to lower proinflammatory cytokines increases 11 β -HSD2 activation, thereby reducing fetal cortisol exposure and decreasing the risk of premature birth. Future research should analyze inflammatory cytokine concentrations in preterm births from mothers who did and did not follow the MD to test the validity of this conclusion.

Charlotte Snow

Discipline: Physics and Astronomy

Authors:

#1 Charlotte Snow

Abstract Name: Background Studies of the Neutron Detector for the HIBEAM Program at the European Spallation Source.

The HIBEAM program at the European Spallation Source (ESS) aims to investigate baryon number-violating processes and other physics beyond the Standard Model using high-intensity cold neutron beams. As part of this effort, a dedicated neutron detector is being developed to provide precise beam monitoring and strong background suppression. In this work, we conduct a systematic study of the neutron and gamma backgrounds that reach the detector under different geometric and shielding configurations. By using Monte Carlo

simulations, we model how neutrons arrive at the detector from both the direct beam and from scattering on nearby components. The results show that the background distribution is highly sensitive to the surrounding materials. Changes in shielding and structural layout significantly affect flux distribution of background neutrons and gammas, with some configurations leading to increased scattered-neutron flux, while others more effectively suppress backgrounds and produce a cleaner signal. Overall, this work provides guidance for optimizing the detector design within the HIBEAM program by identifying the main contributors to the neutron and gamma backgrounds.

Reagan Snyder

Discipline: English and Literature

Authors:

Abstract Name: Dante Alighieri's Search for Justice

In a society where justice had plural meanings, Dante Alighieri explored God's final realm of justice in his piece *The Inferno*. Since Dante wrote this piece in the Middle Ages, the injustices that he personally experienced as well as the perceived injustices of a whole society affects his view of biblical justice. This is shown in how he portrays hell and the eternal punishment that society believed awaited all of humanity. Dante experienced injustice at an early age when his lover, Beatrice, was married to another man. Dante continued to love her throughout his life even after her death and compared her to an angelic being in *The Inferno*. Dante further puts his spin on justice when he includes Maximus and Brutus in the lowest level of hell, equal with the Devil. This placement of the murderers of Julius Caesar shows how the Roman empire was interpreted by societies in a reverent way even hundreds of years after its fall. His interpretation of justice gives insight not only into his personal beliefs but also the beliefs of a whole culture. Dante's fictional story has become a critical part of understanding Medieval culture both in Dante's image of the world and the development of Medieval society after the publication of *The Inferno*; these injustices and their reflection on Medieval culture deserve to be studied.

Makenna Snyder

Discipline: Psychology

Authors:

#1 Jennifer Wittmeyer

Abstract Name: Linking Brain Structure with Epilepsy and Behavioral Measures in Chromosome 8p Rearrangements

This current project is being conducted in collaboration with the Project 8p Foundation, an initiative that aims to create the world's first MRI-based cortical surface and volumetric brain atlas for individuals with chromosomal 8p variations. Chromosome 8p rearrangements affect about 1 in 10,000 children and is associated with various neurodevelopmental disorders including epilepsy and developmental delays. Current neuroimaging studies lack accurate atlases to investigate 8p neuroanatomy, which is commonly characterized by enlarged ventricles and corpus callosum anomalies. This project aims to create an 8p brain template and atlas specific to this population. We also seek to link epilepsy and other behavioral measures to gray matter structure. In this study, pediatric MRIs of individuals with confirmed 8p rearrangements will be processed and corrected to assess gray matter volume in key regions of interest. The main focus is to examine brain-epilepsy relationships in neural regions of interest by correlating cortical thickness and gray matter volume

measures with seizure outcomes (presence/absence, severity, genetic markers, and age-of-onset), as about one-third of the cohort has epilepsy. We will compare brain structure measures in 8p individuals with various phenotypic and genotypic measures and identify the potential genetic and brain structure biomarkers correlated with epileptic occurrences. The expected aims of this study include creating the first MRI atlas for chromosomal 8p variations, identifying structural biomarkers linked to epilepsy severity, and discussing these findings in various journals and presentations, including the American Epilepsy Society meeting and the Project 8p Scientific Symposium.

Claire Sobash

Discipline: Art History

Authors:

Abstract Name: The Persistence of Memory and Modernity in Meiji Woodblock Prints

After a 200-year period of isolation, Japan opened its borders to international exchange in 1854. Emperor Meiji (1867–1912) established a directive to modernize Japan, take on Western culture, industrialize the landscape, and organize propaganda to initiate the restoration of imperial authority under his reign (r. 1867–1912). Woodblock artists like Kobayashi Kiyochika (1847–1915) and Toyohara Chikanobu (1838–1912) were born into samurai families stripped of their titles when the emperor assumed power, yet they interpret this moment in history differently. The novelty of new technology, like the gas lamp and railroads, excited people, but there was an underlying anxiety that traditional Japanese culture would be forgotten. This presentation will interrogate how Kobayashi Kiyochika and Toyohara Chikanobu represent the paradoxes at the heart of the Meiji period (1868–1912). In an art historical visual analysis of two exemplary works by the artists, this presentation will further claim that these artists could represent the mindsets of Japanese people, reflecting the tensions between Japan's anxiety around cultural preservation and the more assertive embracing of Western influence during the 1880s. Kiyochika's print *Fireworks at Ikenohata*, published in 1881, illustrates the nostalgia of Japanese culture during the Edo period (1603–1868), in a reflective moment of celebration where new technology is subverted by traditional candle lanterns and fireworks in the surrounding darkness. Chikanobu's print *Nobility in the Evening Cool*, published in 1887, embodies how Western modernization was an idealized directive for the Japanese Imperial court because of the use of Western dress, gas lamps illuminating the landscape, and modern architecture. This research underpins how national identity at this time in Japan is not monolithic because rapid modernization diverged the values of preserving cultural memory and embracing industrialization.

Vritti Sodha

Discipline: Business

Authors:

#1 Vritti Sodha

Abstract Name: Parents know best: The relationship between parenthood and children's co-ed sports

Adult men and women competing in the same sports doesn't sound fair, but what about children? During the early years of life, there is no significant difference between genders in terms of physical ability. Presumably, those who are parents/guardians have different outlooks on this controversy than those who are not. To better understand this controversy, a seventeen question survey was completed by 417 respondents. Analysis of the results showed that those that were parents and guardians were more likely to allow their children to

participate in co-ed sports than those that were not, with 49.8% of parents responding “yes, always” and 35.4% of parents responding “yes, but only at younger ages.” Hypothetically, those that do not have children are less comfortable with letting their children play sports with the opposite gender, which might suggest that parental experience creates a change in perspective. However, when respondents were asked whether they believe that children’s co-ed sports come with challenges such as differences in physical development most of them answered that they agreed (38.9% of respondents) or strongly agreed (29.7% of respondents). This could suggest that regardless of the acknowledged challenges of co-ed sports, parents and guardians still find value in children participating in co-ed sports.

Mia Soell

Discipline: Political Science

Authors:

#1 Mia Soell

Abstract Name: Trust and Safety in the Time of Algorithmic Amplification and Polarization

Algorithmic amplification is the internal mechanism that dictates the magnification of certain speech and the repression of other view points. In a time of ever increasing polarization with technology companies becoming more and more powerful, how do we achieve transparency within algorithms and algorithmic amplification while protecting proprietary information? How do we as a society best manage the wide reaching impacts of polarization due to algorithmic amplification in social media. Trust and Safety departments within online companies work to safeguard users from harm. They incorporate human oversight into the platform and produce transparency reports. Research surrounding Trust and Safety as well as regulation around the internet have so far not taken into account the boom of artificial intelligence and mass consumption of data. Policy and regulation surrounding speech online has not been updated significantly in this millennium. The the majority of recent regulation focused on child sexual abuse material (CSAM) and copy right issues. There is a lack of research on how AI and the ever increasing push for data will impact society, the power of tech companies and the ways in which they exert that power on government. The methodology is qualitative research working off previous research conducted as well as the interior Trust and Safety policies of the big five technology companies Microsoft, Apple, Alphabet (Google), Amazon and Meta. This project will address the role of polarization due to algorithm amplification and the role of transparency while highlighting the power of these industry super powers. A thorough review of how the key stakeholders government, industry, and the consumer interact in an environment of insufficient regulation.

Addison Sofran

Discipline: Biology

Authors:

#1 Joshua Corrette-Bennett

Abstract Name: The effect of propylparaben on hsp70 expression during axolotl limb regeneration

Wound healing and regeneration have long captivated biologists as a viewpoint into the body’s ability to heal and rebuild. The axolotl (*Ambystoma mexicanum*) is an aquatic salamander known for its enhanced capacity to regenerate complex and fully functional tissues without scarring. Regeneration occurs through three coordinated stages: wound healing, blastema formation, and tissue differentiation, each driven by distinct patterns of gene expression. Among these genes, previous research indicates that hsp70, encoding heat shock

protein 70, is upregulated following exposure to stressful situations, such as limb loss. This molecular chaperone facilitates proper folding of newly synthesized polypeptides, a crucial process for rapidly dividing cells. However, the aquatic existence of axolotls exposes them to anthropogenic contaminants, including parabens, which are endocrine-disrupting chemicals frequently used as preservatives in consumer products. Propylparaben (PrP) is of particular concern because it is a longer-chain paraben which produces stronger estrogenic activity, reproductive toxicity, and eventually produces developmental abnormalities. Despite its prevalence, the biological effects of propylparaben remain insufficiently characterized, especially in regenerative species. This research explores the impact of propylparaben exposure on hsp70 expression during axolotl wound healing and tissue regeneration. Twenty-four axolotls were injected with one of three treatments (0% PrP saline control, 0.0014% PrP, 0.14% PrP) and subjected to two successive amputations for sample collection at Time 0 (non-regenerating tissue) and Time 72 (regenerating tissue). RNA from each tissue sample was isolated, purified, and reverse-transcribed to cDNA, followed by PCR amplification using primers targeting hsp70. Relative expression levels were assessed with agarose gel electrophoresis. We predicted that increasing propylparaben concentration will decrease hsp70 expression during axolotl wound healing and tissue regeneration. Findings from this research will enhance understanding of how environmental pollutants influence molecular mechanisms of regeneration and highlight the broader role of hsp70 as a conserved stress-response gene across eukaryotes.

Vanika Sok

Discipline: Economics

Authors:

Abstract Name: Does women's empowerment improve child welfare? New evidence from Cambodia

Women's empowerment in developing countries remains understudied, and in particular its impact on child welfare. I examine how women's intra-household bargaining power – proxied by women's land ownership, education, perception about justified wife-beating, and household decision-making – affects child welfare indicators. Using Demographic and Health Survey (DHS) data from Cambodia from 2000 to 2022, I estimate how women's empowerment affects child school enrollment status and child anthropometric health outcomes. I also explore whether these impacts differ by the gender of the child, and potentially reduce any gender-based inequality in child welfare. In order to reduce the bias in the estimators of these effects, I control for household level characteristics and region and time fixed effects. The findings will contribute to the literature on gender and development by providing new evidence from Cambodia and offering insights for policies targeting child welfare.

Havana Solano

Discipline: Biology

Authors:

#1 Monique van Hoek

Abstract Name: Testing DRGN-1 Variant Peptides for Improved Antibacterial Activity

DRGN-1 is a synthetic peptide derived from a Komodo-dragon histone H1 fragment (VK25) that has demonstrated antimicrobial, antibiofilm, and wound-healing properties in vitro and in vivo (Chung et al., 2017). However, its antibacterial activity was primarily observed under low-salt EC₅₀ conditions and was substantially reduced under mammalian physiological ionic environments used for MIC testing (Chung et al.,

2017). Additionally, potency varied across bacterial species, with *Staphylococcus aureus* requiring higher effective concentrations than *Pseudomonas aeruginosa* (Strain 9027). These limitations motivated the development of DRGN-1 peptide variants with the hope for improved activity against clinically relevant wound pathogens. In this ongoing project, a panel of rationally modified peptides incorporating amino acid substitutions to increase charge, hydrophobicity, or structural stability is being evaluated. This project evaluates rationally modified peptides incorporating amino acid substitutions to enhance charge, hydrophobicity, and structural stability. Antimicrobial screening in low salt buffer (EC₅₀) against *S. aureus* ATCC 25923 (SA25923) was performed using 96-well microplate assays and analyzed in GraphPad Prism. Preliminary results show that the triple-arginine variant DRGN-1R1R7R10 exhibited enhanced potency with an EC₅₀ of 3.49 µg/mL compared to the parent peptide, while several single-site mutants showed much less activity. The parent peptide did not reach an EC₅₀ within the tested concentration range under these assay conditions, suggesting reduced apparent activity compared with earlier reports. Interestingly, variants containing fewer arginine substitutions or alternative designs, such as R1R7 and RW peptides, demonstrated moderate improvements but lower overall potency than the triple-arginine construct. Ongoing work focuses on assessing the minimum inhibitory concentration (in physiological salt conditions) and antibiofilm activity using crystal violet–based assays for top variants to identify lead peptides with improved potency and therapeutic potential for wound infection treatment.

Nicole Solick

Discipline: Psychology

Authors:

Abstract Name: Beyond the Skin: The Emotional and Social Burden of Acne in Youth

1. Central Research Question and Purpose of the Project Acne is one of the most common dermatological conditions among adolescents and young adults, yet its emotional impact is often overlooked. This project asks: How do acne and acne scarring influence emotional well-being, social interactions, and identity development in teens and young adults? The purpose of this review is to summarize recent findings on the psychological and social effects of acne during a critical developmental stage. 2. Scholarly Context and Contribution Growing awareness of youth mental health and intensified social media pressures have increased interest in how appearance-related conditions affect psychological outcomes. While existing studies examine issues such as self-esteem or anxiety independently, few provide a comprehensive synthesis. This review contributes an updated, integrated analysis of research from 2015 to 2025, highlighting how acne interacts with self-image, emotional distress, and social experiences in today's media-driven environment. 3. Research Methodology This project uses a qualitative literature review approach. Fifteen peer-reviewed studies published between 2015 and 2025 were selected based on their focus on adolescents or young adults and their examination of at least one psychological variable, including self-esteem, anxiety, depression, or quality of life. Common themes were identified through comparative analysis. 4. Conclusions and Expected Results Three major conclusions emerge: (1) acne is associated with lower self-esteem and increased social anxiety; (2) acne scarring causes long-lasting emotional distress; and (3) social media exposure intensifies negative body image through comparison and idealized imagery. These findings support the need for dermatological care that incorporates mental-health support. Future research should explore long-term emotional recovery and the role of supportive environments in improving outcomes.

Nicole Solick

Discipline: Physical/Occupational Therapy and Speech Language Pathology

Authors:
Leah Johnson

Abstract Name: The Search for Relief: How Physical Therapy Interventions Play a Role in Chronic Pain Management

Chronic pain is a pervasive condition that significantly impairs a person's functional abilities, quality of life, and emotional well-being. Historically, opioid medications were among the most common forms of treatment for chronic pain, however, this approach has become increasingly scrutinized over time due to concerns regarding limited long-term effectiveness, dependency, and other associated harms. In response to these challenges, physical therapy has emerged as a critical non-pharmacological strategy for long-term pain management, offering a holistic and patient-centered alternative that emphasizes movement, education, and active participation in care. To better understand the intersection between chronic pain relief and physical therapy interventions, this project will conduct an in-depth literature review of scholarly sources that examine how physical therapy supports sustained pain reduction and improved daily functioning. This process will involve searching relevant academic databases to identify peer-reviewed research that explores the clinical applications and outcomes associated with physical therapy in chronic pain management. By synthesizing findings across diverse studies, the project aims to highlight common themes, identify effective therapeutic approaches, and assess the overall impact of physical therapy within interdisciplinary care settings. Central to our investigation is an exploration of how physical therapy contributes to improved function, enhanced self-efficacy, and greater autonomy among individuals living with chronic pain. We will examine how physical therapy supports patients in understanding the nature of their pain, reducing maladaptive responses, and developing practical, sustainable self-management strategies. Through this analysis, we aim to clarify the unique contributions of physical therapists in chronic pain management and to identify key principles that support long-term, non-pharmacological relief. Ultimately, this project seeks to deepen understanding of how physical therapy can serve as an essential component in the comprehensive and holistic management of chronic pain.

Willow Solomon

Discipline: Mathematics

Authors:
#1 Willow Solomon
#2 Christopher Potvin

Abstract Name: Detecting Regimes in Atmospheric Models

Atmospheric models of the climate are naturally chaotic, but meteorologists have conjectured that each can be clustered into smaller, more predictable regions called regimes. These regimes have been correlated with intraseasonal weather patterns. By using various algorithms to assess data from the climate, clusters will be found that can help predict future weather patterns. To prepare for the analysis of larger data from existing weather, 4 sets of data were used: Lorenz 63, Lorenz 96, Charney DeVore, and Jet Latitude. The first three datasets are simulations that cleanly represent real-world data while Jet Latitude is data taken directly from jet streams over the Atlantic Ocean. Climate data can be difficult to process due to the sheer number of data points; however, we lower its resolution by localizing nearby points onto a grid. This is known as "binning" or "coarse graining". Because these models are from well-understood equations, it is easy to check if a clustering algorithm is working as intended or not. After testing many algorithms, the Louvain Community Detection, Infomap, and Spectral Clustering yielded the most optimal results. Louvain Community Detection prioritizes the modularity of our binning graph; Infomap takes a "random surf" of the graph—a variant of a random walk but with an added "teleportation chance" variable; and Spectral Clustering looks at eigenvectors of the graph. By understanding these algorithms, each one offers an alternative regime of the same climate

data. After deciding on the best algorithms, we applied those algorithms to more datasets from our climate to cluster the models in hope of a better understanding of these global regimes. We posit that these results will help in predicting the effects of climate change and future movement of air currents worldwide.

Apoorva Somani

Discipline: Interdisciplinary

Authors:

#1 Apoorva Somani

Abstract Name: Deterrence by Architecture in the Lunar Regime: Establishing a Permanent Human Presence to Preempt Exclusionary Norms

The coming decade of lunar activity will establish technical and political precedents that will prove exceptionally difficult to reverse. Early choices in infrastructure, operational practices, and governance frameworks will create powerful path dependencies, locking in norms that will dictate the future of lunar commerce, science, and security. This paper evaluates three competing architectures for shaping this normative landscape: a robotics-only approach, episodic crewed missions, and a sustained human presence. It argues that a sustained, government-led, and commercially-integrated human presence offers the most effective mechanism for entrenching norms of openness, transparency, and interoperability. By analyzing historical precedents like the Antarctic Treaty System (ATS) and the International Space Station (ISS), and examining current strategies including the Artemis Accords and NASA's commercialization plans, this research demonstrates that continuous human operations generate unparalleled political salience, operational entanglement, and commercial scaling necessary for robust norm formation. The paper concludes by detailing a strategic path dependency for the United States, transitioning from the ISS to commercial LEO stations, and from a foundational government-led lunar base to a thriving commercial lunar ecosystem, thereby cementing an open, rules-based order on the Moon.

Valeria Somarriba

Discipline: Gender, Ethnicity, Diversity, or Cultural Studies

Authors:

#1 Maria Cassereau

#2 Vanessa Drew-Branch

Abstract Name: Invisible in Plain Sight

This qualitative case study explores the classroom perceptions and lived experiences of Latinx undergraduate students enrolled at a Predominantly White Institution (PWI). Drawing from two focus groups with five participants total, the study employs thematic analysis to examine how students navigate academic spaces shaped by whiteness, cultural invisibility, and performative diversity. Five interrelated themes emerged: classroom engagement and participation anxiety, representation and curriculum gaps, relational pedagogy and inclusive teaching, peer dynamics and social exclusion, and structural and institutional barriers. Findings reveal that relational pedagogy, defined by bell hooks (1994) as the practice of teaching "to transgress" through care and connection, plays a central role in fostering belonging. Students described feeling more engaged when professors acknowledged their lived realities and practiced inclusive dialogue, aligning with Gay's (2018) framework of culturally responsive teaching. Conversely, classrooms dominated by lecture or Eurocentric content reinforced feelings of isolation and conditional visibility, echoing Yosso's (2005) critique

of deficit perspectives in higher education. Participants also noted that course materials often reflected a persistent Black–White racial binary that rendered Latine identity “invisible in plain sight,” consistent with findings by García and Johnston-Guerrero (2015) on Latinx identity negotiation at PWIs. This study contributes to a growing body of scholarship on inclusive pedagogy and belonging by highlighting the emotional labor and cultural taxation (Padilla 1994) that Latinx students experience when their identities are underrepresented or misrepresented in academic spaces. The findings underscore the need for faculty development grounded in cultural humility, curricular diversification that integrates Latinx epistemologies, and institutional accountability that moves beyond symbolic diversity efforts toward transformative inclusion. Keywords: Latinx students; higher education; inclusive pedagogy; representation; belonging; Predominantly White Institutions

Mahalaxmi Some

Discipline: Biology

Authors:

#1 Navi Gill Dhillon

Eimaan Ahmad

Abstract Name: Analysis of Conserved Domains in Promoters of Differentially Expressed Genes in Rice

Plant responses to stress involve changes in gene expression, and understanding these changes is key to improving crop resilience. A critical step in this process is identifying "conserved domains" in the promoters of Differentially Expressed Genes (DEGs), as these domains often provide binding sites for transcription factors. In this study, we aim to identify the Cis-Regulatory Elements (CREs) in the promoters of DEGs associated with heat stress. Previously, we identified 149 DEGs from transcriptomic analyses of two rice varieties, Cypress (heat-tolerant) and LaGrue (heat-sensitive), both exposed to high night temperatures (HNT; $82.4 \pm 1^\circ\text{F}$ or $28 \pm 1^\circ\text{C}$). We hypothesize that the DEGs, either up- or down-regulated under HNT stress, may share a set of common CREs or exhibit specific polymorphic patterns that correlate with distinct DEG expression patterns. To test this hypothesis, we analyzed the promoter sequences using two bioinformatics tools—‘ElemeNT’ and ‘MEME’—to identify core promoter motifs, their relative positions to the Transcription Start Site (TSS), and their statistical significance. These motifs were functionally annotated, revealing potential roles in the regulation of stress-responsive genes. The annotation indicated that certain motifs are enriched in promoters of up-regulated genes, while others are associated with down-regulated genes under heat stress. These findings will be further examined to determine how variations in these CREs correlate with gene expression patterns during heat stress.

Brenna Sommer

Discipline: Physical/Occupational Therapy and Speech Language Pathology

Authors:

#1 Faith Olson

#2 Taylor Schneider

#3 Ava Koens

#4 Hailey Groholski

#5 Kya Krzmarzick

#6 Sheen Chiou

Abstract Name: Meaningful EngAGement in Dementia Care: Memory Books

This study aims to enhance targeted clinical skills of undergraduate students majoring in Communication Sciences and Disorders (CSD) in dementia care via creating a dementia friendly program. Six student researchers designed a series of strengths-based Memory Books for popular Montessori-based activities and implemented the program with individuals with dementia. Montessori-based activities centered the five senses to create active social engagement, productive conversation, and meaningful enjoyment for individuals with dementia, despite their cognitive deficits (Hindt, Morris, Sohre, & Buchanan, 2018; Jarrot, Gozali, & Gigliotti, 2008). In this study, students created Memory Books that correlate to three Montessori activities (Sensory Station, Flower Arrangement and Toolbox) which include themed-based pictures, short stories, descriptions, Would You Rather questions, and tactile materials as conversational topics with visual and auditory contextual support. Research participants were 20 undergraduate students majoring in CSD. They learned to conduct ten 50-minute one on one or small group sessions in a long-term care facility for six weeks. They observed and documented a variety of engagement types (e.g., positive, negative, no engagement) and frequency using a 5-point rating scale and conversational transcript during each session. They conducted a self-rating on their perception of dementia and their clinical skills prior to and after each session. The research project is ongoing, and the program outcome is currently obtained through qualitative and quantitative measures. This research project offers future healthcare professionals a strengths-based, person-centered framework to engage meaningfully with individuals living with dementia, enhancing their understanding of the diagnosis and ability to provide dementia friendly care.

Elizabeth Ashley Son (Church)

Discipline: Art History

Authors:

Abstract Name: Threads of Control: Gender, Power, and the Spider in Greek and Japanese Mythology

Spiders are studied in this research as a cross-cultural symbol in art history. This study argues that both archaic Athens and the early nineteenth-century Edo-period Japanese cultures used the spider as a symbol to reinforce patriarchal ideologies, portraying women's independence and sexuality as dangerous forces that threaten male authority. In the first section, this research will examine the duality of the symbolism of spiders, emphasizing its positive and negative traits, such as a master weaver or a trickster. The second section will provide a brief history and culture of archaic Athens, highlighting negative social attitudes toward women. In the third section, the study will investigate the myth of Arachne who was turned into a spider for her excessive pride and challenging authority. The fourth section demonstrates that nineteenth-century Edo was similarly misogynistic and patriarchal. In the fifth section, to illustrate the devaluation of the Edo women, the story of the mythological creature Jorō-gumo is provided. The comparative conclusion emphasizes that the symbol of the spider reflects the cultural perceptions of femininity, although within different social frameworks, in order to reinforce patriarchal attitudes and maintain control over women.

Elizabeth Ashley Son (Church)

Discipline: Visual Arts

Authors:

Abstract Name: A Study in Resin

My research yielded a new approach to working with UV resin. My idea first came from a desire to make

plants permanent, since mine weren't doing so well. I knew that I wanted to create a work of art that played off of the light, which led me to research stained glass artists whose subjects were plants. Because of limitations, I decided to work with a clear resin that cured using UV light. After much trial and error, I found a unique way of using jewelry wire as a frame for the leaves of plants. I experimented with methods of changing the color of the resin, and found an interesting interplay between acrylic paint and the UV resin. My greatest discovery came from the manipulation of the leaves to create organic shapes. UV resin is usually poured into a mold and cured. I found a way to spread the tinted resin thinly on a silicone mat, partially cure it, and then bend it into its final shape. Having researched this extensively, I found that this is an original use of the medium, finding no examples of similar work. For this reason, I formed a presentation that serves as a demonstration of my research process, but also as a guide for fellow artists and educators to mirror this new technique.

Sherry Song

Discipline: Nursing and Public Health

Authors:

#1 Sherry Song

#2 Emily Zhao

Emily Zhao

Abstract Name: How drug-resistant bacteria persist on hospital or public surfaces and how cleaning methods affect them

Healthcare facilities contain many high touch surfaces, such as door handles, desks, bed rails, and bathroom fixtures. These areas are touched frequently and can function as reservoirs that support bacterial spread. This increases the likelihood of healthcare associated infections, in which patients acquire a secondary infection during their hospital stay. Surgical instruments and other operation related tools can also transmit bacteria when cleaning or sterilization is inadequate, and these infections can worsen illness, prolong recovery, and complicate treatment. A significant concern is the presence of bacteria that are resistant to commonly used antibiotics. These organisms can persist on both environmental surfaces and medical tools and are associated with infections that are difficult to treat and control. Understanding their distribution and how effectively they can be removed is essential for improving infection prevention. This project investigates bacterial contamination on frequently touched surfaces and examines whether antimicrobial resistant strains are present. It also evaluates how effective common cleaning and disinfecting methods are at reducing bacterial levels. The goals are to identify the surfaces with the highest bacterial load, determine whether resistant strains persist longer than non resistant strains, and assess which cleaners provide the greatest reduction. To measure contamination, we will swab selected surfaces before and after cleaning. One swab will be streaked onto nutrient agar to count total bacteria, and another will be streaked onto nutrient agar containing antibiotic to detect resistant bacteria. After cleaning with standard alcohol based or bleach based wipes, the same areas will be swabbed again. Plates will be incubated at about 30 degrees Celsius for 24 to 48 hours, and colony forming units will be counted or scored. Finally, we will compare bacterial levels before and after cleaning and calculate percent reductions. Bar graphs will also be used to highlight differences among surfaces and cleaning products.

Nathaniel Song

Discipline: Mathematics

Authors:

#1 Nancy Scherich

Abstract Name: Computing The GPV Theorem

In mathematics, a knot is a closed curve in 3-dimensional space with no self-intersections. From a topological perspective, knots are made of thin and flexible material; if you bend, stretch, or rearrange a knot without cutting, a topologist would say it is the same knot. A link is made up of two or more knotted components that intertwine. The field of knot theory centers on classifying knots and links by their defining characteristics. The main tools used to distinguish knots and links from each other are called invariants. There are hundreds of different invariants, one such example is the minimal crossing number of a knot or link. There is a special class of invariants called finite-type invariants that satisfy a crossing change property. The GPV theorem states that all finite-type invariants can be computed by a two-step process. Regardless of which finite type invariant you start with, the first step is always exactly the same step. This theorem provides a uniform way to compute all finite-type knot invariants in a very computationally efficient manner that can be easily programmed into a computer. We wrote a python program to automate the first step of the GPV theorem. The main question of our research is to compute the second step of the GPV theorem, which is dependent on the particular knot invariant you apply the theorem to. We are focusing on the linking-number invariant and the quadratic coefficient of the Conway polynomial invariant. Our methodology is to use linear algebra techniques to compute the second step for these two invariants. The second step is a linear transformation on a vector space of diagrams. We are working to construct the linear transformation by computing individual outputs on a basis.

Yea Geon Song

Discipline: Engineering

Authors:

#1 Brooke Odle

#2 Elsa Brillinger

#3 Regina Vicente

Abstract Name: Pilot Study: Multijoint Kinematic Analysis of Nursing Student Posture Using OpenCap in a Realistic Nursing Environment.

Musculoskeletal injuries, specifically those that present with lower back pain, are prevalent work-related musculoskeletal disorders among nurses and caregivers. These injuries are often caused by poor body mechanics during patient handling tasks. While proper posture is known to reduce the risk of injury, objectively assessing these movements in realistic environments remains difficult. Existing studies often focus narrowly on trunk flexion within artificial biomechanics laboratories, neglecting both multijoint coordination and the environmental constraints of actual clinical settings. This pilot study addresses these gaps by using OpenCap, a novel markerless motion capture system, to analyze nursing students' movement in a realistic nursing skills laboratory. Three participants performed a series of manual patient-handling tasks using manikins on a standard height-adjustable nursing bed and wheelchair. To simulate the change from "good" to "poor" posture, bed heights were incrementally lowered to alter body mechanics. For wheelchair lifts, posture was differentiated by the degree of knee flexion used. The primary objective was to validate a workflow for capturing complex trunk, hip, and knee flexion angles in the students' natural training environment. Preliminary trends observed in the data suggest an inverse relationship between bed height and joint angles; as bed height decreased, flexion in trunk, hips, and knees appeared to increase, consistent with "poor" posture definitions. In wheelchair trials, "good" posture was distinguishable by increased knee flexion, though trunk variability remained inconsistent. While statistical analysis is ongoing to confirm these patterns, the successful data collection validates the method. Ultimately, this project confirms that markerless motion capture is a viable tool for assessing complex, multijoint movements in realistic nursing environments.

Discipline: Business

Authors:

#1 Katheryn Zielinski

#2 Jennifer Schultz

Abstract Name: Success Beyond the Syllabus: Examining the Hidden Curriculum in Business Education

Despite advances in education, research continues to challenge the formal university curriculum and its inadequate formation of well-balanced, fully prepared students (Borges et al., 2017, p. 160). Business students are falling short of the expectations required for success in higher education. A key contributor to this issue is the hidden curriculum, an aspect of learning that is often overlooked and unacknowledged by business students. The hidden curriculum encompasses the untaught aspects of the educational experience, such as communicating with faculty, time management, preparedness for class, as well as the implicit norms, knowledge, and behaviors necessary for success. When these components go unrecognized, students may struggle within their degree programs and later in their careers, as essential aspects of their education remain underdeveloped. Higher education aims to prepare students for success both in the classroom and in their professional careers after graduation. However, research suggests that every learning experience contains explicit and implicit objectives, and these two dimensions can sometimes conflict (Orón Semper & Blasco, 2018, p. 485). While business schools communicate formal objectives, the lack of alignment between explicit expectations and implicit demands present ongoing challenges. Due to lack of research in this area, the purpose of this study is to understand which hidden knowledge, skills, and abilities business school students perceive as necessary for success, and to identify where gaps in awareness and application occur. Through comprehensive analysis of students' responses, this study seeks to uncover where business schools and students fail to connect explicit expectations with unspoken ones. Data will be collected through a Qualtrics survey, employing both quantitative and qualitative methods. The findings are intended to support faculty, administration, and other higher education professionals to better address the full spectrum of student learning needs and foster success beyond the syllabus.

Madhuri Sosale

Discipline: Engineering

Authors:

#1 Gabi Martinez

Mindolay Fike

Abstract Name: Investigating the Effect of Tyrosine Phosphorylation on SH2 Domain Binding

Src Homology 2 (SH2) domains bind to phosphotyrosines, making them critical in phosphotyrosine-mediated signaling. Based on CoDIAC (Kandoor et. al, 2024), we identified 3 SH2 domains (Lyn, Syk, and PTPN11) with 2 conserved phosphotyrosine sites each, located in the specificity determining region or binding pocket of the domains. Thus, we hypothesized that phosphorylation would alter or prevent substrate binding. The aim of this project is to determine the role of tyrosine phosphorylation on SH2 domain function and regulation. First, each tyrosine of interest was mutated to glutamic acid (E), the amino acid most similar to a phosphotyrosine. To determine the binding ability of these SH2 phosphomimics to phosphopeptides, overlay assays were performed, and software was used to determine binding intensity. This study indicated that phosphomimic mutations reduced binding to substrates compared to wild-type. We hypothesized that native phosphorylation would have an equal or greater effect on SH2-substrate binding. We generated mutant SH2 domains that allow us to study site-specific phosphorylation by mutating all but one tyrosine to phenylalanine

(F). Phenylalanine is the closest in structure to a tyrosine and cannot be phosphorylated, so we expect that these mutations will have minimal effects on binding, allowing us to isolate specific tyrosines for study without compromising function. WT and mutant SH2 domains were phosphorylated using our lab's kinase toolkit, which allows us to generate phosphoprotein through co-expression of a kinase and substrate in E.coli. We verified phosphorylation via Native PAGE before proceeding with overlay assays, allowing us to compare the WT and pSH2 binding profiles. Determining the effect of site-specific phosphorylation on binding allows us to understand how PTMs affect a domain's ability to bind to target sequences and signaling molecules. This knowledge aids us in further understanding the role of tyrosine phosphorylation when SH2 domains are dysregulated in disease.

Aiden Sosnovich

Discipline: Visual Arts

Authors:

Abstract Name: Every Drop Counts

I believe in the tool of graphic design to still be used as a means of creative expression and communication. In my own personal work, it is vital to create what I am passionate about. Growing up surrounded by Boston and NYC, cities with well-integrated public transportation, and growing up in an age of increasing awareness towards climate change, America's car dependent infrastructure has always been a subject in my life that I have wanted to spread more awareness towards with my art. The Graphic Design II class's 'visual voice' project became the perfect vessel for illustrating these problems in a single composition: arranging information to highlight the emotional weight of the subject. The design philosophy was to build something that established an immediate danger but still could be aesthetically humanist and optimistic towards finding better solutions-much in line with how we as thinkers and as artists can do our part in widespread issues. Compiling information from a variety of sources; news articles discussing corporate lobbying against high-speed rail, US Dept. Of Transportation and NHTSA web pages about roadway safety, and ecology research papers on air pollution's effects on the environment, I chose to represent the current car culture as contaminated and non-renewable. I used a blaring red, overarching gas pump, composed of the same overwhelming and harmful information I found in my research, and displayed it over a foggy blue background. In my eyes, a better and more healthy solution IS possible, but may only be achieved if we hold direct accountability to industries that are corporate lobbying against a safer future, and if we recognize the immediate issues, we face firsthand. Until then, we march further into a grey future for our environment.

Matilda Southerland

Discipline: Biology

Authors:

- #1 Matilda Southerland
- #2 Ugonna Ibegwam
- #3 Angelina Nguyennhu
- #4 Danielle Cash
- #5 Glynnis Rodgers
- #6 Destini Rudd
- #7 Jady Cannon
- #8 Maya Awuro
- #9 Michael Newton
- #10 Savannah Hillharris

#11 Savannah Hillharris
#12 Shanyiah Mccray
#13 Sidney Marie Whitfield
#14 Rakesh Upadhyay
Sidney Marie Whitfield

Abstract Name: Evaluation of Reactive Oxygen Species production (ROS) production under copper stress in duckweed plants

Plants face several stresses in open environment and so is true for aquatic plants where chemical runoff is a common practice increasing the water pollution. These runoffs include salt, heavy metals etc. These pose a health hazard to plant and animals' life in the aquatic systems. This study evaluates the impact of copper-induced stress on an aquatic plant duckweed (*Spirodela polyrhiza*) with a focus on evaluating physiological and biochemical changes. Our results indicate that copper adversely impacts duckweed growth physiology in a concentrations dependent manner. Duckweed exposed to a range of copper concentrations (0–30 μM) for over 14 days period indicate reduction in clonal propagation and root growth with a significant difference after 10 μM and a complete lethality at/over 30 μM concentrations. Microscopic evaluation reveals that the incremental copper stress decreases the growth rate of duckweeds and impedes dissociation of daughter fronds from mother plants. Biochemical changes assessed for reactive oxygen species (ROS) detection for hydrogen peroxide with 3,3-diaminobenzidine (DAB) staining, indicated incremental production of hydrogen peroxide with increasing copper concentrations. Overall findings show that increased reactive oxygen species (ROS) production increases the oxidative stress possibly leading to cell death and suppressed growth changes.

Michael Sowah-Dowuona

Discipline: Biology

Authors:

#1 Brett Schofield
Kailey Spicer

Abstract Name: Satb2 Nuclear Import is Driven by an N-terminal Nuclear Localization Sequence

Satb2 plays a crucial role in regulating gene expression through chromatin organization. It is involved in a variety of processes including osteogenesis where it stimulates expression of the RUNX2 transcription factor. It is also widely used as a highly specific marker for colorectal cancer, and its nuclear absence is strongly associated with a worse prognosis. Nuclear proteins like Satb2 tend to rely on short amino acid sequences called Nuclear Localization Sequences (NLS) to direct their import into the nucleus. Satb2 has a predicted NLS located between amino acids 613-616. However, the functionality of the region has never been established. Using truncation analysis of EGFP-tagged Satb2, we tested which region is necessary for nuclear import. We then took 20 amino acid long segments of this region and individually attached them to a fluorescently-tagged cytoplasmic protein to see which region is sufficient for nuclear import of a cargo protein. Fluorescence microscopy reveals that Satb2 does have an NLS, but it is unexpectedly located in the protein's N-terminus, between amino acids 21-40.

Camiel Spangler

Discipline: Architecture, Construction Management, and Interior Design

Authors:

Abstract Name: Inclusive Residential Design for Individuals with Non-Paraneoplastic Autoimmune Retinopathy

As the number of Americans experiencing visual impairment continues to grow, there is a need for housing that goes beyond basic accessibility compliance and instead anticipates sensory changes while maintaining comfort, dignity, and aesthetic character. Research shows that many existing homes lack adequate lighting, spatial clarity, contrast, and intuitive way finding, which can increase stress, risk of injury, and dependence on others. To address this gap, this study applies a research based design process, case studies of existing housing solutions, literature review on low-vision best practices, and site analysis. This research explores how residential interior design can better support independence, safety, and daily living for individuals with progressive visual impairments through intentional material selection, spatial organization, and technological integration. The project focuses on a single-family home designed for an individual with Non-Paraneoplastic Autoimmune Retinopathy (npAIR), a condition that gradually reduces functional vision. Research findings guided the development of a design strategy that uses layered lighting, contrast-based detailing, tactile way finding, and smart home technology to create an environment that supports both current and future visual needs. Natural materials, high contrast, intuitive circulation patterns, and voice-activated systems reinforce safety and familiarity while preserving atmosphere and residential character. The expected outcome is a design prototype proving that accessible housing does not need to feel clinical or utilitarian, but can instead express mood, nature, and personal identity while remaining functional and inclusive. This work contributes to ongoing conversations surrounding inclusive residential design by emphasizing the role of sensory-supported interiors in improving long-term quality of life for people with vision impairments.

Rae Spangler

Discipline: English and Literature

Authors:

Abstract Name: Provenance in the Book Lab Library

For my Distinguished English Major project, I am designing and implementing a catalog of the books in the Book Lab (VCU Campus, Hibbs Hall, room 408). This consists of three major components. One, I am compiling a digital catalog of the collection, which includes the book title, author, editor(s), Library of Congress call number, and provenance (in other words, previous owners and users). Two, I am adding corresponding physical cards to each book. Both the digital catalog and the cards include all of the information previously stated. The third component provides research into the provenance of the Book Lab collection. Using David Pearson's Books as History, I am writing biographies on a selection of the previous owners of the books in the Book Lab Library. The culmination of these components is a digital catalog, shelf marks, and biographies of the prior owners and users of the Book Lab collection.

Andrew Sparks

Discipline: Geography/Geology

Authors:

#1 Arif Sikder

Abstract Name: Geochemical Controls on Glauconite Variability and Heavy-Metal Enrichment in the Piney Point Formation, Virginia Coastal Plain

The Piney Point Formation of the Virginia Coastal Plain comprises glauconite-rich, fossiliferous sands whose mineralogical and geochemical variability provide critical constraints on glauconite formation processes and sedimentary conditions. This study examines the textural, mineralogical (XRD), and geochemical signatures of glauconite within a ~18 ft exposure along the Pamunkey River to evaluate vertical variations in glauconitization and to distinguish authigenic from reworked components. Bulk sediments were analyzed for grain-size distribution, and glauconite pellets were isolated from discrete sand-size fractions and characterized using X-ray fluorescence (XRF) and X-ray diffraction (XRD). XRD results confirm that the sediments are dominated by glauconite, quartz, and subordinate clay minerals, with glauconite showing variable crystallinity and broadened 10 Å basal reflections indicative of mixed-phase, evolving glauconitic smectite and more mature, well-ordered glauconite. This mineralogical heterogeneity parallels the textural and chemical variations observed in the section. Glauconite constitutes ~7–28 wt% of the bulk sediments (average ~17 wt%), increases systematically toward finer sand fractions, and disappears entirely from the >500 µm class, reflecting grain-size controls on glauconitization. Bulk XRF analyses show Ca, Si, and Fe account for ~90 wt% of the sediments, and intervals of reduced Ca–Si coincide with higher Fe and elevated glauconite abundance; trace metals (Ti, Cr, As, Hg, Pb, S) broadly track Fe-rich, glauconite-rich horizons. Collectively, the XRD mineralogy, geochemical trends, and textural data indicate that Piney Point glauconite formed predominantly in situ through progressive evolution from smectitic precursors under reducing, low-sedimentation, shallow-marine conditions, with minor reworking and mixing near the Piney Point–Old Church contact. These findings highlight glauconite as both a sensitive recorder of sedimentation rate and redox conditions and a significant geochemical sink for heavy metals in the Virginia Coastal Plain.

Mariela Speltz

Discipline: English and Literature

Authors:

Abstract Name: Explorations of Border-Crossing Identity through Dreamscape in Frontera

This analysis examines how *Frontera*, a graphic novel that follows a young man as he attempts to cross the Sonoran Desert to return to Arizona after being deported, draws upon the mythologically-rich space of the desert to create a dreamscape that explores Mexican-American identity. Featuring visual differentiation, cultural icons, and spiritual figures that interact with the main character, Mateo, the text's dreamscape serves as a narrative bridge for characters to transcend their individual identity and connect with a communal identity. Specifically, the symbology of the American flag, a spiritual jaguar from Aztec mythology, and the ghost of an immigrant who died crossing the desert help Mateo reconcile with his evolving Mexican-American identity and sense of community. This research draws on the work of comics scholar Mark Di Paolo, who conceives of comics as a cultural marker of American identity that reacts to the social environment of the time, and Latinx comics scholar Frederick Luis Aldama, whose research highlights the rise in well-developed and complex depictions of Latinx identity in comics in recent decades. Read in conjunction with these scholarly perspectives, *Frontera* may be understood to react to a contemporary society in which the modern political environment threatens the deeply felt American identities of undocumented immigrants. By using dreamscape to explore Mateo's shifting identity throughout his deportation and border-crossing, and showcasing a variety of trans-cultural identities through the dreamscape's spiritual figures, *Frontera* depicts an interconnected, multi-cultural identity for both the main character and contemporary U.S. society.

Sara Spence

Discipline: Biology

Authors:

#1 Ariel Johnson

#2 Ben Bon-Lamberty

#3 Jade Shull

#4 Kayla Mathes

#5 Chris Gough

Abstract Name: Decadal Soil Respiration Following Field-Simulated Insect Infestation and Ice Influence

Soil respiration (Rs) is the largest terrestrial carbon (C) efflux and plays a critical role in regulating ecosystem carbon balance. As Rs is highly sensitive to disturbances, understanding how it responds to increasingly common compound disturbances is essential. The long-term effects of these disturbances are poorly understood. In this study, we investigated how Rs changes over time in a temperate forest recovering from an experimental girdling treatment, followed by a naturally occurring severe ice storm eight years later. Our primary objective was to quantify interannual variability in Rs over eight years across a range of disturbance treatments, and evaluate whether the subsequent ice storm influenced Rs patterns by interacting with the simulated disturbance. This research was conducted as part of the Forest Resilience Threshold Experiment (FoRTE), in which girdling treatments were applied across distinct forested landscape ecosystems to simulate wood-boring insect infestation. Upper canopy trees were randomly selected, stratified, and girdled to simulate varying levels of canopy defoliation (0%, 45%, 65%, and 85%) and targeted canopy stratum (upper versus lower). Prior analyses revealed that Rs declined for three years following the simulated insect disturbance, with reductions directly proportional to defoliation severity, driven largely by tree and root mortality. A gradual recovery followed, consistent with ecosystem reorganization. We expect that an influx of fine woody debris following the ice storm will contribute to Rs recovery. Consequently, we anticipate that compound disturbance from ice will have comparable effects on Rs resilience across the disturbance severity gradient. This work provides insights into how compound biophysical disturbances change Rs over time. The results from this study are crucial for improving predictions of forest C balancing in response to increasingly frequent insect outbreaks and climate-related extreme weather events.

Aniliese Spencer

Discipline: Communications

Authors:

#1 Aniliese Spencer

Abstract Name: Who Are We to You, and What Does That Make Us?: A Qualitative Study on the Role of Digital Media in Shaping Diasporic Perceptions

Over the past two years, digital media has played a significant role in shaping how information about the ongoing genocide in Palestine is accessed, interpreted, and shared, particularly in Western contexts. For members of the Palestinian diaspora community, the role of digital media and the discourses, news, and content it hosts, serves as a key influence in constructing their perceptions of the crisis in Palestine. This study is guided by a critical media/cultural studies framework, which examines the interconnectedness of media and culture in shaping identities, social structures, and power dynamics (Hammer & Kellner, 2009; Kellner & Storay, 2009). Eight participants that self-identified as being a part of the Palestinian diaspora community participated in individual, qualitative, semi-structured interviews that focused on assessing the role of digital media in shaping this community's perspectives of the ongoing genocide. A

thematic analysis of interview transcripts was conducted, identifying four overarching themes: (1) The Genocide Debate, (2) Perceptions Shaping Genocide Perception, (3) Sources of Information Currently Shaping Genocide Perceptions, and (4) Genocide Perception & Identity Impact. Themes were included alongside subthemes to further reflect the complexity of participants' responses. The findings suggest that although digital media was not shown to directly construct this community's perceptions of the genocide, it served as a critical tool for informing those perceptions through access to alternative narratives, fact-checking, and cultural memory. Additionally, digital media fostered identity affirmation, collective reflection, and resistance against cultural erasure. The findings in this study advance broader discussions within the field of communications surrounding the role of digital media in shaping collective understanding and perception within marginalized, diasporic communities, and the role of digital media in informing perceptions of significant international developments.

Ian Spencer

Discipline: Exercise Science and Nutrition

Authors:

- #1 Ronald Evans
- #2 Callie Oehlert
- #3 Madelyn Strom
- #4 Timothy Makar
- #5 Preston Hudak
- #6 Mena Girgis
- #7 Nivan Nyakundi

Abstract Name: Effects of Body Composition on the Energy Cost of Treadmill Walking

Walking is a common form of exercise that has been shown to provide numerous health-related benefits including lowering blood pressure and reducing cardiovascular disease risk. Additionally, walking contributes to daily energy expenditure and can therefore contribute to improve energy balance. Investigating factors that influence energy expenditure during walking can improve our understanding of the bioenergetics of movement and improve our ability to develop effective exercise prescriptions. Data published on the effect of body composition on the metabolic cost of walking (MCOW) has been inconsistent depending on the population studied and the walking speeds investigated. Therefore, the purpose of this study is to evaluate the effects of body composition on the gross and net MCOW in young adults at three different treadmill speed/grade combinations. Apparently-healthy adults (N=40) between 18-30 yrs are being recruited to complete three 5-min treadmill walking trials at 2.5 mph/0% grade, 3.4 mph/0% grade, and 3.2 mph/5% grade. Body composition is being assessed with air displacement plethysmography (BodPod, Cosmed USA). Steady-state $\dot{V}O_2$ and respiratory exchange ratio (RER) are being assessed at rest and during each walking trial (K5, Cosmed USA) and subsequently being used to calculate gross and net values for MCOW ($J \cdot kg^{-1} \cdot m^{-1}$). Results will be analyzed using multiple linear regression analysis with the MCOW as the dependent variable and primary predictors including percent body fat, fat mass, and fat-free mass. It is hypothesized that body composition, including body fat percentage and fat-free mass, will be significantly associated with the MCOW.

Ellie Spencer

Discipline: Biology

Authors:

Abstract Name: Natural or Artificial? Variation in Nest Material Types and Acquisition Decisions in House Sparrows (*Passer domesticus*)

Animal behavior provides insight into the decision-making strategies animals use to balance costs, benefits, and competition to maximize their fitness. In birds, nest material collection requires a unique set of behavioral choices, as individuals evaluate and acquire resources for reproductive investments rather than caloric consumption. Urban environments increasingly present novel ecological conditions for birds, including the introduction of anthropogenic material into nesting habitats, however the behavioral and reproductive impacts of incorporating these materials into nests remain poorly understood. Through this study, I investigate how house sparrows (*Passer domesticus*), a widespread urban species, preferentially select feathers or plastic nest materials, make behavioral choices, and socially interact during nest material collection, as well as the reproductive outcomes associated with material composition of nests. To address this, we deployed experimental “choice stations” across a field site that offered equal quantities of color-coded feathers and plastic twice weekly from May through August of 2025. Nest boxes and stations were mapped, allowing us to quantify the distance traveled during nest-material collection. Continuous video recordings documented individual behaviors, including approaches, material acquisition attempts, handling time, load size, aggressive interactions, and patterns of visitation following initial resource patch discovery. Individual plumage morphology also enabled us to compare behavior between males and birds expressing female or juvenile plumage while gathering materials. We monitored the house sparrow nests throughout the breeding season and recorded the associated reproductive outcomes of each nest. After fledging, we collected and dissected nests to quantify proportions of different natural and anthropogenic materials, including those sourced from experimental trials. By combining material collection behaviors with reproductive monitoring, this study offers insight into material choice, acquisition strategies, competition, profitability, and reproductive outcomes in urban birds, contributing to the understanding of animal behavior in anthropogenic landscapes.

Madelyn Spicer

Discipline: Anthropology and Archaeology

Authors:

#1 Madelyn Spicer

#2 Marie Vergamini

Abstract Name: Fragments of Faith: A Preliminary Study on Catholic Saint Relics

This research explores how the Catholic Church identifies which bodily remains are used in first-class relics of canonized saints. In Catholic tradition, a first-class relic refers to a part of the saint’s body, such as a bone, a lock of hair, or even a tooth. Although relic veneration has been part of Catholic practice for centuries, the details surrounding how these sacred remains are selected and formally recognized are often unclear. To investigate this process, Father Brian Capuano and Dr. Maria Christina Mairena, an archivist with the Catholic Diocese of Richmond, were interviewed. Their insights help clarify how sainthood is officially recognized, how relics have been authenticated across different historical periods, and why saints continue to hold a meaningful place in the faith. Examples discussed included the incorrupt body of Saint Catherine of Bologna and the preserved tooth of Saint Apollonia. These bodily remains are recognized relics based on certain factors such as the condition of the body, the symbolic significance, and the devotional needs of local communities. These findings suggest that the designation of a first-class relic is guided by a combination of theological reasoning, historical tradition, cultural relevance, and at times, practical considerations. Relics of Catholic saints are more than physical remnants. They reflect how the sacred becomes tangible and how the bodily remains of saints serve as powerful focal points for faith and devotion.

Alee Spigener

Discipline: Biology

Authors:

#1 Torey Crockett

#2 Alee Spigener

#3 Jacob Spinney

#4 Taylor Cooley

Abstract Name: The Effects of Clicker Training and Food Rewards as Behavior Modification with Positive Reinforcement in a Horse

ABSTRACT: This study investigates the impact of clicker training combined with a food reward to modify adverse behaviors in a horse. Clicker training, a form of positive reinforcement, uses a distinct auditory cue followed immediately by a food reward to signal a desired behavior. The study is based on one horse that has been used extensively in research studies that has recently developed an aversion to needles and being handled by students. Judy, a 12 year old Quarter Horse mare, began to associate student interaction in a negative way. She became difficult to catch in the pasture and showed signs of agitation and stress by pinning her ears back, trying to bite students, and vigorously shaking her head to avoid being touched near her jugular vein. Through methodical desensitization steps, clicker training, and food rewards, Judy's behavior has been positively transformed in a matter of weeks. This study shows the importance of using clicker training methods and positive reinforcement and how quickly these methods can impact the overall behavior of a horse.

Jake Spignese

Discipline: English and Literature

Authors:

Abstract Name: Consumed by Grief: Monstrous Embodiment and Materializing Queer Affect in Gerardo Sámano Córdova's *Monstrilio*

Decades of queer theory have explored the subjectivities that have been deemed to exist between and outside of binaries defining normative sexual behavior and gender-based identities. An identity that obfuscates these socially constructed bounds destabilizes a subject's social intelligibility, placing them in what Hil Malatino calls the "realm of the monstrous". Despite social progress and the mainstreaming of queer difference, many queer subjects still live within this realm. Existing in a monstrous subject position elicits distinct affects—often rage—which Susan Stryker famously connects to the literary monster in "My Words to Victor Frankenstein." Using Mary Shelley's *Frankenstein* as an allegory, Stryker identifies transgender rage as a transformative affect, which trans subjects can embody to exact agency amidst institutional exclusion. However, in recent fiction, the resounding affect of some queer monsters is not the productive rage that ruptures engendered understandings of human ontology, but grief. Gerardo Sámano Córdova's *Monstrilio* presents a grief-stricken monster, borne by a mother's will to reanimate her lost child. The novel puts forth a queer family's efforts to reinhabit a queer ideal, where monstrous embodiment serves as a repeated confrontation of the impossibility of doing so; the monstrous materializes a queer history that the family can never be rid of, one that elicits a consuming grief in the present. In exploring the affective experience of this family's life with the monstrous, this paper will explore the productive potential of representing queer grief in a post-Stonewall society. Calling on Heather Love's *Backward Feelings*, it will argue the confrontation of grief as necessary to accessing a queer potentiality, specifically examining the literary monster's bodily materiality as a conduit for doing so. Bridging queer affect theory and literary criticism, this paper explores

the imaginative potential of the monstrous amidst a moment in queer history where rage is transmuted into grief.

Sydney Spindler

Discipline: Biology

Authors:

Abstract Name: Characterizing the early interferon response against MCMV and determining the role of ZBP in that response

Z-nucleic acid Binding Protein 1 (ZBP1) is a host sensor that detects viral nucleic acids and initiates antiviral responses, including programmed cell death and cytokine production. One key cytokine, interferon beta (IFN β), plays a critical role in halting viral replication. Murine cytomegalovirus (MCMV), a herpesvirus model used in mice, has evolved mechanisms to both activate and suppress IFN β signaling. While ZBP1 is known to mediate antiviral cell death, its role in initiating the Type 1 interferon response remains unclear. This project aims to investigate how ZBP1 contributes to early IFN β activation during MCMV infection and how this affects viral replication

Estelle Spira

Discipline: Psychology

Authors:

#1 Kasey Creswell

Abstract Name: Alcohol's Impact on Spontaneous Conversation Topics Among Strangers

Alcohol is deeply embedded in social life, frequently serving as a social lubricant that facilitates bonding and group cohesion. Despite its well-documented risks, including the potential development of alcohol use disorder, many individuals continue to drink, suggesting that the social rewards of intoxication are powerful motivators. Although prior research has established that alcohol enhances social bonding and positive affect, little is known about how intoxication influences the content of social interactions. Specifically, few studies have examined how alcohol alters language use, the primary medium through which humans connect and form relationships. The present study aims to investigate how alcohol affects the subject matter of spontaneous social conversations. Drawing on data from Dr. Kasey Creswell's NIH-funded Behavioral Alcohol Responses study, we will analyze transcribed conversations among 393 heavy-drinking young adults (ages 21–29) who engaged in 36-minute unscripted group discussions after consuming either alcohol (target BAC = 0.08) or a placebo. Prior analyses revealed that alcohol increased positive socioemotional experiences and group-level coordination; however, these analyses focused solely on speech duration rather than content. In this project, human-generated transcriptions of recorded sessions will be analyzed using large language models and natural language processing techniques to identify recurring themes and conversational risk-taking. Multi-level modeling will assess whether beverage condition predicts differences in conversational content while accounting for the nested data structure (participants within groups). We hypothesize that alcohol will promote discussion of more personal and socially risky topics, reflecting its disinhibiting effects. By examining how intoxication shapes language, this research seeks to uncover mechanisms underlying alcohol's socially reinforcing properties and contribute to a deeper understanding of why individuals persist in alcohol use despite its known harms.

Trever Spruill

Discipline: Interdisciplinary

Authors:

#1 Trever Spruill

Abstract Name: Handel and the Economic Instability of Italian Opera in Eighteenth-Century London

Italian opera dominated London's theaters in the eighteenth century, though its popularity masked an unstable economic and social foundation. My research enters the broader speculation that opera has never truly been profitable. I focus on George Frideric Handel (1685-1759) and the writing and production of Italian opera in London. At the King's Theatre and the Royal Academy of Music, Italian opera rose to prominence under George I, continuing into the middle of the century. While Handel is often treated as a godfather-esque composer, celebrated for the Messiah, I look instead at his productions and failure to sustain an Italian operatic presence in London despite his fame and royal backing. Through historical musicological methods and archival research at the British Library in May 2025, this project analyzes primary documents related to Handel's productions and builds on the work of scholars such as Donald Burrows and Judith Milhous. This study asks what about London's society and culture made stability infeasible. Several factors emerge. First, London's musical culture resisted opera; since Henry Purcell (1659-1695), few composers had established a sustainable operatic tradition alongside the long-dominant stage play and masque, which emphasize spoken text. Second, the audience demanded performers who were not the best in England but the best in Europe, which produced ballooning budgets and infamous feuds, including famous diva conflicts like those around Francesca Cuzzoni, whose contracts reached the equivalent of millions today. Third, Italian opera was not profitable even in major Italian cities; it had two advantages London lacked: performance in the local vernacular and greater government support. These findings lead to broader questions about operatic sustainability: Would Handel have succeeded with stronger government backing? And what might've happened if his theatre hadn't been dependent on elite patrons? Could a middle-class model have offered a viable path forward?

Evelyn Squires

Discipline: Art History

Authors:

Abstract Name: The Luso-African Ivory Trade: Missing Depictions of Western Black Africans and Luso-African Ivory Carvings in 16th-17th century Renaissance Paintings

This analysis of peer-review research on the Luso-African ivory trade and paintings from 16th-17th century Europe of Luso-African ivory spoons and the Envoy of Congo argues for the potentially missing identification of depictions of black Africans and Luso-African ivory carvings in 16th-17th century Portuguese paintings. This paper argues that depictions of black Africans with Luso-African ivory carvings exist, or once existed, through the analysis of the trade relationship between Portugal and Sierra Leone, the Congo, and Benin, European accounts of the Luso-African ivory trade, the relationship between Christianity and black Africans in both Europe and Western Africa, the lack of stereotypes in the representations of the Envoy of Congo and the ivory spoons, and the pattern of representations of the Luso-African ivory spoons and the Envoy of Congo. During the Luso-African ivory trade of the 16th-17th century, Portugal commissioned ivory spoons, salt-cellars, and figures to be carved in Sierra Leone, Benin, and the Congo.

Portuguese paintings from the 16th-17th century represent Luso-African ivory spoons and a Congolese woven mat in Christian compositions in a frequent and consistent manner. The Envoy of Congo with the ivory tusk may indicate that the representation of a Western Black African subject with ivory was not unusual. This review analyzes primary and secondary accounts from Europeans along with peer-reviewed articles on the cultural and trade relationship between Portugal and black Africans in Western Africa and Europe from the academic journals African Arts, History of Africa, Renaissance and Reformation, Renaissance Studies, and Transafrican Journal of History. This paper argues that the paintings representing Luso-African ivory spoons and the Envoy of Congo with an ivory tusk may indicate a larger pattern of Western Black Africans represented alongside ivory in paintings from 16th-17th century Portugal that are yet to be identified or no longer exist.

Sasanka Sreedevi-Naresh

Discipline: Health and Human Development

Authors:

#1 Rusul Abdulrazzaq

#2 Stephanie Krafsig

#3 Blessing Nguyen

#4 Kevin Lybarger

#5 Samuel Acuña

#6 Hadeel Elyazori

Ande Mitchell

Thomas Rossi

Abstract Name: Extracting Biopsychosocial Insights from Motivational Interview Transcripts on Chronic Pain Using Natural Language Processing

Effective communication is essential for high-quality chronic pain care, yet over 80% of individuals with chronic pain report difficulty expressing their experiences in ways that feel understood by others [1]. These communication challenges are intensified by the multidimensional nature of chronic pain, which often includes rare or complex conditions and highly individualized biopsychosocial factors. Traditional assessments capture only fragments of this complexity, leaving clinicians without a holistic understanding of a patient's lived experience. Natural Language Processing (NLP) offers a scalable method for analyzing rich, narrative data, but its application to patient-centered chronic pain communication remains limited. The objective of this ongoing study is to develop and evaluate an NLP-driven annotation and analysis pipeline capable of extracting biopsychosocial insights from patient narratives to support more comprehensive pain assessment. We collected over 30 chronic pain narratives using a Motivational Interviewing protocol, and then automatically transcribed and manually corrected for accuracy. Each transcript was annotated using two complementary frameworks: (1) the International Classification of Functioning, Disability, and Health (ICF) to categorize functional and contextual factors, and (2) Aspect-Based Sentiment Analysis to capture positive, negative, and neutral emotion valence. Annotated data were then analyzed to identify recurring themes, characterize patterns of healthcare system interaction, and highlight social and environmental influences that shape patients' pain experiences. The purpose of this abstract is to share this NLP annotation and analysis pipeline, including data collection procedures, coding frameworks, and early analytic strategies, so that clinicians and researchers may adopt, refine, or extend these methods in their own work. By disseminating this process, we aim to support broader integration of patient narratives into clinical decision-making and contribute to more personalized, empathetic, and effective chronic pain care.

Anisha Srinivasan

Discipline: Biology

Authors:

#1 Brandon Vaglio

#2 Bonnie Firestein

#3 Nada Boustany

Abstract Name: Protein Kinase A Activity Decreases at Microtubules in Response to Brain-Derived Neurotrophic Factor

The shape of the dendritic arbor determines how neurons receive information. cAMP-dependent protein kinase (PKA) is a signaling molecule that plays an important role in the regulation of dendrite branching. PKA activity can be modulated by brain-derived neurotrophic factor (BDNF), a growth factor that regulates neuronal plasticity and increases arborization in hippocampal neurons. PKA activity is generally assessed in neuronal lysate, which does not determine how PKA activity is regulated at specific sites in cells, such as microtubules. To determine how BDNF affects PKA activity at microtubules, we transfected hippocampal cultures with the tAKAR4 α construct, a PKA activity sensor that localizes to microtubules. tAKAR4 α contains two fluorophores, the donor mCerulean and acceptor mVenus, separated by a region that is phosphorylated by active PKA. This phosphorylation brings the fluorophores closer, decreasing the lifetime of mCerulean. We measured PKA activity of transfected neurons using Fluorescence Lifetime Imaging Microscopy (FLIM), which quantifies changes to donor lifetime. We imaged neurons expressing tAKAR4 α or nonphosphorylatable mutant tAKAR4 α T402A (negative control with a stable lifetime) treated with vehicle or BDNF using a Leica SP8-STED microscope. In primary, secondary, and tertiary orders of dendrites, mCerulean lifetime in tAKAR4 α increased after ten minutes in neurons treated with BDNF compared to those treated with vehicle, corresponding to a decrease in PKA activity at microtubules. We assessed PKA activity in neuronal lysate treated with vehicle or BDNF and found that BDNF increased total PKA activity. Taken together, our results suggest that the regulation of PKA activity by BDNF spatially differs in neurons. Future studies will assess how BDNF affects PKA activity at other sites, and how these changes affect the shape of the dendritic arbor. Understanding the mechanisms underlying dendritogenesis will aid in the development of therapeutics for neurodegenerative disorders associated with a loss of dendrites on hippocampal neurons

Korbin Stacey

Discipline: Physics and Astronomy

Authors:

Abstract Name: Exploring Zinc-Nickel Thin Film Morphology and Thickness on Manufactured Surfaces

Thin films are important in many technologies, from electronics to protective coatings. The way these films grow can change depending on the shape of the surface they are deposited on. In this project, we studied how a ZnNi thin film deposited onto three different surfaces: a flat plate, bolts, and a screw. Using scanning electron microscopy (SEM), we examined the overhead surface morphology and measured film thickness through cross-sectional imaging. Energy dispersive X-ray spectroscopy (EDS) was also used to determine the chemical composition of the film. Comparing a cross-section of the flat plate to the deposition on more complex surfaces, we observed differences in how the thin film covered the surfaces and how its thickness varied. This study shows how surface geometry influences thin film growth and provides insights for improving thin film deposition on non-flat materials.

Lauren Staigers

Discipline: Philosophy, Ethics, and Religious Studies

Authors:

Abstract Name: Self-awareness and Agency in Psychiatric Conditions: a Phenomenological Perspective

This paper presents a phenomenological perspective on the relationship between self-awareness and agency in the context of mental health conditions. Self-awareness involves reflective processes through which individuals evaluate their thoughts, emotions, identities, morals, and personalities. Agency, as defined by Bayne (2011), refers to the outward expression of one's capacity to act and make decisions. Self-awareness gives rise to internalizations, which in turn shape a person's sense of self and contribute to their agentive experiences. In psychiatric conditions, however, this relationship between self-awareness and agency often becomes disrupted. This paper examines such disruptions, focusing particularly on schizophrenia and anarchic hand syndrome, where the first-person perspective, the core of self-awareness, is fundamentally altered. I argue that existing models, specifically the Missing Phenomenological Model and the Perturbed Phenomenological Model (Bayne, 2011), inadequately capture the full spectrum of phenomenological disturbances in agency seen in mental illness. In response, I propose an alternative framework: the Split Self-Model of Agentive Experience. This model accounts for a broader range of symptoms and provides a more comprehensive understanding of how agency and self-awareness interact in psychiatric disorders.

Kylie Stambaugh

Discipline: Exercise Science and Nutrition

Authors:

#1 Sarah Francis

#2 Maren Wolff

Abstract Name: Cyclone Kitchen: A Pilot Evaluation of Hands-On Nutrition Education in Iowa

Many Iowans struggle with everyday nutrition practices. Statewide data indicate that many Iowans reported "poor to moderate" diet quality and their health as "poor or fair". Teaching kitchens offer a straightforward, practical approach by providing individuals with a space to cook, learn, and establish healthier routines under guidance. Cyclone Kitchen is a statewide initiative that combines hands-on cooking with practical nutrition guidance, encouraging Iowans to gain confidence in the kitchen and establish healthy eating habits that support long-term health. This initiative seeks to address a clear gap in accessible food and nutrition education across Iowa, particularly in rural areas where teaching kitchens are limited. Each teaching kitchen event combines cooking tasks with brief explanations and time for reflection, helping people connect what they have learned to their own routines. Two pilot events were offered to extension staff and friends of Extension to assess its structure, delivery feasibility, and consumer-receptiveness. The pilot brought together 14 participants and was led by nutrition faculty and Extension Educators. To assess its effectiveness, Cyclone Kitchen participants completed a 5-question evaluation that was available online and in paper format. The evaluation examined the clarity of the course structure, the impact of the learning objectives and materials, and the level of engagement with activities, assessments, technology, and instructor interactions. Participants also shared what support their kitchen experience provided, any challenges they faced, and how their individual habits shaped their overall experience. Evaluation data provided on the paper form are being entered into Qualtrics. These data will be analyzed using descriptive analysis to determine the effectiveness of the pilot programs.

Discipline: Psychology

Authors:

#1 Brian McCabe

Abstract Name: Fractured Foundations: Does Divorce Impact College Students' Academic Performance, Mental Health, Financials, and Interpersonal Relationships?

The concept of parental divorce is one of the most frequently experienced developmental stressors, and current literature provides limited and often contradictory information regarding how these divorce experiences may affect emerging adults in higher educational institutions. This mixed-methods study examines how the impact of parental divorce relates to the mental health of undergraduate college students, their economic stability, their academic success, as well as the interpersonal relationships that they develop while in college. A sample of 200 undergraduate students (ages 18–25) from Auburn University will complete a comprehensive online survey assessing depressive symptoms (PHQ-8), financial instability (PFW; IFDFW), family functioning, attachment, communication quality, loneliness, academic self-efficacy, engagement, and self-reported GPA. Additionally, the study examines whether financial instability mediates the relationship between parental divorce and the psychosocial or academic outcomes of college students. Following the survey, a subset of up to 20 students with divorced parents will participate in semi-structured interviews to assess their lived experiences, perceived impacts of divorce, and relational or financial challenges during college. Survey data will be analyzed using correlational and multivariate modeling to evaluate direct and mediating effects, while qualitative interviews will be coded thematically to identify patterns in students' narratives. Findings from this ongoing project aim to (1) test whether parental divorce influences depressive symptoms, financial instability, quality of interpersonal relationships, and academic performance of emerging adult college students, (2) test whether financial instability mediates or explains the effects of divorce, and (3) examine the perceptions and experiences of college students with divorced parents.

Alaina Stanisci

Discipline: Business

Authors:

#1 Alaina Stanisci

Abstract Name: Exploring the Psychological Roots of the Authenticity-Aesthetic Paradox

This research examines the rationale behind the Authenticity-Aesthetic Paradox- the reasoning behind why women tend to prefer digitally altered images even though it may conflict with their values of authenticity. Despite Gen Z's stated preference for authentic content, this generation still engages with highly curated, inauthentic content, often preferring digitally manipulated versions of an image instead of the original. Building upon extant literature, this research examines how media literacy, body esteem, and self-congruence may influence consumer preference, liking, and trust of an ad campaign while examining how these effects can vary by whether an image was digitally manipulated or not. The expected conclusion is that these constructs significantly impact whether individuals fall victim to the authenticity-aesthetic paradox. The paper begins with an introduction that outlines the evolution of beauty marketing from traditional print magazines to today's digital landscape, where unrealistic online beauty advertisements have created heightened beauty ideals. This is followed by a literature review that establishes the psychological framework for the conceptual model. While existing quantitative research documents the paradox, a critical gap remains in understanding the qualitative reasons that underlie these deep-rooted issues and the preference for inauthentic content. To determine what causes individuals to experience the authentic-aesthetic paradox, an online survey comparing an edited and unedited image will be distributed to a national sample, and several focus groups will be conducted with Gen Z students across U.S. universities. The objective is to provide a better understanding of why individuals prefer heavily edited content. By understanding what causes individuals to experience the paradox and how the psychological constructs influence image preference, individuals can better protect themselves from the mental health risks that stem from repeated exposure to unrealistic beauty standards, while marketers can make more responsible decisions about how and when to use digitally altered imagery.

Jayden Stanley

Discipline: Visual Arts

Authors:

#1 Jayden Stanley

Abstract Name: Methods, Materials, and Machines: A Craft-Based Investigation of Creative Technologies

This research explores the intersection of craft practices and creative technologies in fine art making, challenging the perceived divide between traditional and digital methods. As a Craft/Material Studies student and a student worker at The Workshop, I engage with both historical, hands-on processes and emerging digital tools. While new technologies are often positioned as replacements for traditional craft, and craftspeople may resist digital methods, this project reframes creative technology as a tool that can be integrated rather than opposed. Through hands-on experimentation, I will investigate how merging these approaches expands artistic possibilities, with an emphasis on process rather than novelty. This research will result in a body of work demonstrating the potential of interdisciplinary making, offering insight into how digital tools can complement, rather than replace, traditional craft. This project also challenges the false dichotomy between traditional craft practices and emerging creative technologies by demonstrating how their integration can foster innovation in fine art. The tension between traditional techniques and technological

advancement has long shaped craft practices, from the industrialization of handmade goods to the rise of digital fabrication. Today, as emerging technologies redefine creative production, similar debates persist about authorship, labor, and the role of the maker. By merging traditional and digital methods, this project highlights new possibilities for material exploration, conceptual development, and interdisciplinary practice. It also engages in broader conversations about how craft and technology continue to shape artistic identity in the digital age. By showcasing these intersections, this research aims to inspire artists, craftspeople, and technologists to embrace cross-disciplinary approaches, fostering a more inclusive and forward-thinking art landscape. This further bridges the gap, not only between craft and technology, but also between the artists who occupy those respective fields.

Sophia Stanphill

Discipline: Art History

Authors:

#1 Sophia Stanphill

Abstract Name: An Insight on the life of Milton Glaser: Works and achievements

This paper explores the life, career, and cultural impact of Milton Glaser, one of the most influential designers that came out of the 20th century. Tracking his journey from a talented child in the Bronx to a major figure in modern visual communication, the paper highlights the important experiences that shaped Glaser's artistic voice, including his early training, education at Cooper Union, and the founding of Push Pin Studios. It examines several of Glaser's most iconic works, including the psychedelic Bob Dylan poster and the globally recognized I <3 NY logo. These works illustrated how he fused fine art techniques with contemporary graphic design to change the game in the design field. Through the journey of his career, the paper discusses Glaser's role in establishing New York Magazine. He then ventures into environmental and commercial design, and his long career as a teacher and author. Through interviews, archival research, books, and movies, this paper shows that Glaser not only transformed the visual landscape of his time but also demonstrated the power of design to influence culture, shape public perception, and create lasting symbols of identity.

Jennifer Stapleton

Discipline: Physical/Occupational Therapy and Speech Language Pathology

Authors:

Abstract Name: The Importance of Hippotherapy: Improving the Lives of the Disabled Through Alternative Therapy

For centuries, horses have been suggested as "healers" and "helpers," although it wasn't until the 1900s that horseback riding was scientifically proven as a treatment and rehabilitation method. The exploitation of hippotherapy, the implementation of the three-dimensional pelvic movement stimulated by the oscillation and gait of the horse to combat symptoms of diseases and disorders, has since become a flourishing field of study, but one that is often overlooked. Benefits of hippotherapy often include increased motor neuron function, facilitating proper anatomical alignment, and reducing spasticity. This research analyzes the diverse and dynamic nature of treatment that hippotherapy facilitates, exploring the utilization of hippotherapy and its effectiveness of rehabilitation for those facing chronic non-progressive encephalopathy (also known as Cerebral Palsy). Cerebral Palsy, a non-degenerative disorder, is a result of a neural lesion or cranial damage and it often results in issues such as reduced mobility, decreased range of motion, and increased spasticity. As

a result, this research focuses on the effectiveness of hippotherapy's unique ability to offer a multidisciplinary rehabilitation framework including the reduction of spasticity and fatigue as well as increase in range of motion and increased neuromuscular activation, muscle strength, balance, and overall coordination. Additionally, this study includes how hippotherapy, an underutilized alternative form of therapy, has been and continues to be proven as an effective treatment and rehabilitation. In the United States alone, 1 in 345 children suffer from a form of Cerebral Palsy; however, only 2% of those who could benefit from hippotherapy actually receive it. Reviewing this research demonstrates the immense benefits that hippotherapy provides and breaks down how it combats symptoms associated with Cerebral Palsy, proving it is more than "just horseback riding."

Cheyenne Stark

Discipline: Chemistry

Authors:

#1 Cheyenne Stark

#2 Emmalou Schmittzehe

Abstract Name: External Standard versus Standard Addition Quantification of Nicotine in E-Liquids Using High Performance Liquid Chromatography (HPLC)

Many studies show significant inconsistencies in the amount of nicotine reported on e-liquid product labels and the amount of nicotine detected in the e-liquids. This is of concern because e-cigarette users that rely on the labeling of the e-liquids to regulate their nicotine intake for smoking cessation could be negatively impacted if the nicotine levels are incorrect. Published methods for quantification of nicotine in e-liquids rely on external standards for the quantification of nicotine in e-liquids, but this method does not account for the varying components in the matrix of e-liquids. The aim of this project is to compare the results from the quantification of nicotine in e-liquids obtained using the external standard method to those obtained using the standard addition method to determine previously observed inconsistencies could be due to a matrix effect.

Daniel Starks

Discipline: Engineering

Authors:

#1 Daniel Starks

Abstract Name: Portable MRI unit with Independent Magnetic Field Variance

The current implementation of Electromagnets in the modern MRI and its robust construction is the leading cause of high costs in order for its manufacturing. This in turn causes MRI's and their use to be a high cost expense for many, for the patient to utilize and for the medical establishment to maintain. An additional expenditure is the extensive coolant used for the resulting heat caused by the Electromagnetic Gradient when they are in use, the cause being from the high amounts of Current. A possible remedy for this problem is the implementation of Gradient free Permanent Magnets, but this in turn causes a loss of quality in image resolution and a set magnetic field. In order to create a way to control the field strength, Spatial Encoding in which individual magnets move their physical position was proposed so that the operator has precise control. The main obstacles in order to achieve this, currently, are a method of which to house the magnets so that the fields they exert and the ones that are exerted on them do not unnecessarily move the magnets and foul the field precision. An additional design consideration is to create the whole apparatus out of readily available

PLA filament and 3-D print it to design specifications. This in turn poses an obstacle, that in order to create a quality piece of equipment with high tolerance is entirely dependent on the quality of the 3-D printer itself. If cost is to be a major consideration, then this is one that must be addressed by physical design and iteration with more affordable models that are readily available. This in turn must be solved with design iterations and equipment placement on the physical device that will not impair the modularity of the desired machine and its intended use.

Alexandra Steele

Discipline: Computer Science

Authors:

#1 Ryan Mattfeld

Abstract Name: Using Unmanned Aerial Vehicles to Autonomously Detect Fusarium Head Blight in Triticum Aestivum at a Field Scale

Fusarium Head Blight is a major fungal disease that affects Triticum Aestivum (winter wheat). It produces harmful mycotoxins that threaten both crop yield and safety. Early and accurate detection is necessary for reducing agricultural and economic losses. This research explores how Unmanned Aerial Vehicles equipped with advanced imaging sensors can autonomously detect Fusarium Head Blight at a field scale. This, in turn, will offer a faster and more cost-effective alternative to traditional laboratory testing methods. The growing use of Artificial Intelligence and Machine Learning in agriculture, primarily through Computer Vision, enables high-precision analysis of aerial imagery. By combining traditional cameras, thermal, and hyperspectral sensors, Unmanned Aerial Vehicles can capture multi-dimensional data on crop health. The research question guiding this study is: Can we use Unmanned Aerial Vehicles to Autonomously Detect Mycotoxins in Triticum Aestivum (Winter Wheat) at a Field Scale? Combining data from multiple sensors will allow deep learning models to identify Fusarium Head Blight infection more accurately than single-sensor approaches. To test this, Unmanned Aerial Vehicles will collect imagery from experimental wheat plots that have been grown specifically to research Fusarium Head Blight and treatments. The images will be processed to classify and localize areas showing the infection. The layered dataset will then be analyzed and compared to previous photos that were used to train the Machine Learning model. Anticipated results include a significant improvement in detection accuracy and the ability to map the distribution of the infection across large fields. This study aims to demonstrate how integrating Artificial Intelligence, Machine Learning, and Unmanned Aerial Vehicle technologies can transform Fusarium Head Blight detection into an automated and scalable process, advancing precision agriculture and contributing to global food security.

Sarah Steele

Discipline: Psychology

Authors:

#1 Sarah Steele

#2 Katrina Steele

Katrina Steele

Abstract Name: EPIGENETIC EFFECTS ON OFFSPRING OF ADULT RATS EXPOSED TO CHRONIC VARIABLE STRESS ON ENHANCED NICOTINE-SEEKING BEHAVIOR

Nicotine remains very relevant, and exposure to tobacco products can alter behavior and neurobiology from

generation to generation (Goldberg et al., 2021). Exposure to chronic stress has been seen to impact human development and the development of disease, resulting in an increased risk of substance-seeking behavior (Jenkins et al., 2021). The effects of parental exposure to stimuli on subsequent developmental changes have previously been studied using models of fear conditioning in rats whose parents were exposed to odorous stimuli. Such studies utilized conditioned fear responses to acetophenone in paternal rats prior to conception to analyze transgenerational and multigenerational effects on the following generations. Altered epigenetic marks, specifically DNA hypomethylation in sperm of F0 and F1 generations, were found to attribute to transgenerational inheritance of behavioral and neurotoxic changes in offspring without prior exposure to the odor (Dias & Ressler, 2014). Few studies, however, have investigated the epigenetic effects on enhanced nicotine seeking behavior of offspring of adult rats exposed to chronic variable stress. Therefore, this study will investigate the effects of prenatal maternal chronic variable stress on conditioned place preference to nicotine in subsequent generations and the epigenetic processes involved. One group of female rats will be exposed to 20 days of randomized stressors, while control rats will not receive any exposure treatment. Following exposure treatment, animals will be bred, and offspring will undergo place preference conditioning to nicotine (0.175 mg/kg, base, s.c.). To date, preliminary data indicate that animals bred from a mother exposed to chronic variable stress exhibit higher place preference for nicotine compared to animals bred from controls. In addition to providing evidence of how the experiences of a parent before conceiving offspring can influence the function of the nervous system and behavior of offspring, the results obtained can have important implications for the treatment of addiction.

George Stefanov

Discipline: Political Science

Authors:

#1 George Stefanov

Abstract Name: Building a Nuclear Future on a Radioactive Ground: The Evolution of the Kazakhstani Government's Nuclear Narratives

What does a state have to gain by downplaying its victim narratives? Reconciling traumatic histories with contemporary modernization goals is a challenge faced by many states, provoking questions about state building and memory politics. In October 2024, Kazakhstan held a country-wide referendum on the construction of its first nuclear power plant. 71% voted in favor. This outcome is surprising given Kazakhstan's background of traumatic Soviet nuclear testing and the country's complex relationship with nuclear weapons. It is perplexing that the government's narratives leading up to the referendum largely ignore this nuclear legacy. This is a clear departure from Kazakhstan's victimhood memory politics surrounding the Holodomor, the gulag system, and other Soviet-era suffering. This project seeks to analyze how the Kazakhstani government's narratives in the nuclear sphere have evolved since independence, in order to understand how such public support became possible. Kazakhstan had two paths it could have taken: continue to be a nuclear victim or become a nuclear victor. I argue that Kazakhstan has deliberately shifted its narrative to downplay victimhood and emphasize modernization. This shift is not solely for strategic political gains, but also linked to memory, reflecting deeper state-building strategies utilized to develop both domestic identity and international reputation. Presidential addresses, official statements, and media coverage surrounding key moments in Kazakhstan's nuclear history post-independence are uploaded into qualitative data analysis software (NVivo) and coded for themes such as victimhood, modernization, inward-versus outward-oriented messaging, and identity versus reputation building. Word frequency and matrix coding queries as well as longitudinal coding comparison help track the evolution of these narratives. By understanding how these themes develop and change over time, the project hopes to show that the 2024 referendum results were not a shock, but rather a culmination of a long process of state narratives.

Nicholas Stefanov

Discipline: Biology

Authors:

Abstract Name: Investigating the Effects of Inflammatory Stress on Hematopoietic Stem Cells in Culture

Acute myeloid leukemia (AML) occurs when healthy hematopoietic stem and progenitor cells (HSPCs) are transformed into leukemic stem cells (LSCs) through genetic mutations. The development of immortalized bone marrow endothelial cells (BMECs) allows us to culture and expand HSPCs. Inflammatory insults to the marrow microenvironment are known to impair self-renewal and drive myeloid-biased differentiation of HSPCs resulting in transformation of healthy stem cells to leukemic ones. Because of their importance in pathogenesis, here we examine the effects of lipopolysaccharide (LPS) on HSPCs. LPS, an endotoxin found in Gram-negative bacteria, causes immune cells to secrete inflammatory cytokines such as IL-6. These cytokines can induce susceptible stem cells to proliferate and outcompete other blood cells. Despite the crucial role of the marrow microenvironment on HSPCs, the influence of an inflammatory environment on HSPC fate is not well understood. The co-culture system we use consists of murine bone marrow cells enriched for stem cell factor receptor (called cKit), grown on a layer of BMECs. Experimental groups are supplemented with LPS to model inflammation or infection. We hypothesize that several phenotypic changes will emerge in the HSPC compartment upon analysis with flow cytometry. Among these changes we predict that the HSPCs will differentiate in a myeloid-biased fashion and total cells in the HSC compartment will decrease. My future work includes using single-cell transcriptomics to detect changes in quiescent or inflammatory genes of HSPCs and testing their long term engraftment capacity upon transplantation. Our goal is to understand how inflammation influences HSPCs and subsequent leukemogenesis.

Alexander Stell

Discipline: Psychology

Authors:

#1 Jason Hart

Abstract Name: Investigating the Moderating Effect of Athlete Status on the Relationship Between Extraversion and Perceived Social Support

[Data Collection in progress]The present study investigates whether the established relationship between extraversion and perceived social support differs between undergraduate athletes and non-athletes. Participants at a medium-sized Liberal Arts university are completing an online survey via QualtricsXM, which contains an informed consent form, a brief demographics questionnaire (where participants will indicate whether they are a college athlete or not), the Big Five Inventory (BFI; John & Srivastava, 1999), the Multidimensional Scale of Perceived Social Support (MSPSS; Zimet et al., 1988), the Sense of Belonging Scale (SBS; Mellinger et al., 2023), the Need to Belong Scale (NTBS; Leary, 2013), the UCLA Loneliness Scale (Russell et al., 1978) and a debriefing. Researchers hypothesize that: (1) the predictive nature of extraversion on perceived social support will be significantly stronger in athletes than in non-athletes; (2) athletes will display more extraversion than non-athletes; and (3) athletes will report more perceived social support than non-athletes. Hypotheses 2 and 3 will be tested using Pearson correlation and independent-samples t-tests. Hypothesis 1 will be tested using a moderated multiple regression, with extraversion as the predictor, perceived social support as the outcome, and athlete status as a moderator. An interaction term (Extraversion $\times$ Athlete Status) will be included to assess whether the strength of the relationship differs across groups. Findings from this study may offer insight into how personality traits interact with contextual factors (e.g., athletic participation) to influence perceived social support. The Sense of Belonging, Need to Belong, and UCLA Loneliness Scales are included to provide additional reasoning

behind our findings. Ultimately, this study has implications for targeted interventions to promote well-being in college populations, and it could be easily replicated at other universities.

Samuel Stenberg

Discipline: Chemistry

Authors:

#1 Sujat Sen

#2 Prince Kumar

Abstract Name: Engineering Nanofluids for electrochemical applications: Thermophysical properties of surface modified silica nanoparticle suspensions

Colloidal suspensions of nano-sized particles (NP) in aqueous media have been historically investigated for their superior thermal properties. Multi-functional suspensions of nanosized particles (nanofluids) have also been investigated as catalytic media for chemical reactions, solar harvesting, and battery applications. Complex and novel behaviors exhibited by such fluids have resulted in theories proposed to explain their thermophysical properties such as viscosity and thermal conductivity, but their use in electrochemical systems remains relatively novel. Here, we report on the use of silica-based NPs and their surface modification using functionalized silanes to prepare stable nanofluids in aqueous base fluids. Nanofluid preparation of both pristine and surface-modified NPs uses a horn-sonication setup under careful temperature control. Particle size, morphology, grain size, colloidal stability and crystallinity of the nanoparticle were confirmed through various analytical methods such as electron microscopy (SEM), sedimentation tests, dynamic light scattering (DLS), X-ray diffraction (XRD), thermogravimetric analysis (TGA), and Fourier transformed infrared spectroscopy (FTIR). Furthermore, we report on various grafts explored for the surface modification step, which aims to decrease the intermolecular attraction between individual NPs by introducing the silane graft. The graft's presence is expected to minimize the formation of aggregates after sonication and for the suspension to not settle under gravity over time. We investigate its effects on nanofluid stability to reveal optimal modification conditions for electrochemical applications. Finally, we have also analyzed these nanofluids using finite element (FE) modeling in COMSOL Multiphysics, incorporating diffusion, charge-transfer kinetics, and particle-tracking physics. This approach helps analyze nanoparticle motion, stability, and interactions in a flow-type electrochemical reactor being developed for electrocatalytic conversions.

Moriah Stenquist

Discipline: Exercise Science and Nutrition

Authors:

#1 David Aguilar-Alvarez

Abstract Name: Ratios of Essential Fatty Acid Intake Associated with Blood Pressure and Triglyceride Levels in Female College Students: A Cross-sectional Study

Background: Blood pressure (BP) and fasting triglyceride (TG) levels are parameters of metabolic syndrome, a cluster of risk factors associated with chronic disease. Essential fatty acids (EFAs), linoleic acid (LA), and alpha linolenic acid (ALA) play roles in inflammation and cardiovascular health. Higher LA/ALA ratios are associated with negative health outcomes. This study aimed to identify associations between EFA intake ratio and BP and TG levels in college students. We hypothesized that higher LA/ALA ratios would be associated with higher BP and TG levels. Methods: Participants completed a two-day diet record. EFA intake ratios were

calculated by dividing the percentage of total calories from LA by the percentage of total calories from ALA. Fasting TG levels were analyzed using Cholestech LDX, and BP was measured with an automated sphygmomanometer. Pearson correlations were conducted with SPSS version 29.0. Results: Significant positive associations were found between the ratio of LA/ALA EFA intake and diastolic BP ($r = .138$, $p = .033$) and TG levels ($r = .226$, $p < .001$), in females ($n = 240$). No significant association was observed between the ratio of EFA intake and BP ($n = 113$) or TG ($n = 110$) levels in males. Conclusion: Higher ratios of LA/ALA EFA intake among female college students are associated with elevated BP and TG levels. It is uncertain whether these results are due to the fatty acids themselves or the foods that contain them. Future research investigating specific sources of EFAs could offer a clearer understanding of this relationship.

Theresa Stephens

Discipline: Biology

Authors:

#1 Thane Wibbels

#2 Maddox Pankey

Emma Wells

Abstract Name: Effects of Metabolic Heating Versus Environmental Heating on Temperature-Dependent Sex Determination in the Hawksbill Sea Turtle

The Hawksbill Sea Turtle (*Eretmochelys imbricata*) is a critically endangered species that exhibits temperature sex determination. This form of sex determination can produce a wide variety of sex ratios that can affect the conservation and ecology of this species. Therefore, it is important to monitor sex ratios produced in natural populations. During the current study, nest incubation temperatures were used to predict the hatchling sex ratios from Hawksbill nests laid on the Pearl Cays, Nicaragua. The Pearl Cays are a major nesting area for Hawksbills in the eastern Caribbean. Additionally, this study examined the possible influence of “metabolic heating” (i.e. heat produced by developing embryos) on sex determination. Subsets of nests were examined over a course of 3 years (15 nests in 2010, 19 nests in 2011, and 3 nests in 2013) by the use of paired data loggers. One data logger was placed in the middle of the nest and one data logger was placed in the sand 1 meter from the nest to monitor the beach temperature. Nest versus sand temperatures were examined and compared during the middle third of incubation (the approximate thermosensitive period of sex determination). Additionally, state-of-the-art statistical software (i.e. “EmbryoGrowth” R Package) was used to calculate the thermosensitive period of sex determination and predict hatchling sex ratios. The results suggest that biased hatchling sex ratios are produced on the Pearl Cays, Nicaragua. Additionally, the results indicate that metabolic heating can influence sex determination in this species and should be taken into consideration when estimating sex ratios based on beach temperatures. These findings provide insight on the ecology of the Hawksbill sea turtle and will facilitate the development of better conservation practices for monitoring hatchling sex ratio production in the future.

Spartacus Stephens

Discipline: Engineering

Authors:

#1 Marwa El-Sayed

Bethany Bothoff

Abstract Name: Investigating Air Quality Impacts of Rocket Emissions at Cape Canaveral Using Low-Cost

Sensors

Over the past five years, commercial spaceflight activity at Kennedy Space Center in Florida has surged by more than 310%, prompting increased concern over the environmental and public health implications of rocket emissions. Rocket launches emit various air pollutants, notably particulate matter (PM), including black carbon (BC) and nitrogen dioxide (NO₂), both of which are regulated under the U.S. Clean Air Act due to their association with adverse health outcomes. However, existing U.S. Environmental Protection Agency (EPA) monitoring stations are located 20 to 40 miles away from launch pads, making them inadequate for capturing localized, near-field air quality impacts. To bridge this data gap, we deployed low-cost TELLUS AirU Pro sensors, calibrated against reference-grade monitors, at three locations within 15 miles of Launch Pad 39A, including areas adjacent to the pad and near the Apollo Visitor Center. These sensors measured concentrations of PM_{2.5}, PM₁₀, carbon monoxide (CO), ozone (O₃), and nitrogen oxides (NO_x) before, during, and after launch events to analyze pollutant dispersion over time and space. This research provides some of the first ground-based, real-time observations of localized air quality changes associated with modern rocket activity. The results can be used to validate existing models of rocket emission impacts and offer actionable insights for enhancing environmental health and safety strategies. More broadly, the study contributes valuable empirical data to support improvements in atmospheric emissions modeling and promotes the adoption of more sustainable practices across the aerospace sector.

Hazel Sterling

Discipline: Engineering

Authors:

#1 Hazel Sterling

#2 Corinne Leonard

#3 Priscilla Hwang

Abstract Name: Investigation of CDH3 in Epithelial Collective Cell Migration using Short Hairpin RNA (shRNA) in MDCK cells

Collective cell migration is driven by the coordinated movement of groups of cells, and is essential for many biological processes. Many factors contribute to the cells ability to collectively migrate, one of which are cadherins, being a source of cell adhesions allowing cells to move together. We hypothesize that knocking down these cadherin-associated genes, using shRNA, inhibits the ability for cells to collectively migrate and form protrusions necessary for migration.. Previous research involving Madin-Darby Canine Kidney (MDCK) cells proves their validity as an exemplary epithelial cell line. In this cell line and others, our lab has observed the expression of a particular cadherin, P-cadherin (CDH3), indicative of a driving force behind the ability of cells to migrate collectively. With these MDCK cells, we compared wild-type (shGFP), and two CDH3 knockdown (shCDH3-1 #4 and shCDH3-2 #2) cell lines, to investigate the role of CDH3 in collective migration. We first conducted 2D wound healing assays to compare the rates of collective migration between the wild-type and CDH3 knockdown cell lines. The rate of migration of the CDH3 knockdown cell lines were significantly less than that of the shGFP cell line, demonstrating CDH3 plays an important role in 2D collective migration. Additionally, we sought to characterize the morphology and extracellular matrix deformation of MDCK shGFP and CDH3 knockdown cells in a 3D space. Cysts were produced for each cell line, by culturing in matrigel. Cysts were loaded into microfluidic devices with collagen. After the first day of imaging, cells were treated with hepatocyte growth factor (HGF) to promote migratory behavior. CDH3 knockdown cysts displayed decreased migratory properties, such as less ability to form protrusions than shGFP cells. CDH3 knockdown cysts also generated decreased extracellular deformation rates, further proving the necessity of CDH3 in collective migration capabilities of epithelial cells.

Joyce Stern

Discipline: Chemistry

Authors:

#1 Ann Wemple

#2 Charles Sheppard

#3 Arielle Vinnikov

#4 Michael Leopold

Abstract Name: Fouling-Resistant Voltammetric Xylazine Sensors for Detection of the Street Drug “Tranq”

As the opioid crisis continues to wreak havoc on a global scale, it is increasingly critical to develop methodologies to detect the most dangerous drugs such as fentanyl and its derivatives, which have orders of magnitude higher potency than morphine. The scientific challenge for chemical detection of fentanyl and its derivatives is complicated by both the constantly increasing synthetic variations of the drug as well as the expanded use of adulterants. One tragically consequential example is the noxious street drug known as “Tranq”, which combines fentanyl or a fentanyl derivative with the veterinary sedative Rompun®, chemically identified as xylazine (XYL). This pervasive street cocktail is exacerbating the already staggering number of fentanyl-related deaths as its acute toxicity poses a danger to medical first-responders and complicates their initial assessment and treatment options for overdose victims. Given the widespread use of XYL as an adulterant, an electrochemical XYL sensor capable of on-site operation by non-experts as a fast-screening tool is a notable goal. This work presents a voltammetry-based sensor featuring carbon electrodes modified with carboxylic-acid functionalized multi-walled carbon nanotubes layered with cyclodextrin and polyurethane membranes for sensitivity and selectivity enhancements. The sensor has critical and robust fouling resistance while providing sensitivity at $950 \mu\text{A}/\text{mM}\cdot\text{cm}^2$, a low limit of detection (~ 5 ppm), and the ability to detect XYL in the presence of fentanyl and/or other non-fentanyl stimulants like cocaine. The demonstrated sensor can be applied to promote public health with its ability to detect and indicate XYL in the presence of opioids, serving to protect drug-users, first responders, medical examiners, and on-site forensic investigators from exposure to these dangerous mixtures.

Ao Sterner

Discipline: Chemistry

Authors:

#1 Dusan Bratko

Abstract Name: Liquid Springs from Wettable Materials

Liquid springs enable storage of energy in the form of interfacial tension upon forcible wetting of lyophobic surfaces. The pressure-volume work performed to compress a liquid into a porous solid can be recovered during spontaneous expulsion, which takes place when pressure is reduced sufficiently below the capillary pressure characteristic of given material of pores and liquid. According to the conventional picture, the requirement for positive intrusion and extrusion pressures limits material choices to substances with solid/liquid contact angles well above 90 degrees. Our work explores an alternative possibility where high wetting pressure is imposed through steric hindrance exerted on liquid molecules intruding micro-sized pores. This novel concept is exemplified in molecular simulations of a prototypical model system with methanol pervading narrow hydrocarbon or graphene pores. While macroscopic surfaces of both materials show significant wetting propensities on macroscopic surfaces, substantial compression is required to wet molecular-sized pores barely accommodating a monolayer of liquid molecules. The observed $O(10^3)$ bar intrusion pressures secure energy densities exceeding those of advanced supercapacitors. Because of small pore diameters and favorable wall-liquid interactions, the intrusion-expulsion cycling avoids pronounced

activation barriers to evacuation and concomitant cycle hysteresis, common in conventional experiments involving water in hydrophobic capillaries. Using open ensemble (Grand Canonical) Monte Carlo sampling, we determine the range of porosities leading to a highly reversible energy storage/recovery operation and identify material characteristics leading to optimal energy-storage and power capacities in molecular spring devices in pragmatic contexts.

Hannah Stewart

Discipline: Music

Authors:

#1 Caroline Bergan

Abstract Name: Expanding Vocal Literature: An Inclusive Linguistic Database

This project aims to address the lack of linguistic diversity in vocal music studies within U.S. universities and conservatories. Within the classical vocal music curriculum, languages such as French, German, Latin, and Italian dominate the languages in vocal music that are performed. This project provides students, faculty, conductors, and vocal coaches with resources for a broader range of languages in classical vocal music. This is done by creating an easily accessible online database that contains over 744 lyric diction resources, including International Phonetic Alphabet transcriptions, audio and visual recordings, and translations in a variety of different languages, along with 131 additional materials such as practice guides, organizations, competitions and journals. The goal of this database is to broaden students' repertoires by providing easy access to a wider range of repertoire from different cultural backgrounds and languages that are not taught in school curriculums. These resources are available globally, allowing vocalists worldwide to access them. Ultimately, this project will increase representation in music education, offering a centralized location for learning materials that can enrich a more inclusive approach to vocal repertoire.

Sean Stewart

Discipline: Computer Science

Authors:

Abstract Name: Optimizing Game AI: Designing a Unified Framework for Efficient Agent Behavior in Unreal Engine

The gaming industry, one of the largest globally, has seen technology advance significantly over the past 50 years (J.P. and Wolf). However, despite these advances, one aspect of video games has not progressed at the same rate: artificial intelligence (AI). Current gaming AI frameworks include Hierarchical State Machines, Goal Oriented Action Planning, and Behavior Trees. These frameworks may be combined to implement AI mechanics in video games, or used independently to power an AI agent, an autonomous decision-making entity that responds to game states. Although effective, each approach has drawbacks that complicate the use depending on the game's type or genre. These challenges, among others, lead to the central question guiding my research: How can existing AI frameworks be leveraged to build a new framework that streamlines, and optimizes the process of building an AI agent for designers and developers? Recent research (Iovino et al.) emphasizes their application across various fields. However, little attention has been given to its specific use in game development. My research aims to address this gap. This study hypothesizes that, in matched Unreal instances, the proposed AI framework reduces CPU cost, decision latency, and maintains or improves task completion rates relative to baseline frameworks, while enabling designers to implement equivalent behaviors

in less time and with higher perceived usability. Employing experimental and design-based research in Unreal Engine, iteratively designing, and refining a prototype using C++ based on a new architecture where a “Commander” AI agent handles complex behavior and issues simplified instructions to simpler AI agents, enabling these agents to perform complex tasks without incurring high computational cost. This framework is evaluated against alternative frameworks using the metrics listed above. This research offers a practical tool for game developers to create efficient adaptable AI agents with reduced computational cost.

Matthew Stitz

Discipline: Physics and Astronomy

Authors:

#1 Ulises Alonso de la Sierra

#2 Ganesh Pokharel

Abstract Name: A study of hole doping in Kagome metal KV3Sb5

Kagome metals consist of corner-sharing triangular lattice points, which give rise to unique electronic properties such as superconductivity and charge density waves. KV3Sb5 is a recently discovered 2D superconductor with superconducting transition temperature, T_c , of ~ 1 K. In order to study the effect of hole doping on KV3Sb5, we synthesized KV_{2.85}Ti_{0.15}Sb5 compound and then performed x-ray diffraction (XRD) and magnetization measurements. The XRD shows that the Ti-atoms substitute the V-atoms on the kagome lattice sites, preserving crystal symmetry. Because Ti has fewer valence electrons than V, this substitution introduces hole doping into the parent compound. Due to the larger radius of the Ti-atom, we observe that the lattice unit cell expands slightly in KV_{2.85}Ti_{0.15}Sb5 compared to the parent compound. The magnetic measurement data reveal that the T_c elevates in KV_{2.85}Ti_{0.15}Sb5 compared to the parent compound. Through the magnetic data, we also discovered that the T_c suppresses with the applied magnetic field. Our study demonstrates significant insight into the effect of Ti-doping on the crystal structure and magnetic properties of KV3Sb5.

Joseph Stockdon

Discipline: History

Authors:

Abstract Name: An Analysis of the Influence of Early Modern Fairy Folklore on the Salem Witch Trials

In 1692 a flurry of witchcraft accusations and executions tore through the village of Salem, Massachusetts, leaving behind a dark legacy that still captures the American imagination to this day. However, unbeknownst to both the Puritans of Salem and the modern public, the episode carried with it the traces of a much earlier tradition: the belief in fairies. This paper, originally submitted for my senior capstone on witches, begins exploration into the effects of early modern fairy folklore on the Salem witch trials. Examining this connection, which has been previously neglected by existing scholarship, highlights the ways in which British and Scottish folk beliefs evolved through both the Reformation and passage to the New World. Uncovering how fairy beliefs presented themselves in the Salem witch trials required analysis of several period documents. The Secret Commonwealth of Elves, Fauns, and Fairies, by seventeenth century Scottish clergyman and theologian Robert Kirk is perhaps the best source on popular belief of fairies in Great Britain. The writings and sermons of early modern Puritan scholars such as William Perkins and Richard Baxter were used to determine prevailing Puritan belief on fairies in the years leading up to the Salem trials. The Salem

interrogation transcripts themselves show that many of the accusations and confessions line up with traditional folk beliefs surrounding fairies, including animals, spirits, and unusual creatures magically assisting the witch in exchange for blood or other rewards. Even though the term “fairy” is not specifically recorded in any of the Salem trial documents, the language and content of the accusations are otherwise consistent with trials in England and Scotland which do specifically name fairies as the culprit.

Adrien Stoen

Discipline: Economics

Authors:

#1 Sarthak Behera

#2 Divya Sadana

Helena Martinson

Abstract Name: Impact on Diabetes Outcomes: Evidence from Affordable Care Act Medicaid Expansion

Before the Affordable Care Act expansion in 2014, Medicaid program primarily covered pregnant women, low-income families with children, and elderly and disabled people with Supplemental Security Income (SSI). The expansion extended coverage to most of the adults up to 138% Federal Poverty Level (FPL), and it was adopted by 27 states in 2014 and by 2021, it increased to 39 states (including DC). Past literature provided evidence that this led to a significant increase in the total Medicaid coverage and consequently a decrease in the total number of the uninsured individuals in the expansion states. According to CDC, among chronic conditions, Diabetes is one of the leading causes of morbidity and mortality in the US. Access to health care is most essential to stay healthy for a diabetic person. With high cost of supplies, medication, education, and medical care to manage diabetes, affordable and adequate health insurance is imperative. This paper examines the impact of the Affordable Care Act (ACA) Medicaid Expansion on diabetes diagnoses, and its management to prevent health complications caused by diabetes. Employing a difference-in-differences framework, we exploit the variation in the eligibility caused by the ACA expansion to compare the changes in diabetes outcomes in the expansion states (treatment group) with the non-expansion states (control group).

David Stoev

Discipline: Mathematics

Authors:

#1 Sirani Perera

Abstract Name: Advancements in Spacecraft Trajectory Generation through Matrix Decomposition Techniques

The Circular Restricted Three-Body Problem (CR3BP) is renowned for its intricate and chaotic dynamics, leaving it without a closed-form solution. In this poster, we introduce an innovative approach to determine spacecraft trajectories within the CR3BP framework using matrix factorization techniques. We formulate a matrix equation where the right-hand side vector is constructed from the spacecraft's position and velocity data, while the coefficient matrix is derived from the spacecraft's temporal data. Subsequently, we apply several matrix decomposition techniques, including modified Gram-Schmidt, the Householder technique, and Givens Rotation, to analyze the coefficient matrix and derive the spacecraft trajectories. Finally, we evaluate the execution time and floating-point operations (FLOPS), alongside the numerical stability of each method, to obtain a quantitative comparison of the proposed techniques.

Sabrina Stogoski

Discipline: Biology

Authors:

#1 Barbara Yang

#2 Frida Delgadillo

#3 Enrique I. Ramos

Abstract Name: How Breast Cancer Cells Hide: The Role of ZMYND8

Breast cancer is among the most diagnosed cancers and leading cause of death in women. In this regard, we are studying ZMYND8, a multifunctional protein that plays a crucial role in regulating genomic stability and the innate immune response in breast cancer cells. We are investigating the phenotypic effects of decreasing ZMYND8 expression on the aggressiveness of breast cancer cells. Studies show ZMYND8 suppresses DNA damage preventing micronuclei formation, thereby inhibiting immunostimulatory signaling pathways in breast cancer cells preventing recognition by the immune system. Loss of ZMYND8 leads to increased DNA damage, triggering activation of DNA sensors and downstream immune responses. As a result, T-cell infiltration into the tumor microenvironment is enhanced, enabling an effective antitumor immune response significantly reducing tumor growth. These findings pinpoint ZMYND8 as a negative regulator of antitumor immunity and suggest that it plays a key role in the progression of breast cancer. We plan to reduce ZMYND8 expression in breast cancer cells using a small interfering RNA (siRNA)-mediated knockdown method and confirm knockdown efficiency by quantitative PCR (qPCR). Once confirmed, we will evaluate its effects by performing colony formation and transwell migration assays to assess growth, migration, and invasion abilities of breast cancer cells. Additionally, we expect the aggressiveness to diminish alongside the already reported reduction in growth. Targeted pharmacological inhibition of ZMYND8 could therefore represent a novel therapeutic strategy to reactivate the body's own immune defense against tumor cells. Combining ZMYND8 inhibitors with established immunotherapies or chemotherapies could achieve synergistic effects and improve the efficacy of existing treatment approaches. Although these findings are currently based primarily on preclinical studies in cell and animal models, they offer promising perspectives for developing new immunotherapies. Further experimental and clinical investigations are needed to fully validate the potential of ZMYND8 as a therapeutic target in breast cancer treatment.

Jackson Stone

Discipline: Interdisciplinary

Authors:

#1 Nate Albin

#2 Catherine Joven

#3 Jackson Stone

#4 Sawyer Brashear

Sawyer Brashear

Abstract Name: Continued Enrichment of Students in Action: Fostering an Engaged Community Through Grades 6-12 School Programming

As students in Dr. Jason Ware's TREKS research generator, we have been continuing the goals of the educational service-learning program, Students in Action (SIA). This program strives to connect grades 6-12

students with service-learning educational content and opportunities for projects. SIA began as a part of the national service organization Multiplying Good, which went bankrupt in August 2024. In light of this, we have assumed Multiplying Good's duties to continue working with the local schools which have partnered with Purdue University previously. The student-led conferences have been received positively, as they have allowed us to continue broadening these schools to new avenues of community engagement. The content in these conference sessions provides students with guidance to get involved in the community, and leaders' knowledge of the local area creates more personalized, relevant examples. The session leads are also significantly younger than the leaders of the conferences under Multiplying Good, so they are capable of relating to the attendees and fostering stronger learning and motivation. Outside the conferences, we prioritize coordinating with our partner schools to send college students to be "coaches." These mentors work alongside the younger students to guide them through proper service-learning initiatives. Since last year, we have hosted two additional conferences. Through these, we have connected students with more opportunities to get involved in their local communities, shown local organizations that students are willing to work, and instilled students with agency to pursue this work. Additionally, we have been able to keep a partner school involved in the program despite having a completely new group of students. Moving forward working with local schools, we aim to refine a standardized model for other universities to implement similar programs. This includes both creating process and planning documentation and brainstorming how to plan without access to substantial monetary backing.

Lucas Stopper

Discipline: History

Authors:

#1 Charlotte Cartwright

Abstract Name: Gender and Power in the Latin Cartulary of the Abbey of Saint-Amand

This project transcribed a heavily abbreviated, handwritten, 13th-century Latin manuscript and translated it into English to analyze how female religious communities wielded power in the Middle Ages. The Cartulary of Saint-Amand contains contracts primarily detailing the day-to-day managerial life of the abbess, or head, of a Medieval abbey, most notably concerning the lands the abbess bought and the tenants she managed on behalf of the nuns of Saint-Amand. The Cartulary contains the abbey's founding documents and grants from the King of France and the Pope that allow the abbey to operate, and the land contracts within the Cartulary span a timeframe of hundreds of years. By maintaining a historical record of lands acquired, rents owed, and agreements made with tenants, the abbess of Saint-Amand ensured future generations of nuns could continue to wield immense lordly power in their community without challenges from men. Through translation, I found that medieval religious women, despite modern notions of perceived frailty and submission, were extremely successful landlords, greatly expanding their property holdings throughout the early 13th century and establishing a monopoly on profits in medieval Rouen, France. The charters contained in the Cartulary establish that the abbess of Saint-Amand fulfilled the role expectations of male landlords, and her authority was not challenged due to her gender. Translations of the Cartulary also demonstrate that medieval religious women were successful financial managers, with numerous charters establishing that the abbess of Saint-Amand received a vast quarterly income from her tenants. My presentation will highlight the intersection of gender and power in later Medieval France to further disprove modern conceptions of gendered authority in the Middle Ages.

Anna Stowe

Discipline: History

Authors:
#1 Anna Stowe

Abstract Name: "Vote for Woman Suffrage and Democracy at Home": Holland, Michigan, and the Fight for Enfranchisement

Michigan women's fight for the ballot began nearly 75 years before the 19th Amendment guaranteed American women the right to vote. Despite facing consistent opposition, women slowly gained a position in the political sphere, often through social activism and discussion groups. In Holland, Michigan, suffrage activism began in 1912 and continued through 1918, when women gained the right to vote via a state referendum. Joining the work of the Holland Equal Suffrage Association, a group of Hope College girls formed their own suffrage chapter in 1917. Although meeting minutes did not survive and, therefore, gaps remained in the narrative, it was possible to reconstruct the movements of Holland's suffrage clubs as well as their connection with other Michigan suffrage organizations and speakers through letters, yearbooks, activist pamphlets, and newspapers. Suffrage gained a relatively large base in Holland, which was surprising given the town's conservative religious foundation. At the same time, as women gained education and workplace opportunities, these organizations reflected the principles of the Progressive Era New Woman, who involved herself in numerous women's groups and reform efforts.

Kyrsten Strange

Discipline: Business

Authors:
#1 Kyrsten Strange

Abstract Name: Adoption of Artificial Intelligence in Management: A Systematic Review of Organizational Use and Employee Perspectives

This study examines how artificial intelligence (AI) is reshaping managerial work and the perceptions of employees responsible for its adoption. As organizations face rapid technological change, they must continuously adapt their processes and operations to enhance customer satisfaction, maximize profitability, and sustain long-term growth. With the accelerating development and diffusion of AI technologies across industries, there is an increasing need for organizations to provide managers with a clear understanding of how to integrate AI into business processes. Recent research suggests that AI-human augmentation in workflows and decision-making is likely to become standard practice by 2030, highlighting the importance of active leadership involvement in co-creation and implementation of AI systems. Since AI's conceptual emergence in the 1950s and its practical advancement beginning in the 1980s, it has evolved from simple tools such as recommender systems, spam filters, and online advertising among others to advanced generative models capable of processing vast datasets and supporting complex decision-making, in some cases even replacing human labor in specific tasks. These technologies now enable a broad range of organizational applications including risk management, data analytics, recommendation engines, and customer relationship management. While organizations are enthusiastic about the opportunities AI presents, employees are concerned about job displacement and integration anxiety. This study synthesizes research on AI adoption across industries and employee perspectives on its integration and proposes a framework for organizations on how to use AI effectively, safely, and ethically while engaging and upskilling employees to support successful implementation. Keywords: Artificial Intelligence, Organizations, Management, Employee Perspectives

Jeremy Straub

Discipline:

Authors:

#1 Jeremy Straub

Abstract Name: Reinventing Undergraduate Computing (and All) Research in the Era of AI

Artificial intelligence (AI) is changing the world, and its impacts are particularly pronounced on those with limited experience. AI has significantly reduced the opportunities for recent graduates and interns in a variety of fields, including and perhaps most significantly impacting the computing fields. It also changes the dynamics of undergraduate research. For programs that perform (and are funded for) undergraduate research training, changes are needed to prepare undergraduate researchers for this new environment. For undergraduates funded by research goal-driven funding, the comparative benefit of undergraduate students to AI tools, for various tasks, may drive the reevaluation of undergraduate student research involvement and tasking. This presentation focuses on the opportunities that AI presents and how to take advantage of them. It has three synergistic focuses. First, it discusses what capabilities that AI can offer and how these can displace undergraduate researchers – particularly when funding is not tied to undergraduate researcher training. Then, it discusses how AI tools can enable undergraduate research by aiding and enhancing their learning, increasing their productivity and facilitating increased project scope. Finally, the presentation discusses how AI is changing and is poised to further change the undergraduate research landscape. This presentation will include a discussion and demonstration of a number of AI tools and also cover how they can be used in research. It will also discuss the additional training requirements that use of these tools may require – for both faculty mentors and student researchers. A brief project concept, suitable for undergraduate participants – and placing undergraduate students in leadership roles – will be built during the presentation using AI tools. This will show how the tools can be used to aid research and reinforce and demonstrate the aforementioned three key focus areas. This presentation will provide guidance for faculty mentors and student researchers alike.

Norah Strauss

Discipline: Visual Arts

Authors:

Abstract Name: Fraktur in the Fields

Fraktur in the Fields September, 2025 Micron Ink on Paper 22" x 30" Using thin, black lines against a stark white backdrop, this piece utilizes movement and mark-making to elicit imagery, rather than relying on a style of representational depiction more typical in my portfolio. Flowing forms invoke familiar scenes: foliage, cloudy skies, fields. Geometric borders with tassel-like icons are reminiscent of the hoop houses and agricultural plots that mark our nations' open land, or of vintage upholstery to be spotted in domestic spaces. These borders have been compared to various folk art practices, but are Influenced by the folk-art tradition, 'fraktur', of the Pennsylvania-Dutch, early Germanic settlers and immigrants that developed a distinct ethnic identity in southeastern Pennsylvania. My paternal side are all Pennsylvania-Dutch, having come to this land when it still identified as a colonizing entity, before this reality was shrouded behind the label of nation. In the center of the piece, fraktur floral motifs are obscured by the surrounding patterns, a stylistic decision driven by seeing how the construction of whiteness and nationality suppress and erase regional ethnic identities and folk art traditions. This phenomenon is achieved on two fronts: Indigenous cultures are subject to violent assimilation campaigns, more extreme in degree to the cultural coercion settlers, immigrants, and refugees undergo, as all are made to forgo their folk identities in exchange for US nationalism and a ruthless construct of whiteness.

Discipline: Biochemistry

Authors:

#1 Todd Weaver

Abstract Name: Site-Specific Lysine Acylation Disrupts Fumarate Hydratase Assembly and Catalytic Activity

Fumarate Hydratase (FH) is a core enzyme in the tricarboxylic acid (TCA) cycle. Metabolic enzymes like FH regulate energy flux within a cell. Once translated, enzymes such as FH undergo post-translational modifications (PTM), such as lysine acylation, which can fundamentally change the enzyme structure and function. This can cause cascading effects on energy production, DNA repair, and tumor growth if uncontrolled. In a line of paraganglioma cancer cells with succinate dehydrogenase loss, FH levels and acylation PTM levels were altered. This project aims to uncover the effect of these PTMs on FH structure and function. Two mimetic variants were designed to mimic FH acetylation and succinylation at two corresponding lysine residues (K292 and K230) with two corresponding non-mimetic variants to act as controls. These four variants were subjected to functional kinetics and structural characterization, including limited proteolysis and cross-link mapping, circular dichroism, differential scanning fluorimetry, mass photometry, and protein crystallization. Although the K292 variants show minimal PTM-induced changes in local FH structure, both K292 and K230 variants exhibit significant alterations in oligomerization and catalytic activity. In the presence of a known competitive inhibitor, the charge-conserving controls retain tetramerization similar to unmodified FH, whereas the acetylation and succinylation mimetics show a marked loss of tetramer assembly, corresponding with severely reduced catalytic activity in kinetic assays. The acetylation and succinylation mimetics showed a five-fold and six-fold decrease in k_{cat} compared to their respective charge-conserving controls. These findings demonstrate how FH acylation disrupts structural assembly and catalytic activity, supporting a model in which uncontrolled PTM-driven oligomeric regulation contributes to metabolic dysfunction in cancerous cells.

Madelyn Streisfeld

Discipline: Psychology

Authors:

#1 Jessica Cantlon

#2 Marissa Laws

Abstract Name: Assessing the Relationships Between Strategy Tendency & Mental Rotation Processing Using Eye Tracking

Mental rotation, a subtest of spatial visualization skills, assesses cognitive ability to mentally manipulate multidimensional objects in space. Research has demonstrated a relationship between high performance on mental rotation tasks and success in STEM fields. Mental rotation skills are trainable; individual differences in performance may be dependent on the cognitive strategies used to complete tasks, so understanding strategies is imperative for refinement and expansion of spatial training programs. 46 adults ages 18-24 were recruited to participate in an fMRI mental rotation task with eye tracking. Additional behavioral assessments included a standardized test of mental rotation and a lab-developed mental rotation strategy questionnaire. My research assesses (1) whether the strategies used by participants during mental rotation tasks correlate with performance metrics, and (2) whether strategy differences relate to eye movement patterns. Eye movements were not found to be valid predictors of strategy, nor were strategies predictors of performance. Analyses grouped by rotation condition demonstrated a significant increase in eye fixations with increasing angular disparity, but a decrease in task accuracy. When examining a participant's entire in-scanner run,

however, fixation counts and reaction times were found to decrease significantly over time, while accuracy increased. These findings indicate that performance improvements and corresponding eye movements may be best explained by learning, emphasizing repeated practice as an integral component of spatial visualization training. Future research may benefit from analyzing strategy tendency by degree of angular disparity to identify subtler trends in eye movement behavior and pinpointing the role of working memory in task execution.

Madelyn Strom

Discipline: Exercise Science and Nutrition

Authors:

#1 Ron Evans

#2 Sarah Farthing

#3 Morgan Meyer

#4 Melanie Bean

Abstract Name: SEX DIFFERENCES IN PHYSICAL ACTIVITY IN ADOLESCENTS WITH OBESITY AS ASSESSED BY WRIST-WORN ACCELEROMETRY.

Physical activity (PA) has been shown to differ between male and female adolescents, with males typically averaging higher daily PA. However, this difference may be complicated by weight status. The purpose of this study was to compare objectively measured PA in male and female adolescents with obesity using wrist-worn accelerometers. Treatment-seeking adolescents (N=69; 43 females, 13.7±1.2 yrs; 98.3±1.8%ile for BMI) wore an Actigraph GT3X for 7 consecutive days. The GGIR package in R was utilized to determine time spent inactive; engaged in light, moderate and vigorous activities (5 sec epochs); and engaged in moderate-vigorous PA (MVPA) (1-min and 5-min epochs). Associations between PA and weight status were assessed with Pearson-Product Moment Correlations. Mann-Whitney U tests were used to compare differences between male (M) and female (F) groups on each PA variable. Age, weight, or BMI were not significantly different between groups. Significant ($p<0.05$) negative relationships were observed between all PA measures and weight status in both groups along with a significant positive relationship between time spent inactive and weight status. Inactive time (M-758.4±87.2; F-759.5±80.9 min) and time in light (M-168.0±42.2; F-166.2±42.6 min/d), moderate (M-50.5±22.7; F-44.9±18.6 min/d), and vigorous (M-5.5±5.0; F-3.2±3.1 min/d) PA did not differ between groups. However, significant differences were observed in MVPA when analyzed in more sustained 1-min and 5-min epochs for all days and weekdays, but not weekend days, with males averaging ~12 min/day more MVPA (M-43.2±23.0; F-31.3±21.8 min/d). In conclusion, male adolescents with obesity accumulated more daily MVPA when measured in sustained periods, particularly on weekdays. These findings highlight differences in activity patterns that may inform tailored strategies to promote PA in adolescents with obesity.

Sarah Strom Bohl

Discipline: Art History

Authors:

#1 Sarah Strom Bohl

Abstract Name: Maternity and Self-Fashioning: Vigee Le Brun at the Threshold of Revolution

This paper reinterprets Élisabeth Vigée Le Brun's Self-Portrait with Her Daughter Julie (1789) as a calculated

act of self-fashioning that fuses maternal virtue with artistic authorship on the eve of the French Revolution. Long sidelined as merely sentimental, the painting—exhibited weeks before the artist’s October flight from Paris—deploys a Madonna-coded visual language (triangular composition, Raphael inflections, chromatic pairing of red and blue) to claim moral respectability and artistic lineage while deliberately omitting studio props that would conventionally index her profession. Through close looking (following the practice modeled by T. J. Clark) and contextual readings of *Souvenirs*, the essay situates the work within the competing 18th-century constructions of womanhood: Enlightenment prescriptions of “natural” motherhood (Rousseau) and the public culture of the Salon and Académie that alternately elevated and constrained women artists. It argues that specific pictorial decisions—the exposed shoulder, the low-tied red sash that draws the eye to the lap/womb, and Julie’s forward, claiming embrace—produce a productive ambiguity, at once intimate and strategic, that recasts maternity as the very site of authorship, reputation management, and survival. By aligning herself with sacred prototypes while meeting d’Angiviller’s neoclassical turn in taste, Vigée Le Brun fashions a public person capable of withstanding scandal and political volatility. The result is not a retreat into domesticity but a bid for legacy: an image that continues to read as tender and tactical, personal and public, across revolutionary thresholds and into our present.

Sarah Strom Bohl

Discipline: Art History

Authors:

#1 Sarah Strom Bohl

Abstract Name: Performing Gender & Power: Donatello's David and Judith & Holofernes

Donatello has long been celebrated as a master of Renaissance sculpture, but two of his most enigmatic works—the bronze David (c. 1440) and Judith and Holofernes (c. 1457–64)—resist stable interpretation. At first glance, they appear to embody opposite ideals: David is nude, delicate, and serene in victory, while Judith is veiled, composed, and violent in action. Yet when read through Judith Butler’s theory of gender performativity, these sculptures emerge not as fixed embodiments of masculine heroism or feminine virtue, but as staged performances of unstable roles. This paper argues that Donatello’s David queers conventional masculinity by presenting triumph through softness, nudity, and aestheticized beauty rather than brute force. In Butlerian terms, his heroism is a costume—performed through stylized gestures that reveal masculinity as artifice. By contrast, Judith and Holofernes performs chastity and civic virtue as equally unstable, cloaking aggressive power in modest attire. Judith’s poised, veiled body simultaneously enacts violence and virtue, exposing the fragility of gendered categories. Situating these sculptures in their Medicean context, I examine how their civic display and later displacement illuminate the cultural labor required to stabilize gendered power. The removal of Donatello’s ambiguous David and Judith from prominent Florentine sites—replaced by Michelangelo’s colossal, hyper-masculine David—underscores Butler’s claim that gender must be endlessly reiterated to appear “natural.” Donatello’s originals remind us that identity is always theatrical, contingent, and vulnerable to collapse. By bridging Butler’s late-20th-century framework with Quattrocento visual culture, this study reveals how Renaissance art can be read not simply as reinforcing patriarchal norms but as staging their fragility. Donatello’s David and Judith anticipate contemporary conversations in feminist and queer theory, demonstrating that gender has never been a given—it has always been performance.

Sofie Strompf

Discipline: Biology

Authors:

#1 Purva Gade
#2 Angela Rojas
#3 Marissa Howard
#4 Lance Liotta

Abstract Name: The p53/PINK1 Complex in the Noncanonical Mitophagy Pathway Secretory Mitophagy

Cells rely on mitochondria for energy, but these organelles are highly sensitive to stress. When mitochondria become damaged, they are typically removed through mitophagy, a pathway that delivers dysfunctional segments to the lysosome. When this system becomes overloaded, cells can shift to an alternative pathway called secretory mitophagy, wherein whole damaged mitochondrial fragments are packaged into extracellular vesicles (EVs) and released. This export mechanism supports survival under oxidative stress by stabilizing mitochondrial function and limiting apoptosis. This study examined how an activated form of the tumor-suppressor protein P53 (phosphorylated at Ser392) behaves under conditions that promote secretory mitophagy. Mitochondrial stress was induced in two cancer cell lines using CCCP, followed by collection of EVs and cell lysates to assess mitochondrial stress responses and P53 redistribution. Across western blotting, immunofluorescence, and immunoprecipitation analyses, stressed cells consistently redistributed activated P53 from the nucleus to the cytoplasm and mitochondria, where it was packaged into EVs alongside PINK1 and other mitochondrial markers. EVs collected under stress showed strong co-enrichment of P53, PINK1, and mitochondrial proteins, supporting selective incorporation during secretory mitophagy. Consistent with this redistribution, nuclear P53 activity decreased as CCCP concentrations increased. Because nuclear P53 normally represses oncogenic transcription factors, Nanog expression was evaluated as well. Nanog remained elevated when activated P53 was exported, consistent with a reduction in P53-mediated transcriptional suppression. Together, these results support a model in which secretory mitophagy removes activated P53 from the nucleus and packages it into EVs. This export weakens P53-dependent transcriptional control and may contribute to a shift toward a more proliferative, cancer-promoting cellular state during high mitochondrial stress.

Wesley Stroud

Discipline:

Authors:

#1 Wesley Stroud
Holly Reiter
Matt Upson

Abstract Name: Undergraduate Research Course Development: Exploring Learning Outcomes, Methods of Assessment and Instructional Strategies

The purpose of this presentation is to highlight the development of an Honors College undergraduate research course by the Research and Learning Services Department at Oklahoma State University. Together, we will explore the challenges and successes of developing an authentic undergraduate research course specifically designed to prepare honors students for future thesis research projects. This presentation will explore critical skills in course development including; creating learning outcomes, identifying authentic methods of summative and formative assessment, and the implementation of instructional strategies that align with the overall purpose and goals of an undergraduate research course. Participants will explore the importance of developing learning outcomes that align with the mission of a department or college and accurately reflect degree program requirements. Additionally, we will differentiate between formative and summative assessments through a variety of assessment options that can be tailored to different learning environments. Finally, we will deconstruct important instructional strategies such as direct/indirect instruction as well as problem/project-based methods of instruction. The overarching goal of this presentation is to showcase

options in course design that promote student creativity, mentor-student synergy, and focus on a dedication to cultivating a vibrant research culture at the undergraduate level.

Kalen Strunk

Discipline: Biology

Authors:

#1 Rin Krichilsky

Abstract Name: Establishing a Baseline for Argentinian Thread-Waisted Wasps: A Species-Level Checklist of Sphecidae sensu stricto

Apoidea, or apoid wasps, encapsulate a wide range of morphologies, behaviors, and essential ecological roles within the order Hymenoptera, yet many groups remain poorly documented in museum collections and online databases. Recent projects at the American Museum of Natural History (AMNH) note that Argentina may host more than 600 apoid wasp species, including a substantial number with type localities inside the country. Within Apoidea, a striking lineage emerges: the thread-waisted. Thread-waisted wasps (Sphecidae sensu stricto) are notable for their elongated waists, sculptured bodies, and vibrant colors, which make them both recognizable and taxonomically intriguing. To examine and clarify existing checklists of this remarkable family of wasps, we compiled the first species-level checklist of Argentinian Sphecidae s.s. We employed a comprehensive approach, utilizing multiple databases such as museum collections, GBIF, iNaturalist, regional catalogs, and taxonomic literature. Species supported by only one source or showing inconsistent information were set aside for further review, and synonymies were checked to reduce any redundant records. During this process, several AMNH species appeared to lack any formally documented record for Argentina; these require final morphological confirmation but suggest gaps in current country-level checklists. Overall, at least 70 unique species have been identified in this checklist. This project enhances AMNH digitization and checklist efforts by combining digital biodiversity records with the direct use of physical specimens. The resulting dataset updates species presence records, highlights areas of originality of Sphecidae s.s. within Argentina. These key findings support ongoing research on thread-waisted wasps in South America and identify several groups where additional collecting and verification would be particularly advantageous, encouraging continued exploration and study.

Brooke Struyk

Discipline: Engineering

Authors:

#1 Brooke Struyk

#2 Tvisha Gala

#3 Yuvi Gawande

Tvisha Gala

Yuvi Gawande

Abstract Name: Malawi Hearing Screening Dome

Hospitals and maternity wards in Malawi face frequent exposure to high environmental noise levels which poses a challenge when conducting sensitive tests such as hearing tests. These tests are imperative during early auditory development in infants, sound interference can mislead the signal and give inaccurate results. Without proper diagnosis, infants receive incorrect help, delaying critical stages of speech and cognitive

development. Caregivers in the region lack financial and practical access for solutions that can be safe, effective and sensitive. As of right now Malawi does not have the technology for hearing tests nor a conducive environment to screen these babies. Our solution is to develop a low-maintenance, affordable, acoustically insulated head dome for a built-in newborn hearing screening system to test without outside noise interference. The dome has to account for the size and fragility of all newborn heads, sterilizability for repeated use, have adequate ventilation without sacrificing protection from ambient noise, and must reflect similar accuracy to common methods used by other developing nations. To design this helmet we used SolidWorks to create a model that worked around the clearance of general infant head measurements. Moreover, we were able to compartmentalise the electronics to get accurate signals and data. We also tested preliminary designs of noise canceling systems by integrating ANC methods. When designing our models, we wanted to actively keep the ethics of people in Malawi in mind. Our goal for this technology is for it to eventually be distributed throughout every hospital and maternity ward in Malawi, and further shed light on the importance of hearing screening in babies and access to it.

Melinda Struyk

Discipline:

Authors:

#1 Melinda Struyk

Abstract Name: How Mentors Practice Empathy: Faculty and Graduate Approaches to Fostering Psychosocial Support, Belonging, and Science Identity in First-Generation and Low-Income STEM Undergraduate Researchers

Mentoring relationships are considered an essential component of successful undergraduate research program models. Their transformative impact is especially salient for students from diverse backgrounds, such as first-generation and low-income students pursuing STEM degrees, who often encounter challenges related to belonging and science identity that can hinder persistence in STEM fields. While literature highlights the importance of empathy in meeting the needs of culturally diverse learners, far less is known about how empathy operates within research mentoring relationships. The present study focuses on how mentors articulate and demonstrate empathy within their relationships with students. Using thematic coding of transcripts from 15 faculty interviews and two graduate mentor focus groups, this qualitative study investigates how empathy took shape within research mentoring relationships. Program evaluations revealed that these mentors had been successful in supporting belonging and science identity in first-generation, low-income STEM students during a summer-long intensive research experience. Accordingly, it is anticipated that key psychosocial elements such as cognitive, affective, and action-oriented empathy, will surface in the analysis. Insights from a companion analysis grounded in Self-Determination Theory (SDT) suggest that meaningful emotional connections are central to these mentoring relationships, providing a theoretical basis for anticipating that distinct empathy dimensions will emerge in the data. The results of this study are expected to contribute to a clearer understanding of how empathy functions as a psychosocial mechanism within undergraduate research mentoring and to inform future program design and culturally responsive mentorship.

Ryan Stubbs

Discipline: Computer Science

Authors:

#1 Ryan Stubbs

#2 Kelis Gates

#3 Md Shirajum Munir
#4 Mostafizur Rahman
Kelis Gates

Abstract Name: USRP Prototype to Enhance Analytic Capabilities in Dual-End Logging

Software-defined radio suites, such as GNU Radio, face challenges in debugging live digital communications because feedback and help are often limited, making errors hard to identify, especially for first-time users. To address this issue, we prototype a Universal Software Radio Peripheral (USRP) with a GNU Radio File Transceiver system that uses Binary Phase-Shift Keying (BPSK) modulation and a wrapper application for data loss detection and analysis via dual-end logging. This system aims to streamline experimentation with the GNU Radio testbed, support efficient parameter control, reduce manual data collection, and provide users with fast, helpful analysis. BPSK modulation and demodulation ensure reliability even in noisy environments, and a wrapper application provides a user-friendly interface for easy adjustment of key transmission variables. The wrapper application allows users to adjust transmission variables via a simple Graphical User Interface that takes user input and configures GNU Radio appropriately before starting the transmission. The application later generates detailed transmission logs that capture the user's variable settings, file data, and transmission timestamps. Developed logging functionality assists the user in identifying issues within the GNU Radio file transfer system and supports the analysis of data loss, transmission reliability, and the effects of the parameterized settings. Our current implementation provides simplified user configuration and transmitter-side logging. In future development, we aim to include receiver-side logging for data-loss diagnostics, the return of information from the receiver, and AI-enabled instant suggestions to both ends.

Nic Stumpo

Discipline: Social Work and Human Services

Authors:

Abstract Name: From Clinical Interaction to Socioecological Environment: Belongingness in Healthcare for Transgender, Nonbinary, and Gender Diverse Individuals

Purpose: To gain a holistic understanding of the healthcare experiences of transgender, nonbinary, and gender diverse (TNG) individuals by using a belongingness framework, in order to elucidate the interaction between structural, interpersonal, and intrapsychic factors. Background: TNG individuals have adverse healthcare experiences characterized by discrimination, misattribution, misinformation, and structural barriers. They also report having insurance delays, extended wait times, and difficulty finding an appropriate provider for gender-affirming interventions. Furthermore, accessing healthcare is limited by insurance coverage, and the affordability and availability of care. TNG individuals, doctors, nurses, and allied health professionals have also noted the importance of education on this population. Previous studies have covered the structural and interpersonal factors impacting the healthcare experiences of TNG individuals, and less research has focused on intrapsychic factors. Additionally, no studies have evaluated the dynamic interplay between these factors under a unified framework. Methods: Using transcripts from a previous study on the healthcare experiences of TNG individuals, thematic analysis is performed to identify how a sense of belonging is constructed in a healthcare context. Transcripts are coded using Dedoose, and prominent themes are subsequently identified. Results: Provisional findings for this study include insurance as a facilitator and barrier, allyship increases belonging, and barriers lead to TNG individuals seeking alternate forms of care.

Fayrah Stylianopoulos

Discipline: Psychology

Authors:

#1 Fayrah Stylianopoulos

#2 Anne-Marie Iselin

Abstract Name: Unveiled: Exploring Purity Culture, Gender, and Well-Being in Global and National Contexts Within and Beyond the Eastern Orthodox Church

Purity culture, which describes a set of theologically conservative values about sexuality that mandates strict sexual abstinence until heterosexual marriage, can evoke fear and shame in those who fail to comply. While extensively studied within evangelical contexts, the presence and impact of purity culture within Orthodox Christianity remain largely unexplored. This study investigated the relation between purity culture endorsement and well-being across 18 countries along two sets of cultural value dimensions: Traditional vs Secular-Rational, and Survival vs Self-Expression using World Values Survey data ($N = 3,486$; $M_{age} = 21.84$ years, range = 18 to 25 years; 56% female), and additional data from American Eastern Orthodox participants ($n = 48$; $M_{age} = 21.10$ years; 66% female) and non-Orthodox participants ($n = 318$; $M_{age} = 21.97$ years, 49% female). As hypothesized, countries higher in Traditional and Survival values demonstrated markedly stronger endorsement of purity culture [$F(2, 3446) = 1463.89$, $p < .001$, $\eta^2 = .459$]. Well-being did not differ significantly across country groups high, medium, and low in Traditional and Survival values [$F(2, 3483) = 0.001$, $p = .99$]. Mean purity culture scores did not significantly differ between American Orthodox Christians and non-Orthodox participants [$F(1, 358) = 0.33$, $p = 0.57$]. Within the Orthodox sample, purity culture was not significantly correlated with depression-anxiety symptoms or objectified body consciousness. Together, these findings suggest that while purity culture endorsement varies strongly by national cultural values, its expected detrimental relation to well-being was not consistently observed. Results contribute to a nuanced understanding of purity culture as a culturally embedded belief system whose psychological impact may differ across religious and sociocultural settings.

Andrew Su

Discipline: Chemistry

Authors:

#1 Nicolay Tsarevsky

Abstract Name: Synthesis of Dynamic Polymers with Covalently Integrated Hypervalent Iodine (III) and Bismuth (V) Functionalities

Polymers are macromolecules made up of repeating monomer units linked by covalent bonds. They are the fundamental building blocks of many natural and synthetic materials and are widely utilized for their versatility across a broad spectrum of applications, including plastic bags, adhesives, PVC pipes, etc. My research focuses on dynamic polymers, materials that can repair themselves and reorganize after damage. Unlike traditional plastics, these polymers contain special bonding units made from hypervalent iodine and bismuth, elements that can form bonds which easily break and reconnect. This reversibility is what gives the materials their self-healing and shape-changing properties. I will study how light or heat can switch these polymers between a flexible, self-healing state and a more stable, long-lasting form. To create these materials, I will use chemical reactions, such as ligand exchange and the condensation of iodosylbenzene with dicarboxylic acids, that build the polymer chains and introduce the iodine and bismuth units that enable this dynamic behavior. By investigating how these polymers can repeatedly form and break bonds when certain chemicals are present, this research aims to allow for the development of self-healing and regenerative materials with advanced applications in material science, such as reactive coatings, adhesives, etc.

Discipline: Psychology

Authors:

Abstract Name: Using “Emotional” Music to Engage Neural Pathways Involved in Cognitive Empathy for Use in Music Therapy for Adolescents with Autism

Empathy is crucial to everyday interactions; the ability to understand and aptly react to the internal states of others is essential to living a fulfilling and successful life. Deficits in cognitive empathy have been heavily linked to Autism Spectrum Disorder (ASD), so there have been numerous studies focused on empathy remediation in individuals with ASD. Many of these studies use music therapy to accomplish this goal, yet not much is known about what kind of music is most effective at developing empathy. Peer reviewed studies on the music preferences of empathetic individuals, the neural pathways engaged by listening to music and social cognition, and the effectiveness of other arts and music based therapy in empathy remediation were analyzed to understand how “emotional” music may be effective at improving empathy in individuals with ASD. The findings suggest that “emotional” music may be able to increase cognitive empathy in adolescents with autism by strengthening the neural pathways used in social cognition, as well as more effectively engaging emotional mirroring in the listener. This paper aims to discuss how due to “emotional” music’s effectiveness at increasing cognitive empathy, music therapy interventions with the intention of increasing empathy in adolescents with autism may benefit from focusing on engagement with “emotional” music. Future studies may expand upon this idea by comparing changes in empathy in participants after “emotional” music therapy and other forms of music or arts-based therapy.

Umair Subhani

Discipline: Psychology

Authors:

#1 Jonathan Amburgey

#2 Jocelyn Cuthbert

Abstract Name: The Impact of Exam Wrappers on Metacognition, Self-Referential Processes, and Academic Performance in Undergraduate Human Anatomy students.

Background: Prior research demonstrates high attrition rates and low student engagement among Human Anatomy and Physiology students. Students in these courses face poor academic performance and low pass rates. Exam wrappers are survey-based tools used to prompt student reflection on concepts such as test preparation, study strategies, and exam performance. By fostering metacognition, exam wrappers can influence how students approach course material, potentially improving student outcomes in Anatomy courses. Purpose: This study investigates whether exam wrappers promote self-reflection, growth mindsets, study habits, and reduced test anxiety and then examines how these factors can impact exam performance. Methodology: Participants were Human Anatomy students who completed surveys assessing self-reflection, growth mindsets, study habits, and test anxiety. We employed a quasi-experimental pretest-posttest design, with students assigned to either an intervention or a non-intervention control group based on their course sections. Surveys were administered at Westminster and Weber State Universities after the first and final exams, with only the treatment group receiving the exam wrappers. Participation was voluntary, and students who completed the exam wrapper could take new questions on unmastered concepts, earning points toward their final grade for correct answers. Implications: The study highlights the possible impact of self-referential capabilities (e.g., growth mindsets and study habits) in a test-taking environment. Findings from this study

may inform research on how self-referential capabilities impact student test performance and how providing the opportunity to relearn and retest after reflection may positively affect student performance.

Sneha Subhash

Discipline: Biology

Authors:

#1 Matthew Pate
#2 Roberto Martin
#3 Emma Baker
#4 Blake Hutchins
#5 Maria Moreno Hollweg
#6 Sabrin Safar
#7 Kyuree Chang
#8 Arthur Sikora
#9 Eduardo Veliz
#10 Steven Vanni
#11 Steven Vanni
#12 Regina Graham
Swara Chindhade

Abstract Name: Nitro-Modified Curcumin Analogs Suppress STAT3 Signaling and Inhibit Glioblastoma Stem Cell Growth

Signal Transducer and Activator of Transcription 3 (STAT3) is frequently overactivated in cancers, including glioblastoma (GBM), where its dysregulation is associated with aggressive disease and poor patient survival. STAT3 supports tumor progression by promoting proliferation, resistance to apoptosis, maintenance of cancer stem cells, and immune suppression. Although numerous STAT3 inhibitors are under preclinical and clinical evaluation, none have yet achieved FDA approval. GBM remains a highly lethal brain cancer with limited therapeutic options, underscoring the need for new targeted treatments. Nitro-containing compounds, known for their strong electron-withdrawing characteristics, are emerging as potential anticancer agents. A library of 41 nitro-containing chalcones and cyclic C5–curcumin derivatives was synthesized and screened for cytotoxicity in three glioblastoma stem cell (GSC) lines. Compounds were tested at concentrations ranging from 0.1 to 10 μM , and cell viability was assessed after 72 hours using an MTS assay. Neurosphere-forming assays were conducted to evaluate effects on GSC self-renewal. Western blotting was used to examine alterations in STAT3-related signaling pathways. SwissDock modeling was employed to predict compound interactions with STAT3. More than half of the synthesized molecules demonstrated average IC_{50} values ≤ 10 μM in GSCs, and four exhibited IC_{50} s in the low-nanomolar range. Among them, Compound 31, a nitro-substituted cyclic C5–curcumin analog, displayed the strongest activity, with an average IC_{50} of 0.76 μM , outperforming WP1066 (IC_{50} 2.12 μM), a clinical-stage STAT3 inhibitor. Compound 31 markedly decreased neurosphere formation, reduced STAT3 phosphorylation, and suppressed downstream gene expression. Docking studies revealed predicted binding to STAT3's SH2 domain, a key site for activation. Nitro groups represent highly effective functional moieties capable of inducing cancer cell death through diverse mechanisms. Several potent nitro-based molecules were identified, with Compound 31 emerging as a promising direct STAT3 SH2-domain inhibitor and a potential therapeutic candidate for GBM.

Naomi (Willow) Sugg

Discipline: Art History

Authors:

Abstract Name: What Shouldn't Decay: Uncomfortable Rot in Modern Depictions

The purpose of my project, "What Shouldn't Decay," is to make you uncomfortable, not with gore or violence, but with a disruption to an ethical and natural order. It examines how and why these modern depictions of unnatural death and decay evoke illicit psychological and moral discomfort. Real instances, such as pigs consuming human flesh, the Mexica biohazard incident, and creative expressions like the uncanny music series by The Caretaker and digital horror by the developer Yames, cause disorientation to your senses. This analysis argues that these depictions expose the psychology and importance of death through the revulsion of the senses. Taking an interdisciplinary approach combining art theory, cultural analysis, and psychology, I trace how people in our contemporary time have transformed physical rot into unthinkable spectacles. The study explains how sensory dissonance, uncanny imagery, distorted sound, and the smell of slow decay, caused solely by human influence, force a discomfort with mortality onto audiences. It argues that our unease arises not only from physical disgust but also from recognizing in these decaying images our own fragility and guilt. Ultimately, this "uncomfortable rot" is existential anxiety about death itself, paired with social disgust of the unthinkable.

Ghavita Sugrim

Discipline: Psychology

Authors:

Abstract Name: Beyond the Classroom: The Role of Socioeconomic Status in English Grades

This study examines whether socioeconomic status (SES) affects English grade point averages (GPAs) among African American high school students. SES, which includes factors like family income, education, and occupation, is known to influence academic performance, especially in communities affected by racial and economic inequality. Using data from the High School Longitudinal Study of 2009_2016 (HSL:09), this research focuses on students at the lowest and highest SES levels, totaling 769 African American participants. To analyze differences in English performance, this study used an independent samples t-test to compare English GPAs between the two groups. The results show clear disparities: students in the lowest SES group had an average English GPA of 1.97, while those in the highest SES group averaged 2.66. This difference is statistically significant ($p < .001$), meaning it is very unlikely to be due to chance. These findings suggest that higher SES African American students tend to perform better in English, likely due to greater access to academic and cultural resources. Grounded in Bourdieu's cultural capital theory, the study highlights how advantages outside the classroom can shape academic outcomes. Overall, the research emphasizes the need for increased support for low-SES students to help reduce achievement gaps.

Fatema Suleiman

Discipline: Biology

Authors:

#1 Charles Kuhlmann

#2 Masakazu Kamata

Abstract Name: JNK Knockdown Alters Cytokine Expression in CAR-T Cells

Chimeric Antigen Receptor (CAR) T-cells are genetically modified T cells engineered to fight cancer cells. While a promising cancer treatment, CAR T cells show limited efficacy against ovarian cancer, partially due to the immunosuppressive tumor microenvironment (TME), which includes immunosuppressive cytokines that diminish CAR-T cell activity. Our research aims to improve CAR-T cell effectiveness by optimizing CAR-T cell cytokine production, which may impact the overall cytokine environment of the TME. We hypothesize that controlling c-Jun N-terminal Kinase (JNK) signaling in CAR-T cells may improve anti-tumor functionality through alteration of CAR-T cell cytokine production. We developed a lentivirus vector containing short-hairpin RNA (shRNA) to knock down JNK in CAR T cells. Human Epidermal Growth Factor Receptor 2 (HER2) targeting CAR-T cells with and without JNK knockdown were produced from human peripheral blood T cells to evaluate the role of JNK signaling in CAR T cell production and functionality. CAR-T cell differentiation status after production was assessed by flow cytometry. CAR-T cell cytokine production was then tested by Enzyme-Linked Immunosorbent Assay (ELISA). JNK knockdown in CAR-T cells did not alter the total expansion, CD4:CD8 ratio, or differentiation status of CAR-T cells during production. JNK knockdown reduced the production of several cytokines (IL-10, IL-4, IL-5, IL-2) by approximately half, while IFN γ production was unaffected. JNK knockdown did not impair CAR-T cell production but reduced the immunosuppressive cytokines IL-10 and IL-4 while maintaining IFN γ . These findings suggest that targeted control of JNK signaling may improve CAR-T cell interactions within the tumor microenvironment by controlling cytokine production, potentially leading to enhanced efficacy.

Kelsey Sullivan

Discipline: Engineering

Authors:

#1 Kelsey Sullivan

Abstract Name: Solar Cells from Germanane

The 2D germanium (Ge) analog to graphene is known as germanene. Hydrogenated-germanene, or germanane, was first synthesized in 2013 using relatively simple wet chemistry methods. Germanane has an inherently tunable direct band gap of approximately 1.6 eV, and high electron mobility, giving it great potential for application in photovoltaics, photodetectors, and thermoelectrics. As of 2023, some thirty-four different electronic device applications, including photodetectors, had been reported in the literature. However, a working photovoltaic device has yet to be realized. In support of efforts to achieve a working germanane photovoltaic, films of germanane, methyl germanane, and allyl germanane were produced. Fine layers of allyl germanane and methyl germanane were produced by spray-coating onto ITO-coated glass. To prepare the solutions, an assortment of solvents was tested with each compound to determine which solvent resulted in the best film. For methyl germanane, toluene produced the best film, and for allyl germanane, tetrahydrofuran (THF) worked best. The films were characterized to determine their optical and electrical properties. Once the optimal technique had been discovered for producing high-quality films of allyl germanane and methyl germanane, photovoltaic device structures were fabricated. These consisted of glass,

ITO, PEDOT-PSS, methyl germanane, allyl germanane, and silver. The devices were characterized using a Keithly Source-Meter to produce Current-Voltage (IV) curves. To date, devices have demonstrated diode behavior but not a photoresponse. Additional optimization is ongoing.

George Sullivan

Discipline: Mathematics

Authors:

#1 Amy Chapman

Abstract Name: Government Shutdowns and Holiday Flights Home: Utilizing Hierarchical Clustering Methods to Precondition Data for Linear Optimization

November 12th, 2025, marked the end of the longest government shutdown in U.S. history, lasting 43 days and costing 11 billion dollars. During periods of strain due to funding constraints, limited personnel, and delays, typical optimization algorithms used by airlines can become unstable and inefficient due to an increased number of variables and larger, more complex flight information. The focus of this paper is on improving the quality and organization of airport operation input data clusters produced by widely used agglomerative hierarchical clustering methods. In doing so, we can model complex nonlinear systems, such as those found in major disruption scenarios, with linearizations of the system that use these clusters to maintain speed, stability, and accuracy. Previous research has shown that clustering airline data before routing and scheduling computations is not only more efficient but also helps indicate which optimization methods should be used to evaluate it. However, only a few publications address how these samples are affected by major disruption scenarios and how algorithmic input must be adjusted accordingly. Using data from the Federal Aviation Administration and the Bureau of Transportation, we can assign a larger array of variables than previous studies, and then simplify and categorize the data using the aforementioned clustering methods. Once this data is preconditioned, an industry-standard constrained optimization solver will be used to solve the linearization of the system. Although clustering and processing the airline data before input reduces the fine details of the solution, forcing the data to conform to a linear system should produce gains in the stability and speed of the optimization solver, as well as maintain the overarching patterns needed to create schedules and minimize delays.

Katelyn Sullivan

Discipline: English and Literature

Authors:

Abstract Name: Becoming Human: Barbie and the Fulfillment of Margaret Fuller's Feminist Vision

This paper explores Greta Gerwig's *Barbie* (2023) as a modern enactment of Margaret Fuller's feminist philosophy in *The Great Lawsuit* (1845). Fuller argued that women's liberation requires both inward and outward freedom, grounded in intellectual autonomy, spiritual agency, and self-reliance. *Barbie* reimagines these ideals through its central figure, tracing Barbie's journey from the superficial perfection of Barbie Land to her choice to "become human" and embrace imperfection and meaning. This transformation dramatizes Fuller's insistence that freedom is not a concession from society but an inherent right. Through close readings of Fuller's text alongside pivotal moments in the film, such as Gloria's monologue, Barbie's existential awakening, and her final declaration of personhood, this paper argues that *Barbie* transcends surface-level notions of equality to recover the deeper philosophical and existential dimensions of feminism. By placing

Fuller in dialogue with Gerwig's film, the study shows how Barbie revitalizes Fuller's radical vision for the twenty-first century, reaffirming that women's humanity lies in the right to live, think, and create freely.

Elliot Summers

Discipline: Psychology

Authors:

Abstract Name: Predictors of Nonsuicidal Self-Injury in Transgender Youth: A Systematic Review

The aim of this literature review is to identify predictors of nonsuicidal self-injury (NSSI) engagement in transgender adolescents. Transgender individuals are at increased risk of NSSI engagement, and adolescents at the greatest risk of engaging in NSSI out of any other age group, as consistently established in the existing literature. Transgender people are at heightened risk of experiencing distal risk factors discussed in Nock's theoretical model of NSSI as per the minority stress model and are therefore more likely to engage in NSSI. A systematic review of articles published in the past ten years in the American Psychological Association's PsycInfo database identifying predictors of NSSI engagement among transgender adolescents was conducted. Existing literature has identified predictors for transgender adolescents engaging in NSSI which generally fall in three main categories: social context, mental health problems, and self-concept. Predictors which emerged most frequently in the literature include poor connectedness and support from family, poor perceptions of school safety, and societal stigmas against transgender people. In order to decrease NSSI risk in transgender adolescents, efforts towards decreasing stigma and increasing support in schools and society are necessary. Future research on predictive factors for NSSI engagement is necessary for clinicians to best serve gender diverse populations.

Amberly Sun

Discipline: Gender, Ethnicity, Diversity, or Cultural Studies

Authors:

#1 I-Chun (Nicky) Wu

Abstract Name: Barriers To Promotion for Women in U.S. Corporate Business

Despite decades of progress in women's workforce participation, women in the United States continue to be significantly underrepresented in senior corporate leadership. This project examines the persistent barriers that limit women's promotion into executive roles. These structural obstacles restrict women's advancement and contribute to situations where women are promoted into precarious leadership positions with a higher likelihood of failure. Understanding how and why these patterns persist is essential for developing strategies that promote equitable leadership pipelines and organizational cultures. Existing scholarship highlights two dominant themes. First, that women face invisible institutional and cultural barriers that prevent upward mobility, otherwise known as 'the glass ceiling effect.' Second, that when women do reach leadership roles, they are disproportionately placed in unstable or high-risk situations, otherwise known as 'the glass cliff effect.' While this body of research has provided strong quantitative evidence of performance disparities and promotion patterns, it has offered limited insight into the lived experiences of women who have navigated these executive environments. Prior studies rely heavily on numerical data, leaving a gap in qualitative accounts directly from former or current women executives. This study addresses that gap by asking: What contributes to the lack of women promoted into executive roles in U.S. corporate business? The project employs a mixed-methods design. Quantitative data will be obtained in the form of updated national statistics

on women's leadership representation, promotion rates, and organizational outcomes. Qualitative data will be collected through interviews with women CEOs and executives, focusing on their experiences with structural barriers, leadership opportunities, organizational support, and moments of risk or instability. By integrating these data sources, the study seeks to identify recurring patterns and factors that shape women's access to executive advancement, offering a more comprehensive understanding of the mechanisms that uphold the glass ceiling and create glass-cliff conditions.

Junqi Sun

Discipline: Chemistry

Authors:

#1 Shanuk Rajapakse
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#3 Henrik P. H. Wong
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#5 Joshua Helms
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Abstract Name: Mechanistic Investigations into Aldehyde Deformylation Reactivity of Bioinspired Heme Peroxo Intermediates: Critical Insight into C–C bond Cleavage Mediated by Cytochrome P450 Aromatase

Heme enzymes play a critical role in activating dioxygen for oxidative chemistry in biological processes. This activation could occur via the binding of dioxygen to a ferrous heme active site, followed by one-electron reduction and proton-assisted heterolytic cleavage of the O–O bond. Therein, mid-valent heme peroxo (heme-PO) species have emerged as a key active intermediate. Human aromatase is one such heme enzyme that catalyzes the conversion of androgens to estrogens in steroidogenesis. The third step of aromatase involves the loss of the C19 aldehyde group as formate, and a concomitant aromatization of steroid ring A. This unique oxidative C–C bond cleavage reaction is proposed to involve a heme-PO species as the active oxidant, albeit minimal experimental evidence has been presented. Aromatase inhibitors (AIs) are at the forefront of clinically validated therapeutics for postmenopausal breast cancer. Gaining mechanistic insights into aromatase function is therefore essential and urgent for the design of next-generation AIs with improved efficacy and reduced side effects. Bioinorganic model chemistry provides a powerful toolkit towards this effort, uniquely enabling the synthesis of highly effective bioinspired mimics and the characterization of relevant reactive species using a medley of spectroscopic and theoretical methods. To probe the deformylation reactivity landscape of heme-PO adduct, we employed bioinspired heme-peroxide mimics with electronically disparate iron centers in conjunction with structurally varied aldehyde substrates. Detailed kinetic analyses reveal the electrophilicity of the substrate and the nucleophilicity of the peroxo moiety being critical determinants of the deformylation rates. Coupled with thermodynamic, radical trapping, isotope labeling studies, and complementary computational investigations, we demonstrate the likelihood of an initial enolization followed by a nucleophilic attack mediated by heme-PO on aldehyde substrates, which is overall rate-limiting. The characterization of a key heme peroxyhemiacetal reaction intermediate is also presented.

Medha Sundar Rajan

Discipline: Health and Human Development

Authors:

#1 Krishna Prajapati
#2 Danieli Rodrigues

Abstract Name: Establishment of Peri-Implant Disease Models in Lewis Rats

Peri-implant disease (PI) is an inflammatory condition involving soft and hard tissues surrounding dental implants and represents a major contributor to implant failure, affecting 15% - 56% of all dental implants. The progression from peri-implant mucositis to peri-implantitis involves a shift from reversible soft tissue inflammation to irreversible bone destruction and loss of osseointegration. As the number of dental implant procedures continues to increase, there is a growing need for reliable experimental models to study their progression and treatment. Despite the clinical significance of peri-implantitis, there is currently no standardized small animal model that replicates its biological and structural features. This study focuses on developing peri-implant disease models in Lewis rats to study disease progression and quantify disease-associated bone loss using high-resolution microCT imaging. In an ongoing study, a total of 23 twelve-week-old Lewis rats are divided into three groups: control (n=3), peri-implant mucositis (PIM, n=10), and peri-implantitis (PI, n=10). All rats will receive commercially pure titanium screws in the maxillae and undergo a 28-day healing period to allow osseointegration. After the healing period, a 6-0 silk ligature will be introduced in select rats to induce inflammation. Rats harvested at 7 day post ligature will model peri-implant mucositis, while those harvested at 14 days post ligature will represent peri-implantitis. Implant-only control animals will undergo surgical re-entry without ligature placement to confirm that bone loss results specifically from inflammation. Harvested maxillae will be analyzed using microCT to assess peri-implant morphology, quantify bone volume fraction (BV/TV), and measure the vertical distance from the implant head to alveolar bone crest. Statistical analyses at a 0.05 significance level will compare bone loss among groups. We hypothesize that ligature placement will significantly reduce BV/TV and increase vertical bone loss relative to controls, validating the induction of peri-implant disease.

Ovyaswastika Sundaram

Discipline: Engineering

Authors:

Abstract Name: Beyond Mobility: The Role of Prosthetic Innovation in Emotional Healing and Identity Reconstruction

The field of rehabilitation engineering extends beyond restoring physical movement; it also plays a vital role in rebuilding confidence, identity, and social connection for amputees. Despite major advances in prosthetic technology, many users continue to face psychological and emotional challenges that affect their overall quality of life. This paper investigates how the design and functionality of prosthetic devices influence the mental health and emotional recovery of amputees. Drawing on interdisciplinary research in engineering, neuroscience, and psychology, this study examines how sensory feedback, neural communication, comfort, and aesthetic personalization contribute to users' mental well-being. Key themes include the role of sensory restoration in emotional healing, empathetic design for comfort, neural reconnection for embodiment, aesthetic appeal for social acceptance, and technological integration for holistic rehabilitation. Findings from existing studies indicate that sensory feedback can reduce phantom limb pain and enhance user enjoyment, that socket design directly influences comfort and satisfaction, and that user participation in aesthetic customization increases motivation and confidence. Neural stimulation helps reestablish communication between the brain and the prosthesis, while the combination of psychological and technological approaches promotes independence and emotional resilience. These results demonstrate that prosthetic devices shape mental health as significantly as they restore physical function. Therefore, successful prosthetic designs must integrate emotional well-being, personalization, and functional performance. By aligning mechanical precision with psychological understanding, rehabilitation engineering can create prosthetics that not only restore mobility but also help amputees reclaim their sense of self, confidence, and belonging.

Giwon Sung

Discipline: Engineering

Authors:

#1 Janik Mischke

Abstract Name: Real-Time YOLOv8-Based Object Detection and Reporting for Construction Sites

This paper presents a real-time computer vision pipeline for automated monitoring and reporting construction sites. The system contains a custom trained YOLOv8 object detector with optical character recognition (OCR) to generate daily site reports with no human intervention. The YOLOv8 model was trained on a curated dataset, which had been annotated via CVAT, to recognize critical construction objects: steel reinforcement, person, construction workers, concrete buckets, and achieving a mean average precision (mAP) of over 95%. An OCR module parses delivery note using a Python script that extracts tabular data into CSV format. An automation script then compiles detection results and delivery records into a structured HTML/PDF report. The proposed framework demonstrates end-to-end automation: from video frames and documents from the construction site to a finalized daily report. This paper details the training process, system architecture, and field results that emphasize that real-time object detection with document parsing can significantly streamline construction progress tracking and safety management.

Giwon Sung

Discipline: Engineering

Authors:

Abstract Name: Developing and Calibrating a Multi-Factor Scour Prediction Equation: Insights from the Schoharie Creek Bridge Collapse

Bridge scour is the leading cause of hydraulic structural failure. To manage this risk, the civil engineering community relies on standard empirical models, most notably the HEC-18 CSU equation, which provides a conservative safety envelope for design. While these equations are excellent for predicting maximum scour in cohesionless sand, challenges naturally arise when applying them to complex field settings where the geology resists erosion differently than laboratory sand. This study presents a forensic hydraulic analysis of the 1987 Schoharie Creek Bridge (I-90) collapse in New York. Leveraging forensic data from the NTSB and USGS, this ongoing research reconstructs the hydraulic conditions of the record 1987 flood. This study focused on the scour depth at Pier 3, which was identified as the primary cause of the bridge's collapse during the heavy rainfall. First, the hydraulic state at Pier 3, which had collapsed during the flood peak was modeled using Manning's equation and historically observed discharge data to determine specific parameters, including the approach velocity, and Froude number. It is hypothesized that the standard CSU equation, designed for safety, predicted a theoretical scour depth significantly greater than the actual 3-meter hole documented by forensic divers, due to the resistive properties of the riverbed's dense glacial till. To solve this, the primary objective is to develop a site-specific geomorphic calibration factor. By analyzing the discrepancy between the theoretical prediction and the forensic evidence, this study aims to derive a correction coefficient based on the bed material's critical velocity. The expected outcome is a calibrated predictive model that determines if the collapse was a hydraulically inevitable consequence of the design, regardless of the geological resistance. The contribution of this study lies in providing a refined, location-specific scour assessment approach that bridges the gap between generalized equations and real forensic evidence.

Shreya Sunil

AL - University of Alabama at Birmingham

Discipline: Biology

Authors:

#1 Shashank Saurav

#2 Bhuwan Giri

Abstract Name: Bile Acid Salt Metabolites Inhibit Pro-Inflammatory Th1 and Th17 Cell Polarization

The intestinal immune system operates at the complex intersection of microbial metabolites and host regulatory networks, yet the influence of bile salts on adaptive immunity remains unclear. Recent findings have hinted at their potential to regulate immune cell differentiation. In this study, we investigated the capacity of bile acid metabolites on Th1 and Th17 cell polarization and its implications in the pathogenesis of colitis and inflammation-related colon cancer. C57BL/6 WT mice were maintained and euthanized in accordance with IACUC guidelines. Spleens were harvested and CD4⁺ naive T cells were isolated. T cells were cultured in DMEM, and conditioned media where Th1 was supplemented with IL12 and Anti-IL4, and Th17 was supplemented with IL6, TGF β , Anti-IFN γ , and Anti-IL4. Cells were stimulated with PMA/ionomycin/GolgiStop and stained for IFN γ and IL-17A, and data was analyzed using Attune FlowCytometry. For Th1 polarization, treatment with 20 μ M IsoAlloLCA led to a decrease in Th1 polarized cells compared to DMSO control (16.11% vs. 69.25%), while Deoxycholic acid (DCA), 3-oxo-deoxycholic acid (3-oxo), and lithocholic acid (LCA) showcased levels of 60.5%, 53.34%, 62%, respectively. For Th17 polarization, IsoAlloLCA reduced Th17 cells to 7.57% compared to 46.73% in DMSO controls. DCA, 3-oxo, and LCA also suppressed Th17 polarization to 34.07%, 18.55%, and 29.16%. Th1 polarization was partially inhibited by secondary bile acids, particularly DCA and 3-oxo. Th17 polarization was completely inhibited by primary and secondary bile acids. These findings point to a potential link between bile acid metabolism and suppression of inflammatory T cell responses.

Kaile Suoo

Discipline: Computer Science

Authors:

#1 Kaile Suoo

#2 Theodora Chaspari

#3 Raquel Yupanqui

Abstract Name: The Analysis of Sensor Based Geo-Spatial Data to Determine the Effect of Environmental Factors on Stress and Walkability

Neighborhood walkability is a significant factor for allowing older adults to maintain regular physical activity, which is linked to their overall physical and mental health. Previous studies have shown that these effects are worsened in low-income communities, finding decreased walkability in a low-income Latino community by analyzing data collected during two-week walking trip samples using wearable and mobile devices. The dataset includes both geo-spatial and physiological data, including heart rate, electrodermal activity, and body acceleration. Participants also completed surveys after each walking trip and reported environmental stressors encountered during their walk. This project aims to further analyze this data to explore associations between stress and other walkability-related factors through cross referencing self-

reported stressor data with location and physiological signals. Environmental stressors reported by participants were categorized into various categories (e.g., traffic, people, weather, etc.), allowing for analysis of different types of stressors commonly encountered by pedestrians during trips. Heatmaps were also created to find locations with the highest density of stress reports for each category. Identifying areas where different types of stressors were most commonly reported allows signal data to be examined in specific analysis windows, providing insight into the effect that each type of stressor has on participant physiology. Additionally, ambient environmental factors such as temperature and humidity were also considered during analysis to determine the influence of these factors during trips. The expected results of this study are to identify the most important environmental factors that influence pedestrian stress and find potential improvements for pedestrian infrastructure. Additionally, this research builds upon the development of analyzing data collected from devices using computational methods.

Martie Surasky

Discipline: English and Literature

Authors:

Abstract Name: On Researching and Writing Celtic Folklore and Selkies

In my project I have aimed to complete research for the development of a graphic novel that revolves around the Celtic folklore creature “selkies”, seal-like people who don seal fur coats and transform into seals themselves. I want to be able to share information about these creatures from folklore while also drawing inspiration from the folklore itself so that I can teach others about the creatures I myself am so passionate about. My goal was to develop the plot for a graphic novel revolving around these creatures while also displaying queer themes such as transgender identities. I also aimed to gain experience in depth research for fiction. I’ve researched various sources, from research papers and interviews to primary sources including documented folklore and song. I’ve discovered that there are a wide variety of resources to pull inspiration from, and that there are a variety of ways to pull inspiration from these sources. Ultimately, I aim to have created a finished plot for the planned graphic novel, as well as a reflection on my experience as a writer in doing research. I hope to present my outcomes on both my writing and what I managed to accomplish through the fellowship as well as how I can carry the experience I’ve gained into the future as a writer and an artist.

Sreenidhi Surineni

Discipline: Biology

Authors:

#1 Sreenidhi Surineni

#2 David Nikom

#3 Sika Zheng

Abstract Name: Automated Machine Learning Analysis of Axonal Swellings in an Alzheimer’s Disease Model

Automated detection and classification of pathological features in neurodegenerative diseases, such as Alzheimer’s disease (AD), is crucial for understanding disease progression and developing therapeutic interventions. Axonal swelling, an early pathological marker in AD, is traditionally quantified manually, which is time-consuming and prone to variability. To address these challenges, we developed ASCAM

(Axonal Swelling Classification and Analysis Model), a two-part machine learning solution. ASCAM first uses a classification model to distinguish images containing axonal swellings from those without, followed by an object detection model that accurately identifies and quantifies swellings in stained pons brain sections from AD mouse models. The object detection model was trained on 7,144 images and tested on 188, with ground truth annotations provided by a blind observer. Data augmentation techniques, such as rotation and scaling, were employed to enhance generalization. Using a deep learning architecture optimized for small object detection, the model achieved a boundary F-score of 0.6636 at a 4-pixel threshold and a Pearson's correlation of 0.961 with manual quantification. The classification model, which differentiates swelling-positive from swelling-negative images, achieved a validation accuracy of 93%, streamlining the analysis pipeline. Together, these models provide a scalable solution that significantly reduces the time and variability associated with manual methods, offering a robust tool for neurodegenerative disease research. This method can also be adapted for detecting other pathological features across various staining techniques, with potential applications in neurodegenerative, cancer, and inflammatory disease research.

Akash Suruvu

Discipline: Biology

Authors:
#1 Akash Suruvu

Abstract Name: Exploring DLL3 CAR-T Cell Therapy and Antibody Drug Conjugate Payloads in Small Cell Lung Cancer

Background: Small cell lung cancer (SCLC) is a very aggressive malignancy for which there are limited targeted therapies and low long-term survival; however, the approval of tarlatamab, a bispecific T-cell engager, has shifted therapeutic options towards surface targeting therapies. Most molecular subtypes of SCLC express DLL3, a Notch ligand, an attractive surface target of T-cell redirection therapies like chimeric antigen receptor T-cells (CAR-T). Nevertheless, the efficacy of CAR-T cells in more complex 3D models is yet to be explored. Although antibody-drug conjugates (ADCs) based on topoisomerase I (TOP1) payloads such as SN-38 and deruxtecan have demonstrated efficacy, these responses are limited. Methods: SCLC spheroids were derived from SCLC cell lines and treated with DiO-labeled, DLL3-targeted CAR-T cells, CD56-targeted CAR-T cells, non-targeted T cells or chemotherapy. Spheroid growth was tracked by brightfield and fluorescent imaging. To test the cell viability using a panel of SCLC cell lines against microtubule inhibitor ADC payloads and the CDK2 inhibitor, proliferation assays were carried out. Results: DLL3 CAR-T cells demonstrated significant cytotoxic effects on 3D spheroid growth over 15 days, as compared to spheroids exposed to non-targeted T cells. Conversely, spheroids with lower DLL3 expression the CD56 targeting CAR-T cells were more effective. SCLC cell lines showed high sensitivity to microtubule inhibitor ADC payloads, including mertansine and MMAE, at 10 μ M. Conclusion: Our results indicate that SCLC spheroids can be used for testing DLL3-targeting CAR-T cells, especially in neuroendocrine subtypes with high surface expression. Future experiments will test the reliance of CAR-T cells on target expression (using siRNA) and test the CAR-T cells in combination with other agents. Additionally, the sensitivity of SCLC cell lines to microtubule inhibitor-based payloads implies that ADCs using these payloads may be viable options when resistance to ADCs with TOP1 inhibitor payloads occurs.

Adolfo Susano

Discipline: Computer Science

Authors:

Abstract Name: Exploration of Convolutional LSTM Models Architectures on Stock Market Forecasting

There have been many attempts to capture detailed trends from the inherently volatile nature of financial forecasting such as the S&P 500 Index, with the use of Long Short-Term Memory (LSTM) networks for these predictions. These models, which are types of Recurrent Neural Networks (RNNs), excel in capturing long-term dependencies, such as financial stock predictions, thereby enabling the capture of trends as well. However, due to the volatile and noisy nature of the market, these models fall short of capturing key details in both the long and short term. Recent literature has described the use of a hybrid model, the Convolutional Neural Network CNN-LSTM, combining both neural networks. This combination allows the CNN to focus on short-term patterns, extracting rich features from the input data sequences, while the LSTM focuses on the long-term trends in the market. This study aims to test various architectures of the CNN-LSTM, including sequential, where CNN output feeds directly into the LSTM, and parallel, where CNN and LSTM process the input data independently and their outputs are combined models, to understand how the CNN contributes to richer features for predictions and pattern extraction on our main target of the closing price of S&P 500 index. Across the time periods of 2019, 2020, and 2025, the parallel CNN-LSTM model was able to outperform both the baseline LSTM and the sequential CNN-LSTM models, achieving better predictive accuracy. This success varied depending on the time period, with the best results occurring during 2019, achieving an MAE (Mean Absolute Error) of .87 compared to the best result of an MAE of 5.04 for the base LSTM. This study employs an ablation study, where multiple model architectures with the same hyperparameters are compared to explore the results across the chosen time periods.

Anastasija Sutovic

Discipline: Physics and Astronomy

Authors:

#1 Anastasija Sutovic

#2 Isabel Martinez Hernandez

#3 Varunika Shree Prabhuram

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Isabel Martinez Hernandez

Varunika Shree Prabhuram

Abstract Name: From Wave-functions to Tangible Models: Redefining Electron Cloud Representations Based on a Multimodal Approach

This research project builds a quantitative model for visualizing electron probability distribution by describing a median-based multiple “cloud bands” for each orbital. Traditional methods propose one distance for the atomic radii calculated from the wavefunction of the effective active electrons. Starting with the simple models that take the mean or the peak radial distance using Hydrogen-like wavefunctions, Theoretical calculations using Self-consistent field SCF function, Density Function Theory (DFT), Transverse Energy Equation, empirical studies of J.C. Slater, and various methods to calculate Van der Waals radius often lead to different results for a single location. In this research, we propose a multimodal analysis of electron clouds using each mode as a separate band. The number of modes are given by $m=n-l$ based on the principle and the angular momentum Quantum numbers of the active electron. Based on the zeroes of the radial wavefunctions, we treat 4s orbit as 4 separate modes and 3p orbit as 2 separate modes for the electron cloud, etc. Using Desmos-generated integral curves of the radial probability function, we identify the median radius r_m , as the point where the cumulative probability reaches 50%. We further our studies to analyze the standard deviation and the probability of each mode. Using this methodology, we were able to obtain the inner and outer radii of different electron shells and then scale these values up to create larger 3-D tangible models that keep the same proportions as the most probable regions for the electron clouds instead of a single location.

Elizabeth Sutton

Discipline: Chemistry

Authors:

#1 Jason Bennett

Abstract Name: Exploring CNT/PEDOT Coated Electrodes for THC Detection

The increase in legalization and recreational use of marijuana products is leading to a growing number of drivers operating motor vehicles under its influence. Currently, there is no roadside test available for law enforcement similar to a breathalyzer currently used for alcohol. Electrochemical detection is attractive for many reasons such as high sensitivity, fast response, and simplicity with making a portable device that can be used with little technical background. Selectivity is especially important, as law enforcement must be able to distinguish between psychoactive compounds like D9-tetrahydrocannabinol (THC) and non-intoxicating medicinal compounds such as cannabidiol (CBD). Previous work with glassy carbon electrodes shows that both THC and CBD can be electrochemically oxidized at similar potentials. This means that it is not selective towards THC. The long-term goal of this project is to develop a selective sensor for roadside detection for THC. The research presented here will focus on modifying glassy carbon electrodes with 3,4-ethylenedioxythiophene polymerized (PEDOT) with polystyrene sulfonate (PSS) and carbon nanotubes (CNTs) to serve as an electrocatalyst toward the selective detection of THC. The direct electrochemical oxidation as well as the electrochemical reduction of the species created when THC is oxidized using hypervalent iodine reagents will be explored as possible detection schemes. Considering the phenol groups on the THC are the electroactive component, initial studies presented will include model phenolic compounds. The CNT/PEDOT layer will be analyzed through scanning electron microscopy imaging and probed using cyclic voltammetry.

Thomas Sutton

Discipline: Biology

Authors:

#1 Hayden Huggins

Abstract Name: IFET-1 Controls Nucleocytoplasmic Shuttling of IFE-3 in *C. elegans* Germ Cells

Cellular ribonucleoprotein (RNP) complexes play an important role in the post-transcriptional regulation of gene expression throughout development. Under intrinsic and extrinsic stress conditions, cells form RNP condensates that bind mRNA and coordinate functional gene expression, i.e. protein synthesis. One key factor of RNP complexes is the RNA-binding protein eIF4E, which binds the 5'-methylguanosine (m7G) cap of mRNAs and typically promotes recruitment to ribosomes. Misregulation of this pathway has been implicated in diseases such as Alzheimer's, ALS, and cancer, making it a key focus of current research. In *C. elegans*, a major germline expressed eIF4E ortholog, IFE-3, plays a crucial role in oocyte cell fate and embryonic viability. IFE-3 binds m7G caps and, along with its cognate transporter protein IFET-1, regulates a unique subset of mRNAs. Studies have shown that under stress conditions, IFE-3 localizes to perinuclear and cytoplasmic RNPs to regulate the translation of mRNAs. Here, we utilize CRISPR/Cas9 fluorescently-tagged RNP factors to investigate the localization of IFE-3 in response to various stressors. While previous work has shown that IFE-3 localizes to cytoplasmic RNPs called stress granules under heat shock conditions, we demonstrate that depletion of IFET-1 abrogates this localization. Instead, IFE-3 accumulates in the nucleus of

both early germ cells and oocytes when IFET-1 is depleted. Interestingly, this nuclear localization was observed for IFE-3 but not for its close paralog IFE-1, possibly suggesting a previously unrecognized role for IFET-1 in nucleocytoplasmic shuttling of IFE-3 in germ cells.

Janell Sutton

Discipline: Law and Legal Studies

Authors:

#1 Stephen Magu

Abstract Name: Trial By Media: The Verdict Gap Between Public Opinion and the Courts

This research project investigates the phenomenon of “trial by media,” in which extensive news and social media coverage of high-profile criminal cases shapes public opinion and produces a “public verdict” that may diverge from the jury’s final decision. Understanding this dynamic is essential to evaluating how media environments influence the legitimacy and perceived fairness of the judicial system, particularly in an era where social media accelerates the spread of narratives and public judgments. Guided by theories of media framing, agenda-setting, the spiral of silence, and judicial legitimacy, this study examines how media narratives and biases construct perceptions of guilt or innocence long before a verdict is reached. Using a mixed-methods comparative design, this project analyzes six major cases: three from the pre-social media era (O.J. Simpson, the Menendez brothers, and the Central Park Five) and three from the social media era (R. Kelly, Depp–Heard, and Alex Murdaugh). Data will be collected from traditional news sources across the political spectrum, archived public opinion surveys, court records, post-trial juror interviews, and social media metrics. The study hypothesizes that cases occurring during the social media era will show a faster, more polarized formation of public verdicts due to the speed, virality, and algorithmic amplification of online content. It further predicts that increased partisan divergence in media framing will correlate with larger gaps between public opinion and jury verdicts, and that higher volumes of negative coverage will align with harsher public judgments. While social media is expected to exert a strong influence on public perception, the findings may reveal that juries remain more anchored to legal evidence than to dominant media narratives. Ultimately, the research aims to clarify the evolving relationship between media and the justice system and to offer recommendations for courts and journalists seeking to preserve the fairness and integrity of criminal trials.

Haruka Suwabe

Discipline: Biology

Authors:

#1 Van Phuc Nguyen

#2 Yannis Paulus

#3 Caden Dang

#4 Lily Pham

#5 Saketh Agava

Abstract Name: Retinal OCT Automated Layer Segmentation using Minimum Cost Path Algorithm

Optical Coherence Tomography (OCT) is a non-invasive eye imaging tool used to diagnose, monitor, and guide treatment planning. OCT B-scans are analyzed by identifying the retinal layers and measuring the thickness of each layer. Currently, many B-scans are segmented manually, which can take over 40 minutes

per image. As a fast, reliable automated method for retinal segmentation is lacking, we propose an automated segmentation approach using the Minimum Cost Path (MCP) algorithm to reduce processing time and accurately identify retinal layers and their thicknesses. OCT imaging (Ganymede, Thorlabs) was performed in New Zealand white rabbits at 4 months of age. The algorithm performed retinal layer detection in three stages: preprocessing, segmentation using MCP, and visualization. During preprocessing, Otsu thresholding identified the largest object, followed by standard blurring and contrast enhancement. In the segmentation stage, the Sobel operator was applied to calculate an intensity-gradient map, which measures the strength of local intensity changes in each pixel. The MCP algorithm then used this map to find the lowest-cost path corresponding to the strongest edges. This process is repeated until all edges are detected. The MCP algorithm showed significantly improved efficiency, reducing segmentation time to approximately 8 seconds per image while measuring the average thickness of multiple retinal layers. However, several layers were often misidentified. The GCL and choroid were oversegmented. On the other hand, the sclera and INL/ONL/OLM were frequently underdetected due to high noise levels, which prevented the algorithm from finding a stable path. Our results demonstrate the applicability of the MCP algorithm as an automated OCT segmentation system. Although the algorithm's reliability is limited by image quality, it shows potential as an assistive tool for ophthalmologists in diagnosis and monitoring.

Rylea Swafford

Discipline: Linguistics and World Languages

Authors:

Abstract Name: From Old English to Modernity: The Evolution of English From a Morphological Perspective

The presentation focuses on the evolution of morphological aspects of the English language from the Old English period to Middle English and then Modern English. Morphology refers to the form and structure of words and morphemes of a given language. This research is a small scope of a broader, research project detailing the evolution of English over time from its respective morphological, syntactical, and phonological aspects. Then analyzing it typologically to determine whether English retains aspects of Germanic languages from a typological scope, for instance, grammatical gender and case such as nominative, genitive, dative, accusative, and instrumental. This research scope discusses the evolution of inflectional morphemes, grammatically gendered language, and noun declension. Old English was a synthetic language, grammatically gendered, and case-marked for quantity and gender in nouns and verbs. Modern English, an analytical language, has no grammatical gender and no case markings for quantity or gender in nouns and verbs, Modern English also no longer inflects for its paradigms of case. English has morphologically simplified over time due to external influences such as Norman French and Old Norse. This presentation presents differences in English morphology over time, the paper concludes that, while English is genetically a Germanic language, after analyzing it typologically, I propose it does not retain aspects of a Germanic language due to its dissimilarities with its related languages.

Sidharth Swaminathan

Other/Institution Not Found

Discipline: Engineering

Authors:

#1 Sidharth Swaminathan

Abstract Name: Design of an Integrated Silicone Mixing and Extrusion System for 3D-Printed Soft Robotic Applications

Soft robotics offers significant potential in healthcare and rehabilitation applications, yet traditional fabrication methods like silicone molding remain labor-intensive, slow, and geometrically constrained. This project presents a locally modified Fused Deposition Modeling (FDM) platform capable of directly printing silicone elastomer actuators with embedded pneumatic channels for soft robotic applications. The system integrates a custom dual-syringe extrusion pump by New Era (Model SyringeTWO) that precisely mixes and dispenses a two-part platinum-cure silicone (Dragon Skin™) in a 1:1 ratio immediately before deposition. By varying pump speed, the volumetric flow changes from 57.34 $\mu\text{L/hr}$ to 7515 mL/hr, enabling both fine-feature printing and rapid bulk infill within one setup. To address the long cure time of room-temperature silicones, a specialized end-effector with active thermal regulation was engineered. Ceramic cartridge heaters in machined aluminum heat blocks, combined with directed cooling fans, maintain a local process temperature between 40°C and 47°C around the nozzle, promoting rapid cross-linking upon deposition while minimizing premature curing inside the mixer and tubing. A microcontroller-based control loop monitors thermistor feedback and adjusts heater and fan outputs to preserve this narrow thermal window throughout the print. The printer was validated by fabricating functional artificial muscles with complex internal voids designed for pneumatic actuation. Printed structures proved airtight, flexible, and capable of repeated cyclic loading without catastrophic failure. Actuators with 40% infill reliably withstood internal pressures of 40–150 kPa over multiple inflation–deflation cycles without leakage, while individual print jobs were limited to 7–9 minutes by syringe pump stalling. This enabled consistent fabrication of airtight muscles with embedded channels suitable for pneumatic testing. Collectively, this integrated mixing, extrusion, and thermal-control system provides a scalable, rapid-prototyping route for silicone soft actuators, offering improved geometric freedom and reduced labor compared to conventional molding workflows. Further details will be presented during the conference.

Drayeson Swanegan

OK - University of Central Oklahoma

Discipline: Art History

Authors:

Abstract Name: Black Sociological Data Visualization: Infographics Shedding Light on Black Oppression and Succession

This study examines the visual history of Black progress in the United States through the lens of early and modern infographic practices. While narratives of African American advancement are often preserved in texts, films, and essays, visual data has played an equally critical role in documenting both oppression and achievement. Beginning with diagrams of slave ships, labor maps, and other visual records of enslavement, this project traces how these forms established a foundation for later modes of graphic representation. The work of W.E.B. Du Bois, particularly the data visualizations created for the 1900 Paris Exposition, is analyzed as a pivotal moment in the evolution of modern infographics. Du Bois's charts not only advanced sociological inquiry but also offered a compelling visual testament to Black capability, resilience, and success in the post-slavery era. By connecting pre-emancipation diagrams to Du Bois's post-emancipation visualizations, this study argues that the origins of Black graphic design can be meaningfully situated within the broader and often overlooked history of visual documentation of slavery. Further, the project considers ongoing debates about the definition of infographics, expanding the category to include a range of historical visual media. Through a sociological and psychological lens, this research demonstrates how infographics shape cultural perception and contribute to the fight for justice and representation among Black communities.

Dylan Swanlek

Discipline: Psychology

Authors:

#1 Dylan Swanlek

#2 Vickie Jean

#3 Peter Rerick

Abstract Name: The COVID-19 Time Warp: Was that One or Five Years Ago?

Five years ago, in early 2020, the world was stunned by the virus that we later came to know as the coronavirus. The virus quickly spread, resulting in what we all know as the COVID-19 pandemic, which stole people's daily lives and later altered their experience of time. Many generational milestones were put on hold, such as benchmark birthdays, anniversaries, and high school and college graduations. Many teens and young adults lost crucial developmental stages and now suffer the consequences of spending every day indoors. This study examines how young and middle-aged adults perceive the passage of time during the early stages of the pandemic compared with post-pandemic reflections. The hypothesis suggests that individuals who experienced the pandemic at a younger age are more likely to report higher levels of time perception distortion, while older individuals are more likely to report lower levels of memory confusion related to the time period. Building on prior research by Ogden (2020, 2022) and Longro et al. (2025), this study uses a self-report online survey administered via Qualtrics to explore time distortion, mood, and task load across age groups. Preliminary results support the hypothesis, showing that older individuals perceive time as moving slowly, while younger adults report more ongoing time confusion in the years following. These findings shed light on the long-term psychological effects of the pandemic-related disruption and suggest age-related differences in how people rebuild and process emotions after trauma. The study's conclusions are consistent but limited by a small sample and reliance on self-report.

Manaal Syed

Discipline: Biology

Authors:

#1 Zeng-Quan Yang

#2 Hilda Afisllari

Abstract Name: Unraveling the Expression, Clinical Relevance, and Oncogenic Potential of DHX15 and Related DEAH-box RNA Helicases in Human Cancer

RNA helicases are motor proteins that utilize ATP hydrolysis to remodel RNA structures and RNA-protein complexes. A major subfamily, the DEAH-box helicases, is defined by a conserved Asp-Glu-Ala-His (DEAH) motif and includes critical members such as DHX8, DHX9, DHX15, and DHX16. DHX15, the functional homolog of the yeast spliceosomal disassembly factor Prp43, is essential for core RNA processing events, establishing it as a central node in post-transcriptional gene regulation. Dysregulation of RNA helicases is increasingly recognized as a driver in human malignancies. For instance, DHX15 is overexpressed in hematologic cancers, where it promotes resistance to apoptosis via NF- κ B signaling and correlates with poor patient prognosis. However, a comprehensive systems-level analysis of DEAH-box helicases in solid tumors remains limited, particularly across epithelial cancers. In this study, we employed an unbiased systems-level approach to assess the expression, clinical significance, and functional roles of over ten DEAH-box helicases. This was accomplished using both cancer cell lines and comprehensive clinical datasets, including The Cancer Genome Atlas (TCGA) and the Clinical Proteomic Tumor Analysis Consortium (CPTAC). We found that several DEAH-box helicases, notably DHX15, were significantly overexpressed at both mRNA and protein levels across multiple tumor types compared to non-malignant

controls. Furthermore, expression of several DEAH helicases correlated significantly with adverse clinical parameters, including high tumor grade, advanced stage, and poor patient prognosis. Using genome-wide functional genomics screens, we explored both upstream regulatory mechanisms and downstream effectors to elucidate the roles of these helicases in cancer progression. Altogether, our findings provide a critical foundation for understanding DEAH-box RNA helicases as key contributors to tumor biology and highlight their potential as therapeutic targets in human cancer.

Michael Synoracki

Discipline: Engineering

Authors:

#1 Michael Synoracki

#2 Matthew Clontz

Abstract Name: An Algorithm to Determine Trail Profile Based Upon Distance Sensor Arrays and IMU Inputs

Advanced development techniques for mountain bike systems are becoming increasingly prevalent as both recreational and professional athlete interest in mountain biking has grown. There are methods for testing and simulation where the response of a bicycle is tested for the terrain and profile of a specific trail. However, information regarding the measurement and modeling of such surface profiles is severely limited. The present work is an investigation of an instrumentation configuration which will allow the measurement of trail profiles. The system consists of an array of laser-based distance sensors which are mounted to the hubs of the front and the back wheel of the bike. However, previous work indicated that data from the distance sensors alone is insufficient to determine an accurate trail profile. As a result, the current work involves the inclusion of a 9-axis IMU to supplement the algorithm which determines the trail profile based upon measured data. Utilizing measured values from the distance sensor arrays and IMUs, a geometry-based algorithm has been developed to determine the trail profile for a number of "obstacle scenarios." The algorithm starts by cycling through an expansive case structure to determine the obstacle scenario, then uses the results of the case structure to determine which geometric relationships will return the correct height of the front wheel hub at a given instant. This work is being carried out in parallel with mechanical and electrical implementation. Once the measurement system is operational, experimental data from controlled scenarios will be used to validate the performance of the algorithm

Sofia Szczepankiewicz

Discipline: Biology

Authors:

#1 Mohammad Hassan

#2 Mallory Thompson

#3 Laura Sipe

Abstract Name: Wanted: Dead and Immunogenic. Combining Metformin and Chemotherapy to Promote Immunogenic Cell Death in Triple-Negative Breast Cancer

Cancer has a troublesome ability to evade immune detection. Cancer cells often avoid expressing imperative antigens, allowing them to stay undiscovered and promote tumor persistence or recurrence after treatment. Investigating ways to not only induce death, but to also reduce tumor recurrence is crucial in triple negative

breast cancer (TNBC) research, as patients with this subtype are up to 2.6 times more likely to experience recurrence compared to patients with other breast cancers. One way to prevent tumor recurrence is by engaging the immune system, enabling it to recognize and exterminate cancer cells that could cause recurrence. This independent research will continue into the spring semester, establishing whether a common pharmaceutical substance, metformin, in combination with the platinum-based chemotherapies cisplatin and oxaliplatin will induce immunogenic cell death (ICD) in TNBC cells. Ultimately, this combination treatment will augment antitumor immune responses that have been observed in our previous in-vivo study with chemotherapy treatment alone. This project will test the hypothesis that metformin can pharmacologically trigger autophagy in TNBC cells and that, when combined with platinum-based chemotherapy, this process promotes ICD. In-vitro experiments using the murine E0771 cell line reveal that metformin treatment significantly increases ATG5 protein levels compared to the vehicle control dose, successfully indicating that metformin treatment triggers autophagy. I will conduct further in-vitro experiments with the combination treatment to analyze calreticulin exposure on the cell membrane and ATP release to identify markers of ICD.

Simone Szován

Discipline: Psychology

Authors:

#1 David Shields

#2 Lori Sheppard

Abstract Name: To Eat or Not to Eat: Anxiety, Depression, and Eating Behavior

The purpose of this research study is to better understand the relationship between eating behaviors and mental health outcomes among college students. According to Martin (2024), among college students, poor eating habits and limited consumption of vitamin-rich foods are prevalent; meanwhile, high-fat meals and high-calorie foods are frequently consumed. Busy schedules and financial limitations make college students choose the easy meal. Among college students, depression is a common mental health disorder. College students deal with a lot of stress through their studies, which is an important risk factor for mental health disorders, like depression and anxiety (Liu, et al., 2020, p. 1). This quantitative research study utilizes established, validated, and reliable measures to study the target variables. Seated college student perspectives are gathered using the Patient Health Questionnaire-9 (PHQ-9), Three-Factor Eating Questionnaire, and the Generalized Anxiety Disorder-7 (GAD-7) assessments. Participants are recruited via email and complete the instruments through a secure online platform, with approximately 100 participants expected. Data collection is ongoing and will be completed by late February. Analysis will include descriptive and correlational statistics, and post-hoc analysis as appropriate. Results are expected to align with established literature and provide evidence that eating behaviors and mental health outcomes are significantly related. Furthermore, it is expected that these relationships will be stronger in female participants and those recently enrolled in college. Understanding the relationship between food and mental health has long been a focus of psychological research. Literature has established multifaceted consequences for poor eating behaviors and mental health, with impacts on institutional concerns like student retention and success, and student concerns, like emotional well-being and physical health. This study will provide insight and recommendations that can help address these issues at both the individual and institutional levels.

Dianela Tabares Revilla

Discipline: Biology

Authors:

#1 Maria Guerrero

Abstract Name: A Low-Cost Workflow for Culturing and Teaching with *Halobacterium Salinarum*

Halobacterium salinarum is an extremophilic archaeon that thrives in high-salt environments and develops a striking reddish pigmentation, making it an attractive model organism for teaching and research. This project focused on creating a simple, low-cost liquid culture medium to maintain *Halobacterium* for use in undergraduate biology laboratories and as part of the Padron campus culture collection. Cultures of *H. salinarum* were grown at 37°C in media with salinities ranging from 25% to 30%. Growth was monitored by absorbance readings and visual inspection of the characteristic orange pigment. Microscopy was also used to assess cultures. To prepare smears, cells were briefly immersed in 3% acetic acid, which removed excess salt crystals and fixed the cells for differential staining. This adjustment allowed clear observation of the pleomorphic, rod-dominant morphology without interference from salt. When broth cultures reached A660 readings of 1.0–1.2, no more than 50 mL was needed to obtain a high yield of crude DNA for extraction. Using the InstaGene protocol with volumes of 1–2 mL at high absorbance density produced DNA with good purity based on A260/280 ratios. This micro-extraction provides material suitable for basic molecular biology exercises. Together, these results demonstrate an accessible and reproducible workflow for culturing, observing, and extracting DNA from *Halobacterium salinarum*. By keeping materials inexpensive and procedures straightforward, this project supports sustainable use of extremophiles in undergraduate biology and microbiology laboratories and expands hands-on research opportunities for students.

Taylor Tadych

Discipline: English and Literature

Authors:

Abstract Name: The Textual, Cultural, and Commercial Publishing Intersections of Young Adult (YA) Fiction

My research uses genre theory as a primary frame to examine and explain the virality of Young Adult (YA) fiction. One of the most vibrant, rapidly growing divisions of the publishing industry is the YA market. Yet, the current demand for and critical approach to YA are messy in terms of artistic genre, readership, and the identity being defined. From the 1970s to the mid-1990s, writers (and the publishing industry) reimagined how to speak directly to the interests of a new adolescent audience. Global hits such as *Harry Potter* (1997-2007) by J.K. Rowling and *The Hunger Games* (2008-2025) by Suzanne Collins have an impressive multigenerational appeal. YA's audience is deceptively broad, and many fans are not within the traditional target age group. More than half of its book buyers are over 18, and among them, the majority are women aged 30 to 44. The intersections between this multifaceted audience, conventions and craft, and industry trends have been described but not broadly theorized. The core developmental change during the teenage years is becoming an independent person, and YA is often the first genre readers choose outside of school or parental influence. In this way, the first genre you acculturated to is now incessantly tied to your greater experiences as a reader and upholds the nostalgic need to return to this first "outside identity" in future texts. This study moves the conversation beyond the assumptive criticism of YA's scholarly appropriateness. Historically, adult literary fiction often presumed a universal (and often adult, male, white) perspective. The boom of YA is a clever response to a cultural hunger for stories that treat interiority—especially of young and marginalized voices—with a seriousness that parallels how it is actually lived. Consequently, Young Adult fiction best explains how genre is co-opted and sustained outside its writers.

Ben Taft

Discipline: Psychology

Authors:

#1 Alina Smith

Richard Bargdill

Abstract Name: Organized Existential Resistance: Philosophy, Force and Art

Organized Existential Resistance (O.E.R.) is the technique of resisting oppressive forces with the use of existentialism. Existential resistance first emerged from French philosophers, psychologists, freedom fighters, and artists who fought against fascist occupation during WWII. Both the Existential Side and the Resistance Side of O.E.R have multiple components that are covered in this research. First are the six major themes of existentialism that arose as acts of resistance. Existential themes include Radical Freedom and Responsibility; Meaning Making amid Suffering; Solidarity and Intersubjectivity; Revolt and Revolutionary Consciousness; Courage, Anxiety, and Moral Risk; and Creative Expression as Liberation. Further elaboration of the Meaning Making amid Suffering theme is provided. Also included are the stories of freedom fighters, which show different methods that were used to resist fascism. A brief history of John Heartfield, and examples of his work, are told to explain Creative Expression as Liberation. As well as the story of Lucie and Raymond Aubrac, who risked their lives to resist Nazi occupiers. When Raymond was captured, Lucie organized a group effort to retrieve Raymond from a Nazi Gulag. Their friend and colleague, Jean Moulin who was also captured with Raymond, showed steadfast determination by not divulging information despite being tortured to death. Lastly this research provides information on how the knowledge of Organized Existential Resistance (O.E.R.) can be applied to the current day.

Isabelle Taiana

Discipline: Psychology

Authors:

Abstract Name: Precrastination in the Team Setting

Precrastination is the tendency to begin and/or complete tasks as soon as possible—even at the expense of additional effort—to relieve the mental burden of having unfinished work. An individual is considered a precrastinator when they consistently exhibit this rushing behavior when a task is given. Recently, researchers have begun to examine its implications for individuals who engage in it. However, there is limited research examining how this phenomenon specifically affects team dynamics. The impact of precrastination on team dynamics should be better understood in the team context because rushing behaviors can influence the behaviors of others, potentially leading to varying team experiences and outcomes. Thus, the present study explores how precrastination impacts dynamics in team settings in areas such as communication, quality of work, time management and overall efficiency. The aim of the present study is to examine how a precrastinator's presence on a team affects key areas of team dynamics as well as performance outcomes by utilizing a sample of college students. Students were asked to complete a survey with demographic questions and a precrastination measure, followed by a Zoom interview where they were asked about their experiences working with precrastinators in team settings. Their responses were analyzed to identify common themes related to precrastinators' effects on team dynamics and students' attitudes toward working with them. Preliminary findings suggest that students' attitudes toward working with precrastinators are generally positive. Although some precrastinators can make their teammates feel rushed or overshadowed, most are perceived as reliable team members that produce high quality work and help motivate their teammates to stay productive. This study can contribute to the literature by investigating the understudied phenomenon of precrastination, particularly in team settings. The findings may offer insights that could help better understand how team dynamics and outcomes are affected by precrastination.

Kruthy Takkala

Discipline: Biology

Authors:

#1 Linda Zapata

#2 Anumantha Kanthaswamy

#3 Anantharam Vellareddy

#4 Manikandan Samidurai

Abstract Name: Characterization of Tau and Amyloid- β Pathology in a Novel Mouse Model of Alzheimer's Disease

The general characteristics of Alzheimer's Disease (AD) include progressive neurodegeneration, cognitive impairment, and neuropathological features consisting of A β plaques, hyperphosphorylated tau, and neuroinflammation. Despite many available animal models, the majority are incapable of fully mimicking the complex pathologies seen in human AD. The recently developed a Novel mouse model expresses both A β and human tau pathologies, allowing for a more comprehensive representation of the disease. Our objective in the present study was therefore to characterize neuropathological changes in Novel mice compared with controls by means of immunohistochemistry. In detail, we quantified age-dependent differences in tau phosphorylation, A β deposition, microglial activation, astrocyte reactivity, complement activation, and vascular alterations within hippocampus and striatum. Immunofluorescent analysis using primary antibodies against AT8, Tau-217, 6E10, A β 1-42, IBA1, CD68, GFAP, and C3 showed intense colocalization of A β plaques and hyperphosphorylated tau in novel mice and increased microglial (CD68/IBA1) and astrocytic (GFAP/C3) activation compared with age-matched controls. Additionally, Collagen IV staining revealed vessel-associated pathology indicative of cerebral amyloid angiopathy. Altogether, novel mice are characterized by the presence of multiple convergent hallmarks of AD pathology, supporting their value as a translationally relevant model to study neurodegenerative mechanisms and therapeutic strategies.

Dane Talbott Settle

Discipline: Visual Arts

Authors:

#1 Dane Talbott Settle

Abstract Name: Nebi: Reinventing Mechanisms in Lighting Design

My bedside lamp design, Nebi, investigates how light can enhance story time for both children and readers. Through two physical mechanisms, I abstracted the features of a smart lightbulb to create an interactive lighting experience. The first, employs interchangeable colored acrylic disks to physically filter a standard lightbulb, demonstrating additive color relationships through physical action. The second, adapts the mechanism of a camera iris; twisting the lamp's top opens and closes vertical blinds, allowing children to directly observe how physical changes affect brightness. These features achieve the same function as a smart lightbulb, by allowing children to change the color and brightness, thus the mood, of the light. While smart, remote lightbulbs are convenient, these interfaces hide the mechanics of how light operates, preventing understanding. The tangibility of my design helps children develop a stronger cognitive experience when reading a book. My design process consisted of research, sketching, critiques, prototypes, computer-aided design, renders, and four functional, identical products. While designing, I closely focused on

manufacturability and sustainability with careful consideration of material, construction, and right-to-repair. The outcome of my work includes four fully functioning prototypes and digital renders. For NCUR, I propose to display one of my completed designs and a poster to display my design process within the Visual Arts session. My goal is to demonstrate how playful product design can support learning and imagination in everyday objects.

Srushti Talluri

Discipline: Nursing and Public Health

Authors:

- #1 Srushti Talluri
- #2 Kevin Owuor
- #3 Kayla Frey
- #4 Evelyne Owengah
- #5 Moses Okombo
- #6 Janet Turan
- #7 Zuha Fatima
- #8 Zachary Kwen
- #9 Lynae Darbes
- #10 Abigail Hatcher
- #11 Abigail Hatcher
- #12 Anna Helova

Abstract Name: Health Worker Resilience as a Driver of Health System Resilience in Kenya: A Mixed-Methods Study

Background: Health systems in southwestern Kenya, one of the most resource-limited and understaffed global regions, are frequently affected by community-level disruptions due to weather events, political violence, and economic crises that lead to adverse health outcomes in pregnant/postpartum women with HIV and their health workers (HW). This study aimed to examine predictors and mechanisms of HW resilience amid service disruptions and their potential impact on health system resilience. Methods: We conducted an exploratory sequential mixed-methods study in Kisumu County, Kenya in 2023-2025, utilizing the Job Demands-Resources framework. We integrated findings from qualitative data [4 focus groups (FGDs) with 29 HWs and 10 key informant interviews (KII)], and a cross-sectional survey among 200 HWs. FGDs/KIIs were analyzed using rapid thematic analysis; predictors of HW resilience were examined using multiple linear regression; and findings were triangulated and synthesized during the integration phase. Results: HW resilience was associated with professional quality of life ($\beta=-0.0964$, $p=0.0010$), compassion ($\beta=0.2348$, $p=0.0010$), higher levels of stigma ($\beta=1.0966$, $p=0.045$), being ≥ 51 years ($\beta=2.5671$, $p=0.012$), and having a university-level education ($\beta=2.9403$, $p=0.015$). Additionally, compassion, burnout, stress, financial stress, anxiety, trauma, stigma, emotion-focused and avoidant coping mechanisms, and adaptive performance methods were associated with increased depression scores, affecting resilience. HWs described significant work-related strain during crisis periods, noting heightened burnout, emotional fatigue, financial stress, and reduced motivation that interfered with their professional and personal lives. These stressors compromised HW's ability to provide consistent, high-quality care, weakening the system-level resilience. FGDs/KIIs participants emphasized a pressing need for resources to support their personal and professional well-being, seeking programs focused on coping strategies, time management, work-life balance, and emergency preparedness. Conclusion: Burnout, financial stress, and diminished professional quality of life collectively weaken individual health worker resilience and adversely affect adaptive capacity, critical to health system resilience and quality of care.

Kazuma Tamagawa

Discipline: Mathematics

Authors:

#1 Kazuma Tamagawa

Abstract Name: Optimization of Learning Schedules Considering Individual Concentration

This study proposes a method for constructing personalized study schedules using mathematical optimization to maximize individual learning efficiency. We incorporate time-series data of individual concentration into the optimization problem. In recent years, the widespread proliferation of digital devices, such as smartphones and video games, has remarkably increased individual differences regarding concentration duration and the timing of peak performance zones. Consequently, it is no longer appropriate to uniformly apply general theories regarding concentration when formulating customized study schedules. To address this issue, our research proposes a novel approach that integrates time-series data of instantaneous cognitive states, obtained from Electroencephalography (EEG), into a mathematical optimization problem, thereby accurately reflecting unique individual characteristics. We formulate the scheduling problem based on a Mixed-Integer Programming (MIP) framework. Specifically, we first convert concentration data obtained from EEG into quantitative scores. We then set the maximization of the "total concentration score" for task allocation in each time slot as the objective function. Furthermore, by incorporating real-world constraints such as task deadlines and required durations into the model, we design it to construct highly practical schedules. Comparative analysis revealed that the optimized schedule utilizing EEG data yielded a significant improvement in the daily total concentration score compared to generally recommended study schedules. A notable finding is that during time zones where concentration is relatively low, the model selected an allocation that frequently switches task types, essentially fragmenting and dispersing tasks. This specific allocation was confirmed to effectively prevent the decline of concentration. These results demonstrate that optimizing based on an individual's fluctuating concentration, rather than adhering to conventional continuous task execution, can significantly improve learning efficiency. Future work aims to process EEG data with AI to create a continuous feedback loop, enabling the automatic construction of adaptive study schedules.

Ria Tamrakar

Discipline: Biology

Authors:

#1 Stacy Jones

#2 Dhruv Thanki

#3 Jonathan Coffman

Abstract Name: Comparative Analysis of Eubacteria in Avian Excreta with Eubacteria in Porcine and Equine Feces on a Georgia Farm

This study presents a comparative analysis of the eubacterial communities in avian species versus pigs and donkeys, utilizing 16S Polymerase Chain Reaction (PCR) and Next-Generation Sequencing (NGS). The gastrointestinal tracts of animals harbor diverse and complex microbial ecosystems that play a crucial role in host health, physiology, and nutrition. Understanding the composition of these microbial communities across different host species is fundamental to veterinary science and microbial ecology. We hypothesized that significant differences would exist in the gut microbiota of avian hosts compared to mammalian hosts (pigs and donkeys) due to their distinct evolutionary paths, digestive physiologies and dietary habits. Fecal samples were collected from each animal group and processed. Eubacterial 16S rRNA genes were amplified using universal primers, and the amplicons were sequenced. Results indicate a taxonomic divergence between the

avian and mammalian gut microbiomes. The avian microbiota was predicted to have a lower proportion of Bacteroidetes, whereas, the microbiomes of pigs and donkeys would be dominated by Firmicutes and Bacteroidetes, consistent with a fermentative digestive strategy for fiber degradation. Furthermore, specific bacterial genera were found to be unique to each host type, suggesting a host-specific adaptation of the gut microbiota. These findings highlight the impact of host phylogeny and physiology on shaping the gut microbial ecosystem. The application of 16S PCR and NGS provides a powerful tool for elucidating these complex microbial assemblages. Further analysis of this data will provide deeper insights into the functional capacities of these distinct microbial communities and their co-evolution with their respective hosts.

Anna Tamura

Discipline: Biology

Authors:

Abstract Name: "Antioxidant" A Term Too Broad in the Context of Cancer

With an aim to demonstrate the mechanism-based impact of four antioxidants in glioblastoma temozolomide (TMZ) treatment, a systematic literature review was conducted examining how different antioxidants affect temozolomide therapy in glioblastoma. Antioxidants have been shown to induce resistance to treatment in many instances but enhance sensitivity in others. This research hypothesized that the impact correlates with the primary mechanism in action: scavenging reactive oxygen species (ROS) or modulating pathways. Three antioxidants with a single consistent impact on TMZ therapy, glutathione, curcumin, and resveratrol, were reviewed to identify their underlying mechanism. N-acetylcysteine (NAC), an antioxidant that has shown both impacts of either resistance or enhancement, was analyzed as two separate antioxidants based on these dual impacts. This highlighted the possibility of the antioxidant mechanism playing a key role in influencing the outcome of TMZ therapy. As a result, a correlation was identified between ROS-scavengers with inducing resistance and pathway-modulators with enhancing sensitivity, which provided evidence that antioxidants are contextually dependent on mechanism in action. This research may extend to other cancers treated with similar oxidative stress-inducing therapies, suggesting a broader applicability of the mechanistic categorization. However, future research is needed to understand the factors that determine whether an antioxidant will act primarily as an ROS-scavenger or a pathway-modulator to effectively control outcomes to TMZ therapy.

Jordan Tan

Discipline: Psychology

Authors:

#1 Jordan Tan

#2 Yanbin Li

Abstract Name: Who Goes Abroad? A Psychological and Demographic Analysis of Study Abroad Intentions

This study explores the psychological and demographic factors that influence college students' intentions to study abroad. Prior research suggests that socioeconomic status (SES), gender, race/ethnicity, and academic standing play a significant role in determining who participates in international education among college students. Additionally, psychological variables such as motivation, personality traits, and self-efficacy have been shown to influence readiness and willingness to study abroad. This study builds on existing literature by using a quantitative survey-based approach to assess the impact of demographic characteristics, intrinsic and

extrinsic motivation, perceived barriers, intercultural self-efficacy, and Big Five personality traits on students' intentions to participate in study abroad programs. Using the Social Cognitive Career Theory (SCCT), the study conceptualizes intention as a function of self-efficacy beliefs, outcome expectations, and contextual influences, shaped by individual inputs such as personality and background. Data collection has begun with undergraduate students at James Madison University, and the aim is to finish data collection February 2026. Data will be analyzed using independent samples t-tests, one-way ANOVA, Pearson's correlation, and multiple regression. The study aims to identify the predictors of study abroad intention and to uncover barriers. Findings may inform the development of support systems and policy changes that broaden access to study abroad.

Valerie Tan

Discipline: Biology

Authors:

Abstract Name: How Gene Variations Affect Heart Health: Function of Gene Variants in Heart Disease

Alternative splicing allows a single gene to produce multiple proteins, playing a critical role in heart development and disease. Disruptions in this process have been linked to conditions such as heart failure. Our earlier studies have identified a gene variant of Mbnl1 (Muscleblind-like protein 1) in failing hearts generated by alternative splicing. The alternative splicing event of Mbnl1 produces a new gene variant without Exon 7 (a 36bp DNA fragment), which we termed as (Mbnl1- ΔExon7). Our earlier study has found out inhibition of Mbnl1 Exon 7 could protect stress induced cardiac cell death. Using mouse models, inhibition of Mbnl1 Exon 7 could further prevent the development of heart failure post myocardial infarction injury. However, the underlying mechanism between the Mbnl1 alternative splicing and its impact on cardiac injury remains unknown. This project aims to investigate how the Mbnl1 ΔExon7 isoform affects heart cells under stress. We will utilize bioinformatics prediction, targeted immune-precipitation to understand whether Mbnl1 variants could be differentially modified. We will further explore whether the Mbnl1 gene variants can have different impacts on cardiac cell death during stress when expressed in cultured cells. This research enhances our knowledge of alternative splicing in cardiac stress and offers hands-on experience in molecular biology techniques and data analysis. Findings from this study may contribute to the growing field of RNA-based therapeutics for heart disease.

Skyler Tan

Discipline: Biology

Authors:

#1 Manuel Llinas

#2 Rajat Kumar

Abstract Name: Identifying Early Sexual-stage Markers in Malaria Using Single-Cell Transcriptomics

The malaria parasite, *Plasmodium falciparum*, develops into sexual-stage gametocytes within the human host. The parasite develops across several morphologically distinct stages between a human and a mosquito host. Previous evidence suggests that all parasites descended from a committed schizont, the stage before division, also develop into the same sex. Despite this, there exists very little literature categorizing these early sexual drivers. In this poster, using single-cell transcriptomic data, slingshot analysis, differential analysis, and RNA velocity techniques, I attempt to identify early sex markers across *P. falciparum* strains during the stalk

developmental phase. First, a trajectory-based analysis was used to compare the genes driving sexual commitment between the NF54 strain and the E5 strain. Following a pipeline developed by previous literature, 8 female and 6 male gene candidates were found for E5. Only 1 gene overlapped between the E5 and NF54 gene candidates. I then combined both datasets to look at the same developmental area of the UMAP to look for genes that were differentially expressed in both the NF54 and E5 strains. To confirm the dynamics of the expression of these genes, RNA velocity was used on the NF54 dataset. Using RNA velocity dynamics modeling, it was found that relationships across strains not captured in trajectory analysis were recovered. Male gene markers for both NF54 and E5 were upregulated in the male lineage compared to the female lineage and vice versa for the female genes, confirming previous findings. Overall, this analysis identifies several promising sexual gene candidates that are conserved across strains, allowing for future study into sexual development in the malaria parasite.

Isabella Tang

Discipline: Political Science

Authors:

Abstract Name: Barriers to Reintegration of Human Trafficking Survivors: Evidence from Tanzania

Tanzania is a source, transit, and destination country for underreported trafficking of men, women, and children, primarily for the purposes of forced labor and sexual exploitation. Despite the Tanzanian Government's recent advancements in combating human trafficking, little research has examined popular perceptions of trafficking survivors and, by association, the barriers to reintegrating trafficking survivors into their communities. Leveraging a vignette — a short story designed to depict a scenario, used to elicit participant attitudes — embedded in an in-person survey of 1,002 rural villagers in coastal Tanzania. I examine how five features of a trafficking survivor's experiences — (1) age, (2) wealth, (3) type of labor, (4) form of pressure, and (5) the relationship between the trafficker and the trafficked — influence the likelihood of an individual experiencing stigma or receiving support in their return communities. In addition to measuring participants' personal willingness to warn, help, and socialize with the survivor, they were asked to predict their community's treatment of the same survivor. Finally, we assessed the extent to which participants felt the survivor embodied the following traits: (1) selfish, (2) smart, (3) brave, and (4) untrustworthy. To examine these dynamics, I use regression analyses in R to model how variation across five key features of a survivor's trafficking narrative predicts both individual and perceived community responses. Results show that being trafficked into sex work rather than domestic servitude, returning with more wealth (as opposed to returning poorer), and being trafficked by relatives (as opposed to strangers) trigger alarm and reduce support, while the victim's age and the type of pressure they experience are less influential. The study also concludes that, regardless of randomization, individuals perceive themselves as playing a more active role in warning, helping, and socializing with the survivor than their community counterparts do.

Maya Tarnoff

Discipline: Linguistics and World Languages

Authors:

#1 Elizabeth Kissling

#2 Isabel Lacayo

Ciara MacMullen

Julia Gulledge

Abstract Name: Concept-Based Language Instruction: Subjunctive is All About “Dominion”

This study interrogated the effects of a new approach to teaching the difficult-to-acquire grammatical structure of mood in Spanish as a second language (i.e., indicative and subjunctive): Concept-Based Language Instruction (C-BLI) (Poehner & Lantolf, 2024). Conventional rules-of-thumb teach phrasal “cues” to the subjunctive, which are linguistically inaccurate, therefore confusing, and also hard to remember. In contrast, C-BLI, which is rooted in Vygotskian Socio-Cultural Theory, presents students with scientific linguistic concepts that are abstract but linguistically complete. Several studies suggest that C-BLI can be effective for intermediate and advanced learners learning a variety of grammatical, lexical, and pragmatic concepts (see Poehner & Lantolf, 2024), but empirical studies of C-BLI for teaching mood have had mixed results, and almost all C-BLI studies have recruited intermediate and advanced learners. Our study filled two gaps by recruiting beginning learners and applying a new cognitive linguistic concept – “Dominion” (Vesterinen, 2013) – to explain mood. That is, our study taught beginning and intermediate-level Spanish students (n=29) at two US universities that mood choice is a matter of construing events as inside or outside of a conceptualizer’s “Dominion.” We analyzed 24 hours of in-class discussion, verbal explanations of students’ thought processes, written homework assignments, and tests. We evaluated how students developed conceptually during the C-BLI and what mediation (feedback) they required, and how each was impacted by proficiency level. We found that both beginning and intermediate students achieved significant conceptual development, using the concept of “Dominion” to motivate their mood choices. We also found that teacher mediation was required to attend to a variety of confusions about the concept. Students’ proficiency level did indeed impact the prevalence and nature of several of these conceptual confusions. Our study has implications for expanding C-BLI in beginning classes and for all instructors and learners wrestling with the complex concept of mood.

Erika Shayne Tarongoy

Discipline: Interdisciplinary

Authors:

#1 Joanne Muller
#2 Starlette Sinclair
#3 Laura Frost
#4 Lyndsay Rhodes
Janet Provitera

Abstract Name: NSF Advance’ Project RAISE ‘Day of Dialogue’ Series: Revealing Perceptions of University Representation

As of 2021, women make up 39.1% of the U.S. adult population who have obtained a bachelor’s degree, while men make up 36.6%, reinforcing the importance of female representation to scholarship (US Census Bureau, 2021). However, even as women demonstrate clear importance to the size, creativity, and diversity of the academic workforce, women’s academic underrepresentation in science, technology, engineering, and mathematics (STEM) is ever-growing (Blackburn, 2017). Research also suggests that higher education STEM environments can contribute to the underrepresentation of historically marginalized groups (Carlone & Johnson, 2007; Domingo et al., 2022; Ong et al., 2018). Recent data within Florida Gulf Coast University (FGCU) found that gender, race, and ethnicity inequities within STEM and overall faculty align with the previous literature, with women and BIPOC being underrepresented (OIR, 2022). In the purpose of addressing such systemic inequities, Project RAISE (Reveal, Amplify, and Implement Strategies for Equity) was created at Florida Gulf Coast University (FGCU) and received an NSF Advance Catalyst grant to complete such work (NSF, 2020). Project RAISE intends to conduct internal analysis and combat revealed inequities through three goals: 1) Collect and visualize patterns of representation and equity through an intersectional lens; 2) Educate key FGCU stakeholders about deficits in STEM representation and equity; 3) Engage stakeholders for strategy planning for enhanced diversity at FGCU. Within the project, the ‘Day of Dialogue’ Series was made to help accomplish the team’s second goal, involving faculty in discussions to

highlight educational inequities across student, staff, and faculty bodies. This conference proceeding will demonstrate how the Day of Dialogue Series can provide visualized data and involve stakeholders in improving environments that may contribute to inequity at FGCU. Furthermore, the activity's insights will be shared on utilizing qualitative methods to reveal educational inequities and improve the culture of higher education.

Lauren Tarter

Discipline: Sociology

Authors:

#1 Lauren Tarter

Abstract Name: Indigenous Gender Identity: Challenging the Lens of Colonial Epistemology

Western views of sex and gender have historically affected and shaped records of Indigenous gender practices. Traditionally, Western societies have viewed gender and sex to be binary(male/female), static, and physically self-evident. In the 1960s, philosophical, social, and feminist studies began reexamining the relation between Western society and gender, finding it to be a social structure founded in societal expectation and not biological certainty. In the wake of increased scrutiny over the epistemological foundations of gender, we can finally examine the inherent bias found not only in our own history but also in the gendered history of colonized nations. This colonial lens is most prominent in cultures such as the Indigenous North American tribes, where the written history of cultural practices only exists as colonial ethnography. In this study, we will analyze the colonial lens of Euro-American gender epistemology in relation to records of gender identity in different Indigenous North American tribes. By identifying and removing both the colonial and modern lenses of gender, this research shows the nuanced effects of indigenous culture, religion, and societal expectations on gender identity, presentation, and performance beyond ties to biological sex. By examining regional differences, this study demonstrates the complexity of gender as spiritual, situational, and interconnected.

Yuta Tatebayashi

Discipline: Mathematics

Authors:

#1 Yuta Tatebayashi

#2 So Hattori

#3 Kaede Watanabe

Abstract Name: An Optimization Model for Emergency Patient Allocation with Fairness and Medical Compatibility

In urban emergency medicine, rapidly and accurately determining which hospital should receive a patient is a complex, life-critical decision. Conventional dispatch protocols typically direct patients to the nearest hospital to reduce travel time. While fast, this approach can lead to the overloading of certain hospitals, underutilization of others, and insufficient consideration of whether a hospital is medically appropriate for a given patient. To address these issues, this research proposes a new nonlinear optimization model – a mathematical decision-making tool – designed to balance three objectives simultaneously: assignment efficiency, hospital workload fairness, and medical compatibility. Few existing studies directly incorporate detailed clinical attributes into the assignment process, and our model adds value by explicitly integrating

these medical factors into its decision framework. The model consists of four main components. First, to ensure efficiency, it minimizes the total distance ambulances need to travel. Second, it monitors hospital burden and avoids assignments that would cause a sudden, unmanageable surge in a facility's workload. Third, it introduces a method for calculating medical compatibility. Patient attributes (age, gender, pregnancy status, consultation history, blood type, Rh factor) and hospital capabilities are represented as feature lists, and a standard scoring formula is then used to rate how well each hospital can meet each patient's needs. Fourth, the model measures fairness by examining how unevenly workloads are distributed across hospitals and works to reduce this imbalance. By adjusting the importance assigned to each of these components, the model enables decision-makers to flexibly prioritize speed, equity, or medical necessity depending on the situation. This presentation explains the structure and objectives of the model and outlines our plan to compare its performance with conventional distance-based methods using numerical simulations. In the long term, this research aims to support more balanced, transparent, and patient-centered decision-making in emergency transport systems.

Rachel Taylor

Discipline: Chemistry

Authors:

#1 James Lane

Abstract Name: Isolation of Quercetin from Various Sources and its Radical Neutralizing Properties

Quercetin is one of the most abundant flavonoid compounds in the human diet, being found in various edible plants, and is among the most potent dietary antioxidants. Antioxidants prevent oxidative stress by scavenging free radicals that can cause cell death and therefore are critical in people's diets for maintaining health. We conducted extractions of quercetin from plant sources and commercially available supplements to assess the amount of extractable flavonoids and the radical scavenging ability of these extracts. We found that the total flavonoid content (TFC) significantly varied between each of the four supplements tested and that more flavonoids were extracted using microwave assisted extraction (MAE) versus a sonication method. The half maximal inhibitory concentrations (IC₅₀) of each of the samples indicating the ability to scavenge free radicals was also determined using a spectrophotometric assay. The amount of extracted quercetin in the supplements and plant sources allows for informed decisions about dietary and nutraceutical intake of antioxidants to help in the prevention of disease through non-pharmaceutical measures.

Collin Taylor

Discipline: Psychology

Authors:

#1 Jamil Johnson

Abstract Name: Songs That Heal: The Effectiveness of a Music Therapy Approach for Treating Depressive Symptoms in Low-SES Adolescent Populations

Adolescence is a vulnerable stage of development, with nearly one in five teenagers in the United States experiencing at least one depressive episode before adulthood. Adolescents from low-income backgrounds face additional challenges that heighten their risk for depression. Traditional therapeutic approaches, while beneficial, often come with barriers such as high cost, limited access, and large discontinuation rates. These limitations give rise to interventions that are both effective and practical. Music therapy, defined as the

clinical use of music interventions for therapeutic goals, has shown success in improving emotional well-being and self-expression. This literature review evaluates the current scholarship regarding the effectiveness of music therapy for reducing depressive symptoms in adolescents from low-income backgrounds. There is also an implementation of an Anti Oppressive Practice theoretical framework in the thematic analysis of the literature. Findings suggest that music therapy can reduce depression, though more research with adequate methodology is needed. It is also time-efficient and affordable, making it more accessible for disadvantaged populations. The research suggests music therapy is a promising intervention for addressing gaps in mental health services for low-income adolescents, with possible implementation in underfunded schools and children's hospitals.

Todd Taylor

Discipline: Engineering

Authors:

#1 Todd Taylor

#2 Mahdi Paslar

#3 Ravi Hadimani

#4 Carrie Peterson

Abstract Name: Impact of Individualized Neuroanatomy and EEG Functional Connectivity on Primary Motor Cortex Excitability During Transcranial Magnetic Stimulation

Transcranial magnetic stimulation (TMS) is a non-invasive technique that targets specific brain regions through localized electric fields. The primary motor cortex (M1) is commonly stimulated due to its reliable elicitation of motor evoked potentials (MEPs), measurable via electromyography (EMG). Typically, the relationship between TMS-induced electric field intensity and motor cortical excitability is assessed through analysis of the MEP recruitment curve. While variability in TMS responsiveness has been associated with cortical oscillatory states, intrinsic brain states, and anatomical factors such as scalp-to-cortex distance, the detailed effects of individualized neuroanatomical and functional connectivity features on TMS outcomes remain unclear. In this study, we investigated the influence of individualized neuroanatomy and EEG-derived functional connectivity on motor cortex excitability during TMS. We recruited 20 healthy adults (8 women; mean age 28.3 ± 9.4 years), obtaining multimodal datasets including EMG recordings during TMS, resting-state electroencephalography (EEG), and structural magnetic resonance imaging (MRI) [1]. EEG analyses provided insights into the functional connectivity of M1, while MRI-derived anatomical models enabled accurate computational simulations of TMS-induced electric fields. Our results confirm that the relationship between motor cortex excitability and functional connectivity aligns with established literature. By integrating neuroimaging, electrophysiological data, and computational simulations, we expect to significantly improve predictions of individual M1 responses to TMS. These insights may enhance personalized TMS protocols, refine stimulation parameters, and reduce interindividual variability, ultimately improving the efficacy and precision of therapeutic neuromodulation.

Jadzia Taylor

Discipline: Art History

Authors:

Abstract Name: Laughing at the Sacred: Abstract

This paper investigates the use of religious satire as it is used to address the human condition regarding religion. To show these connections, this paper will look into two contemporary U.S. and British media. The British comedy Monty Python's: Life of Brian (1979) and the American animated sitcom The Simpsons (1989 – present day). More specifically, this comparison will dissect The Simpsons Season 4, episode 3: "Homer the Heretic" (1992). While both of these sources are western in origin, this does not mean that religious satire, or satire in general, is a western-only phenomenon. The purpose of this research is to demonstrate how, although these two Western countries utilize different satirical patterns in their works, they do not use their religious satire as a way to mock the religion itself, but rather the people who practice and follow it. Following the outline of the paper, the first topic that will be discussed is how each nation developed its use of this satirical form. Before leading into a rundown of the two media, looking at the satirical patterns they both use and how they relate to the human condition. Lastly, the paper will address the

controversies both had to go through in order for us to view and appreciate them today. Academic film reviews of the two chosen media and books on the history of religious satire will be used to support this paper.

Jazmine Taylor

Discipline: Psychology

Authors:

#1 Sophia Barrett

#2 Mohamed Elghamry

#3 Khaoula Dahani

Abstract Name: Cultural Coping as a Preemptive Filter: Challenging the Linearity of Insight-to-Intent in MENA College Students

The traditional model of mental health service utilization assumes a linear progression from psychological distress to Recognition of Need (insight), and subsequently to Intention to Seek Services. However, for historically marginalized populations, particularly Middle Eastern and North African (MENA) college students, this linearity is often disrupted. This research extends prior work that highlighted the critical gap between a MENA student's intention to seek help and their actual follow-through to counseling. This follow-up study investigates the critical collision between emotional resilience and cultural coping. MENA students are often socialized toward emotional restraint and reliance on "in-house" coping strategies (e.g., familial support, private management), which serve as mechanisms of resilience. We examine whether these culturally-aligned, strength-building strategies can unintentionally prevent students from translating good intentions into seeking professional mental health care. Using data from the 2023–24 Healthy Minds Study (HMS) dataset, our analysis will focus on MENA-identifying students who exhibit clinically significant psychological distress (i.e., insight) yet report no intention to seek services. We hypothesize that this decision to forgo care is driven not by traditional barriers (e.g., cost or access), but by the immediate selection of the preferred, culturally-validated "in-house" coping alternative. We will use survey-adjusted logistic regression, predicting the intention to seek services, with the core predictor being the students' measured preference for "in-house" coping. We anticipate this preference will emerge as a robust, negative predictor, demonstrating that cultural coping functions as a preemptive diversion from the formal care pipeline. This challenges the assumption that insight necessarily precedes intent, suggesting interventions must engage cultural values upfront to create effective and culturally-aligned pathways to care.

Nicky Taylor

Discipline: English and Literature

Authors:

#1 Nicky Taylor

Abstract Name: 'You Know the Type': a Deconstruction of Misogynoir/Portrayals of Cruel Women in Danielle Evans' *The Office of Historical Corrections*

Danielle Evans' novella *The Office of Historical Corrections* (2020) is a masterclass in portraying flawed, complicated women who consciously make sacrifices to survive, without characterizing them as violent, unforgiving, or cruel. Misogynoir targets Black women throughout the narrative. Set contemporarily, the story follows the employees of the fictional Institute of Public History, an organization dedicated to truth and

justice. Cassie, the protagonist, works to correct misinformation, down to small details like the history of Juneteenth in an advertisement. The deuteragonist, Genie, is her long-term rival who shares a passion for righting falsifications, even if the average person views her as pedantic and invasive. Cassie and Genie are pitted against each other by IPH; Genie conducts the controversial fieldwork—Cassie interfaces with the public as the calm, “non-threatening” Black woman. People view Genie’s methods of correction as crass and unnecessary, such as when she challenged the celebratory portrayal of George Washington in a play that sounds suspiciously like *Hamilton* by including damning facts about his slave owning past. After Genie is fired from IPH, she reimagines herself as an investigative journalist, and the two reunite to research the complicated history of Josiah Wynslow, a Black man who lived in a rural Wisconsin sundown town, Cherry Mill, in the 1930s, and was supposedly killed by a racist mob. Together, they discover that Minerva Wynslow, Josiah’s sister, fled her life in Chicago to live in Cherry Mill, where she passed as white. Minerva’s choice to leave her family behind is easily misinterpreted as cruelty. Even in death, Minerva can’t escape judgment. However, he chose to reinvent herself and assimilate into white society, to live safely in a world that wants her to feel pain. Ultimately, Evans portrays the cruel reality Black women face—one where they must sacrifice dignity and honor to survive.

Mikaela Aprille Tejada

Discipline: Psychology

Authors:

#1 Avipsa Hamal

Avipsa Hamal

Abstract Name: The Barriers and Successes of Accessing Mental Health Services for LGBTQ+ Students with Disabilities in Higher Education: A Nationwide Analysis.

Individuals with disabilities within the LGBTQ+ community often face more stigma and social barriers, which may result in poorer mental health outcomes and reduced overall well-being (Argenyi et al., 2023). For this community, there may be an increased need to access mental health services to address their concerns, yet institutions may not cater to the specific intersectional identities of this population. Our team sought to find answers to the following questions: 1) What are some of the experiences of LGBTQ+ individuals with disabilities when it comes to accessing mental health services, and 2) What are some recommendations that services can implement for future students? Utilizing Qualtrics, we created a pilot survey exploring how the target population currently perceives accessibility to mental health services and assess their general feeling of belongingness to their communities. Specifically, questionnaires inquired about the types of services currently available, their effectiveness, and the overall campus atmosphere, including feelings of belongingness. Participants had the opportunity to enter a raffle for a chance to win one of twenty \$25 Amazon gift cards. Recruitment started in October and will continue till the end of December via cold emailing, email chains, and physical fliers. Our team plans to analyze results beginning January 2026. Preliminary findings of the survey revealed that many participants indicated mental health needs (depression, anxiety, etc.), aligning well with previous research. Participants who have attempted to access mental health services at their institutions have expressed barriers within these three themes: a lack of accessibility, a lack of representation, and financial constraints. Using data from our survey, we plan to interview volunteer participants to learn more about individual experiences and to gather feedback on existing mental health resources. We hope to develop action plans or initiatives for college mental health services to improve accessibility for this population.

Andreina Tejada Aguila

Discipline: Computer Science

Authors:

Abstract Name: Tennis Match Prediction Project

In the past, sports predictions were based on expert opinions, however with the development of data analytics models and more technology resources, there are more techniques available on predictions which analyze historical data and player statistics. In order to reach these predictions, I create a project that uses historical data to find a probability of who is more likely to win based on past performance and predicts the winner based on that probability, apply machine learning algorithms to improve match outcome predictions and provide perceptions for coaches by identifying key factors influencing match outcomes. Among the models tested including Decision Tree, Logistic Regression, Random Forest, Random Forest performed the best overall, achieving the highest accuracy and balanced performance across precision and recall. Logistic Regression also showed stable results, while the Decision Tree tended to overfit and performed worse on unseen data. Additionally, the performance of the best model was clearly better than random guessing, which would only achieve chance-level accuracy. When compared to the simple method of always picking the higher-ranked player as the winner, the machine learning models did improve, but the margin was not significant.

Maria Tejedor

Discipline: Engineering

Authors:

#1 Maria Tejedor Mendoza

#2 Andrea Giron Bonilla

#3 Anibal Santos

Andrea Giron Bonilla

Abstract Name: Experimental Evaluation of Calcium Lignosulfonate for Dust Suppression on Rural Unpaved Roads: A Sustainable Approach in Impacted Areas in La Peña, Veraguas, Panama

Panama has a significant percentage (approximately 58%) of its road system unpaved, creating a significant problem due to dust emissions from vehicular traffic and wind, particularly during the dry season. Residents living near these roads must remain with their doors closed to avoid dust contamination inside home. This project proposes the use of calcium lignosulfonate as a sustainable method to improve an unpaved road in La Peña, a small town in the province of Veraguas, Panama. From an engineering perspective, the road's unstable surface generates excessive dust, reduces durability, and performs poorly under traffic and weather conditions. Traditional maintenance methods, such as frequent watering or gravel replacement, are costly, temporary, and environmentally unsustainable, highlighting the need for an innovative solution. To address these challenges, a combined laboratory and field-based approach is applied: previously extracted soil samples from the road are characterized and treated with calcium lignosulfonate; subsequently, compaction and strength soil laboratory tests such as modified Proctor, direct shear, and permeability are conducted to determine physical and mechanical soil properties of the treated specimens. Based on preliminary laboratory results, a pilot application is implemented on a 30 m long unpaved road segment near an affected public high school in la Peña, allowing measurement and monitoring of PM_{2.5} in the air, assessing the product's performance in dust suppression under real traffic and environmental conditions. Laboratory and field tests are expected to demonstrate that applying calcium lignosulfonate to an unpaved road surface improves soil particle bonding, stability, and compaction; reduces dust emissions; and decreases the need for frequent maintenance. Therefore, the anticipated outcomes highlight the potential of calcium lignosulfonate as a cost-effective, viable solution for unpaved road dust suppression, thereby increasing mobility, public well-being, and overall quality of life in rural communities in Panama.

Belen Telahun

Discipline: Computer Science

Authors:

#1 Aloysious Kabonge

#2 Murtaza Fakhry

#3 Ileana Perez

Murtaza Fakhry

Aloysious Kabonge

Abstract Name: Using Artificial Intelligence to Satisfy Generalized Use Cases

The research started when the FCC proposed new rules to reduce cyber risk for emergency alerting systems. Many regulations, once adopted by the Commission, are then supplemented based on new developments in the field. These proposed rules are put out for public comment, after which they cannot be altered until a new record accumulates and the full Commission acts. The research results help ensure that proposed rules are informed by the best information currently available, a process that exceeds the capacity of most regulatory agencies. The student research team developed an AI application using RAG techniques that fine-tunes a large language model using vector database methods and a custom language set. The application includes a chatbot front-end that responds to prompts in a way that accounts for new developments in the field, thereby helping the regulator's limited staff consider a wide range of sources from academia, industry, and government. The team's research can help the regulator improve upon existing policies to improve emergency alerting reliability and security based on recent developments in alerting technology as expressed in the custom language set and other relevant sources that the application identifies. This phase of the project is complete and will be demonstrated at the conference. The application that the student researchers created can be applied to any use case by altering the custom language set. The student researchers are now working with an external client to apply their research to the hospitality sector. This research, driven by a new set of custom sources, will help the client better use customer feedback to improve their service and products. This research will help the team learn the extent to which the research product can be generalized to a new sector.

Kylie Tenhouse

Discipline: Biology

Authors:

#1 Kawsar Chowdhury

#2 Erica Holliday

#3 Vishnu Suppiramaniam

#4 Abhinav Yenduri

Abstract Name: Prenatal cannabinoid exposure causes memory deficit through altered glutamate receptor function

Prenatal exposure to cannabinoids (PCE) has increased substantially alongside the growing legalization and use of cannabis, a trend projected to continue. Mounting evidence links PCE to persistent neurodevelopmental impairments, especially in learning and memory. Despite growing concern, no therapeutic strategies currently exist to address the cognitive dysfunction associated with PCE. This study investigates how PCE affects the single-channel properties of synaptic AMPA (α -amino-3-hydroxy-5-methyl-

4-isoxazolepropionic acid) and NMDA (N-methyl-D-aspartate) receptors—critical mediators of excitatory neurotransmission and synaptic plasticity. To elucidate the mechanisms underlying AMPA and NMDA receptor dysregulation, pregnant Sprague Dawley rats received either sesame oil or 5 mg/kg of Δ9-tetrahydrocannabinol (THC) via oral gavage from gestational day 5 through postnatal day 9. Electrophysiological analyses were performed on hippocampal synaptosomal AMPA receptors from adolescent offspring (postnatal days 40–50) in control and THC-exposed groups. PCE offspring demonstrated a pronounced reduction in AMPA receptor open probability and altered single channel burst dynamics compared to controls. NMDA receptor activity was also disrupted, reflecting broad impairments in glutamatergic signaling. Collectively, these findings indicate that prenatal THC exposure alters both AMPA and NMDA receptor channel kinetics, likely compromising synaptic plasticity mechanisms such as long-term potentiation (LTP). Given the central role of AMPA and NMDA receptors in memory processing, these PCE-induced receptor alterations may underlie the learning and memory deficits observed in affected offspring. This study offers vital mechanistic insights into synaptic dysfunction following prenatal cannabinoid exposure and highlights the urgent need for targeted interventions to mitigate its neurodevelopmental consequences.

Gabrielle Tenia

Discipline: Dance

Authors:

Abstract Name: Moving Toward Healing: Dance-Specific Approaches to Psychological Well-Being

While physical activity is widely known to support mental well-being, this research explores how dance-specific movement offers psychological benefits that go beyond those of typical exercise. Through an interdisciplinary lens, this project examines how structured dance technique, improvisation, choreography, and Dance Movement Therapy (DMT) support emotional, cognitive, and social health. DMT uses movement as a therapeutic tool to help individuals express emotions, develop mind–body awareness, and regulate stress. Research in the field shows that dance allows people to release emotions, spark creativity, and build confidence through both guided and spontaneous movement. This project also includes a practical performance component to investigate how movement qualities influence mood and personality. By analyzing improvisation sessions, choreographic processes, and the original dance work created for this research, the study observes how dancers communicate internal emotional states through dynamics, tension, rhythm, and spatial choices. These embodied explorations demonstrate how movement can shape and reflect one's emotional experience in real time. Beyond emotional benefits, dance has been shown to strengthen memory, attention, and overall cognitive function across age groups. It also promotes social connection through shared movement experiences, increasing feelings of community and belonging. These combined effects suggest that dance may be a powerful tool for addressing rising rates of stress and generational anxiety, especially among young people. The findings of this research highlight the unique psychological value of dance and suggest that dance-based programs may be beneficial within schools, community settings, and wellness initiatives. By combining scientific research with lived, artistic exploration, this project argues that dance-specific movement should be recognized as an important resource for supporting mental health and fostering resilience.

Emmalee Teoli

Discipline: Art History

Authors:

#1 Emmalee Teoli

Abstract Name: The Art of Drew Struzan: More than Movie Posters

Drew Struzan, despite a difficult upbringing with little parental love, found solace in creativity and art from a young age. Using basic materials, he honed his skills and attended ArtCenter College of Design in 1965, where he met his future wife. Balancing freelancing and college to pay for school, Struzan graduated after six years. His career took off with album covers and later movie posters, gaining fame for his work on "Star Wars: A New Hope." Known for capturing the essence of films in his distinctive style, Struzan worked on various iconic projects like Star Wars, Indiana Jones, and Back to the Future. Despite struggles with the business side, he remained dedicated to his craft until retiring in 2008. His battle with Alzheimer's disease was announced in 2025, leading to his passing. Struzan's legacy as a legendary artist in hand-painted movie posters continues to be celebrated in the entertainment industry, with fans hoping for a new talent to emerge while honoring his memory.

Sarah Terapane

Discipline: Biology

Authors:

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- #2 Michael D. Schultz
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Abstract Name: How Antigen Delivery Route Shapes the Development of Cross-Reactive Mucosal Immunity to Influenza

Influenza viruses undergo frequent antigenic shifts, making them prime targets for the development of a universal vaccine that provides long-lasting broadly protective immunity with only a few doses over a lifetime. Such a vaccine would reduce public health costs, increase vaccination coverage, and lessen the need for annual reformulation of seasonal vaccines. Traditional systemic influenza vaccines offer limited protection compared to the broader antibody responses developed by natural influenza infection in the respiratory tract, suggesting that the route of antigen delivery may influence immune breadth. To test this hypothesis, we compared systemic and respiratory delivery of the influenza antigen H1_{CA09} in mice using a replication-deficient adenovirus serotype 5 vector (Ad5). Intranasal immunization uniquely induced the development of antigen specific IgA antibodies at the site of viral entry, which cross-reacted with H1 protein from distantly related strains of influenza including the ancestral strain PR8. To test whether the cross-reactive antibodies provided functional protection, we next challenged identically primed and boosted mice with a sublethal dose of PR8. Notably, intranasal immunization enhanced viral clearance and significantly reduced viral morbidity, pulmonary inflammation, and fibrosis in comparison to intramuscular immunization in a heterologous challenge. In summary, these findings support that intranasal delivery of influenza antigen

is critical for the development of strain cross-reactive mucosal immunity, and suggests that local antigen delivery should be considered in the development of “universal”, broadly protective, influenza vaccines.

Natalie Terry

Discipline: Psychology

Authors:

#1 Dr. Kelly Lynn Mulvey

Abstract Name: Understanding How Teachers Form Expectations of Future Students

There are many factors that contribute to teachers’ expectations for their students. Some of these factors include gender, diagnostic information, and valence of background information about the student. This study addresses a research gap by examining the role of diagnostic information in shaping teachers’ expectations for future students in the United States, as well as the interaction with student gender and prior academic and behavioral information. This study aims to gain a better understanding of how information a teacher receives prior to meeting a student can impact their expectations of students’ academic performance, behavior, and social interactions. Participants were recruited using Prolific and included 140 current kindergarten through twelfth grade teachers living in the United States at the time of the survey. Each teacher read one of eight randomized vignettes describing an imaginary student to be placed in their classroom for the upcoming school year. Three independent variables were manipulated between the vignettes, gender (male/female), background information (positive/negative), and disability status (504 plan due to ADHD or asthma). Participants then answered Likert-scale style questions adapted from three established measures to determine teachers’ academic and non-academic expectations of the student, including their perceived conflict and closeness with the child and perceived behavioral control of the child. Survey responses will be analyzed using SPSS to answer the research question: How do gender and diagnostic information about a future student impact teachers’ expectations of the student’s academic achievement and teacher-student relationship development?

Joseph Terzich

Discipline: Law and Legal Studies

Authors:

Abstract Name: The Fourth Amendment on ICE: Unlawful Detentions and Workers Rights

This paper examines the constitutional limits of immigration enforcement in the workplace by applying the legal framework established in *INS v. Delago* to the ongoing class actions of *Noem v. Vasquez-Perdomo* and *Escobar Molina v. Department of Homeland Security*. In considering the Fourth Amendment standards governing workplace warrants, probable cause, and seizures, this paper concludes that current Immigration and Customs (“ICE”) actions are clearly unconstitutional. The paper initially discusses when warrants are needed and the requirement that they identify individual suspects or are designed to gather reasonable suspicion of specific suspects. Delgado also articulates limited circumstances for immigration officers to operate without warrant. The paper then turns to probable cause, as it is based on the totality of the circumstances governing the encounter between immigration officers and individuals. Delgado prohibits officers from detain or physically move an individual with generalized suspicion, the officers must have individualized reasonable suspicion. The paper then defines what constitutes a seizure in a workplace setting and how that standard has evolved over time. The majority in Delgado concluded that some workplace

surveys conducted by immigration officers do not restrain the workers liberty and therefore do not constitute a Fourth Amendment seizure or detention. The dissent countered that the intimidating presence of the Immigration and Naturalization Service agents at one's workplace would make a reasonable person feel free that they were unable to leave or deny questioning, therefore making it a Fourth Amendment violation. As the law has evolved, the determination of a workplace seizure is fact specific. Applying this framework to plaintiffs in Vasquez and Escobar, this paper concludes that ICE agents are violating workers Fourth Amendment protections.

Rebecca Tesfaye

Discipline: Biology

Authors:

#1 Alexandra Shah

Abstract Name: Understanding the Differential Production of Antibiotics from Soil Bacteria from Different Locations

This research examines how bacteria found in children's playgrounds differ from bacteria collected in a less-treaded wooded area. The purpose of the study is to test how bacterial isolates from three different soil locations respond when challenged against ESKAPE safe relatives. Understanding these differences is important because identifying the bacteria present in specific environments and observing their characteristics can help categorize them more accurately. Three soil samples were collected: SS1a from a hill where children frequently played, SS1b from the playground mulch, and SS2 from a forest area. Samples were taken 1–4 inches below the surface to capture soil with the most environmental contact. In the lab, each sample underwent soil dilutions, was plated onto agar, and incubated at room temperature for 48 hours. Colonies were then identified and counted to calculate colony forming units (CFU). Colonies with unique characteristics were transferred to fresh agar plates and incubated for another 48 hours. These isolates were then tested on bacterial lawns of ESKAPE safe relatives (non-pathogenic bacteria), including *E. coli*, *Staphylococcus epidermidis*, *Enterococcus raffinosus*, and *Pseudomonas putida*, with *Enterobacter aerogenes* and *Acinetobacter* added later. After 48 hours of incubation, plates were examined for zones of inhibition indicating antimicrobial activity. Colonies showing inhibition were isolated, streaked onto new plates, and incubated again for further characterization. Additional identification of strains will include gram staining, the catalase test, and DNA amplification. The clearest zone of inhibition was found on *Staphylococcus epidermidis* in SS1a, then two unclear possible zones appeared in SS1b, and no inhibition zones were observed in SS2. These results suggest that bacteria from the hill near the playground exhibited the strongest antimicrobial properties. A unique observation was the wide variation in colony appearance and the change in odor in SS1b, which shifted from putrid to coffee-like and then back to putrid over time.

Erica Thaggard

Discipline: Nursing and Public Health

Authors:

#1 Caitlin Torrence

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#4 Francine Sheppard

Abstract Name: From Classroom to Caregiving: A Model for Student Learning in Dementia Care

Introduction: Healthcare providers are often not prepared to care for individuals living with dementia and their caregivers. To ensure positive patient outcomes, all healthcare professionals should receive dementia-specific training. Compounding the challenge is that few university students are interested in healthcare careers working with older adults. Universities play a key role in addressing this shortage and fostering interest in geriatric care. This project aims to increase student knowledge and skills for working with older adults with dementia and supporting caregivers. To address this need, an interdisciplinary, multi-instructor service-learning course and The Healthy Brain Club, a dementia-specific respite, were developed in Spring 2025. Through the course, students engage in coursework and then plan and implement evidence-based activities for people living with dementia at the Healthy Brain Club. **Methods:** Students complete dementia knowledge and attitudes surveys at the beginning of the semester, at completion of classroom learning, and at the end of the semester after working at the respite. Students also submit semi-structured reflections midway and at the semester's end. Reflections from two semesters were coded using thematic inductive analysis. Further analysis will explore associations between students' initial dementia experience and assessment scores. **Results:** Five primary themes emerged: 1) Students report increased confidence and comfort working with people living with dementia and caregivers, 2) Both course sections are essential for building skills and knowledge, 3) Awareness of career opportunities broadened, 4) Students valued interdisciplinary collaboration, and 5) They recognized the caregiver role as crucial and expressed a desire to support caregiver wellbeing. **Conclusion:** The combination of coursework and applied learning greatly contributed to students' knowledge and interest in dementia care. Building relationships and managing the respite gave students ownership rarely felt in volunteer roles. This course/respite model is proving successful in increasing knowledge and interest in dementia care.

Parth Thakar

Discipline: Physics and Astronomy

Authors:

#1 Dr. Mujawar Mubarak

Abstract Name: Visualizing Plasma Flow and Secondary Ionization in Constricted-Anode Geometries Using Multi-Dimensional Particle-In-Cell (PIC) Simulation

Constricted-anode plasma sources generate locally intensified electric fields that enhance ionization near the anode, making them valuable in propulsion and laboratory plasma systems. However, the narrow geometry produces complex charge accumulation and secondary ionization effects that remain difficult to measure experimentally. To address this challenge, our research develops and applies a multi-dimensional Particle-in-Cell with Monte Carlo Collisions (PIC-MCC) simulation of a DC discharge in 1-D, 2-D, and 3-D configurations that model a constricted-anode device. PIC-MCC is a first-principles method that tracks electrons and ions individually while computing self-consistent electric fields and incorporating energy-dependent collision processes. This approach enables direct visualization of plasma flow behavior, species-specific particle motion, sheath formation, charge buildup, and electric potential structures—features that are often inaccessible to physical diagnostics. Throughout this project, we have constructed 1-D, 2-D, and 3-D PIC models; implemented energy-dependent cross-section tables; generated maps of electron and ion density; and produced detailed visualizations of electric fields and potentials. Our simulations consistently show strong electron accumulation in the anode region, leading to steep electric-field gradients that trigger secondary ionization cycles. In 3-D, geometric focusing intensifies this effect, increasing particle density, local heating, and the overall ionization rate. These insights demonstrate the utility of PIC modeling for revealing plasma behaviors that cannot be directly observed. Ongoing work focuses on re-optimizing the 3-D solver to more accurately capture secondary-ionization physics, improving predictive capability for the design and operation of future constricted-anode plasma sources.

Discipline: Biology

Authors:

Abstract Name: Enhancing Anaphylaxis Risk Assessment through Machine Learning: A Focus on Egg Allergens

This study aimed to improve the accuracy of anaphylaxis risk prediction in pediatric patients with egg allergies through the use of advanced machine learning models. Traditional clinical assessments relying on IgE thresholds, patient history, and skin-prick results typically achieve only 50–60% accuracy, leaving substantial uncertainty in evaluating whether a child might experience a severe reaction. To address this gap, three predictive models—generalized Linear Model (GLM), an Ordinal Regression model, and an XGBoost gradient-boosting model—were developed and compared. These models were trained on a preprocessed public dataset containing immunological markers such as Gal d 1– and Gal d 2–specific IgE levels, total IgE, skin prick test wheal sizes, symptom severity history, and relevant demographic variables. The dataset was cleaned, normalized, and divided into training and testing subsets before being used to generate both categorical severity predictions (Anaphylactic, Sensitized, Tolerant) and continuous allergen severity scores. XGBoost demonstrated the strongest performance of the three, achieving an Area Under the Curve (AUC) of 97% and a Mean Absolute Error (MAE) of 11.3. Compared to GLM and Ordinal Regression—both of which showed difficulty modeling higher-severity reactions—XGBoost was better able to capture nonlinear patterns, such as interactions between specific IgE biomarkers and past reaction history. These findings suggest that machine learning, particularly ensemble-based approaches, has meaningful potential to enhance clinical decision-making by offering more accurate and individualized risk predictions. With more reliable tools, clinicians may be better positioned to identify high-risk patients, reduce unnecessary food challenges, and tailor intervention strategies to minimize the likelihood of severe anaphylactic episodes.

Mamadou Thiam

Discipline: Biology

Authors:

#1 Brett Morrison

Abstract Name: Role of Schwann Cell Monocarboxylate Transporters in Peripheral Nerve Regeneration

Monocarboxylate transporters (MCTs), specifically MCT1, MCT2, and MCT4, are the primary transporters for lactate, pyruvate and ketone bodies in Schwann cells. These transporters play critical roles in many cellular processes, including metabolism, myelination, and peripheral nerve regeneration. Our laboratory and others have previously shown that removing MCT1 alone from Schwann cells leads to hypomyelination, disrupted lipid metabolism, and reduced motor end-plate innervation. Surprisingly, we found that selective ablation of MCT1 from Schwann cells did not impact nerve regeneration. Since Schwann cells also express MCT2 and MCT4, our hypothesis is that these two closely related transporters are able to partly compensate for the loss of MCT1. To assess the role of all MCTs, we obtained mice with selective ablation of MCT1, MCT2, and MCT4 from Schwann cells, termed P0-Cre:MCT TripleFlox mice. These mice do not develop peripheral nerve abnormalities, at least during young adulthood. P0-Cre:MCT TripleFlox mice and littermate controls (i.e., WT:MCT TripleFlox mice) underwent sciatic nerve crush and recovery was followed for six weeks by electrophysiology, behavior studies, and histology. By electrophysiology, there was incomplete recovery of conduction velocity (56.5% of pre-crush values in P0-Cre:MCT TripleFlox mice, as compared to 78.6% in WT:MCT TripleFlox mice, $p < 0.05$). Impaired recovery was also seen by behavior, with significantly impaired recovery of toe spread index ($p < 0.0001$) and horizontal ladder walk ($p < 0.01$), and

histology, with significantly reduced neuromuscular junction (NMJ) reinnervation ($p < 0.01$). We also obtained primary Schwann cell cultures from these transgenic mice and found reduced expression of genes important for regeneration, including c-Jun (reduced 32%, $p < 0.05$) and FGF2 (reduced 50%, $p < 0.05$). Our findings demonstrate that knockout of all MCTs from Schwann cells impairs the capacity of peripheral nerves to regenerate, at least partly due to inability to express critical regenerative transcription and growth factors.

Frances Thiry

Discipline: Biology

Authors:

#1 Isobel Cobb

#2 Sarah Rush

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Acadia Conboy

Ashlynn Stacy

Abstract Name: Space to grow: Development and implementation of mixed-method assessment tools to assess occupancy, utilization, and interaction patterns of informal learning spaces in the JMU biology department

Informal learning spaces are taking on an increasingly significant role in university settings to enhance the student experience. These spaces offer students learning-related activities outside the traditional classroom, fostering socialization and community. While prior research has demonstrated the value of informal spaces such as institutional learning commons and libraries in benefit to students' academic success and experiences, less is known about the impact of and student engagement in smaller unstructured community spaces (e.g., atriums, study rooms). Further, the absence of systematic methods for evaluating such spaces limits empirical decision-making and resource allocation. This case study uses the "BioCommons" at James Madison University to examine students' engagement in and perceptions of an informal departmental learning space. A mixed methods approach was taken combining qualitative observations of visitor activities with surveys for understanding their usage and perceptions of the space. Since fall of 2023, 1468 unique observations were conducted by trained student researchers providing data on visitor ($n=13,189$) actions, interactions, and resource usage, which were coupled with 510 closed- and open-item surveys lending insight to visitor backgrounds and perceptions of the space. Results have documented the utility and benefit of the departmental space in facilitating alone and group learning, relaxation, and community building, as well as access to student- and faculty-led programs and resources viewed to help offset barriers commonly associated with college student success. Preliminary findings of this ongoing study add to our understanding of how to monitor informal learning spaces and their contributions to the academic and personal growth of college science students.

Frances Thiry

Discipline: Biology

Authors:

#1 Anneliese Rogerson

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Abstract Name: Seeing Science Differently? Using Eye Tracking Technologies to Explore How Neurodiverse and Neurotypical Biology Students Read Graphical Displays.

In the sciences and our everyday lives, graphs are essential tools for the communication of complex data in a more accessible and actionable form. As a result, graph literacy – the ability to interpret and critically engage with graph data – is regularly highlighted as a core competency in undergraduate science. Despite a growing catalogue of research identifying student challenges in graphing and beneficial graph instruction methods in college science, there is little known as to how neurodiverse learners engage with graph data. As an estimated 10% to 30% of postsecondary students in the US may be neurodivergent, understanding if learners of varying cognitive backgrounds “see” and make sense of graphical displays differently is of importance to inform inclusive teaching strategies. This exploratory study employed eye tracking technologies and cognitive interviewing to comparatively examine how neurotypical (n=21) and neurodiverse (n=22) biology majors read and interpret graphs. Participant eye movements were recorded as they completed 14 graph-based tasks of varying complexity drawn from textbook and everyday sources. Following the eye-tracking session, participants completed semi-structured “think aloud” interviews focused on their experience with and decision-making processes in graphing. Preliminary quantitative and qualitative results from the eye tracking data indicate that students across cognitive groups direct their attention and visual search patterns comparably when completing tasks with lower complexity graphs; however, variation in strategies were observed as a function of cognitive condition when interpreting more complex graph displays. Self-reports gathered from the interviews highlight similar levels of use and confidence as well as decision-making patterns in graphing between cognitive groups, while neurodiverse students also often identified their condition may impact how they make sense of graphs. Findings from this novel pilot project have the potential to inform inclusive teaching and data communication practices.

Jacob Thomas

Discipline: Biology

Authors:

#1 Jacob Thomas
#2 Matthew Persons

Abstract Name: The Effects of Fishing Spider *Dolomedes triton* Silk Cues on Defensive Behaviors and Predation of Aquatic Beetles (*Peltodytes* sp.)

The six-spotted fishing spider, *Dolomedes triton*, is a semi-aquatic predator that detects prey through vibrations on the water surface. These spiders also deposit hydrophobic silk in water that may alert prey to their presence and induce adaptive antipredator behaviors. If so, silk may function as an enemy-avoidance kairomone. Alternatively silk could function as a trip-wire to extend the sensory detection of prey by the spider and enhance prey capture. We tested these contrasting hypotheses using the aquatic beetle, *Peltodytes* sp. We measured shifts in beetle behavior and predation by juvenile spiders with and without the presence of *Dolomedes* silk. *Peltodytes* are benthic but must surface regularly to breathe, which leaves them momentarily vulnerable to predation at the surface. We measured the number of times the beetles (N = 119) performed this action in arenas containing or lacking silk, predicting that they would limit surfacing in the presence of *Dolomedes* silk if they could detect it. We also measured *Dolomedes* (N = 59) ability to capture *Peltodytes* in the presence or absence of silk, predicting that the spiders would be less successful at capturing beetles that were aware of their presence through silk cues. The beetles showed a significant change in behavior in the presence of silk, however, their surfacing increased rather than decreased in the first 4 minutes of trials in

arenas containing silk. Spiders were also significantly more successful at capturing beetles in the first 4 minutes of trials in silk-inoculated arenas and attacked beetles earlier when silk was present. Detection of silk apparently initiated escape behaviors of beetles, thus functioning as an enemy avoidance kairomone, however, increased activity was maladaptive within our testing arenas and more frequent surfacing enhanced detectability by spiders and led to increased predation.

Oliver Thomas

Discipline: Environmental Science and Sustainability

Authors:

#1 Camden Haines

#2 Hanley Rooker

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#4 Oliver Thomas

Will Chelberg

Abstract Name: Microhabitat usage and symbiotic dynamics of a shell-dwelling cichlid (*Neolamprologus similis*)

Aquatic ecosystems promote variable microhabitats which in turn support dynamic biotic assemblages. One such microhabitat involves gastropod shells and the dependence on these microhabitats for breeding success in shell-dwelling cichlids native to Lake Tanganyika in East Africa. Once a microhabitat is selected by a male-female pair, both parents will care for the nest and eggs until the young are developed enough to leave the shell. This research aims to quantify how parental division of care influences offspring quality and developmental timing in the shell-dwelling cichlid *Neolamprologus similis*. Mating pairs of *N. similis* will be introduced to study tanks to assess shell selection, mating success, male-female brood care division, brood size, and larval development. Parental roles and the duration of care provided by each individual will be systematically recorded at specific intervals throughout the day. Data will be analyzed using generalized linear models for hatching/survival rates and time-to-event analyses for developmental timing. Insights from this work will inform conservation strategies for shell-dependent fishes and clarify the ecological consequences of parental workload partitioning within the species.

Sunny Thomas

Discipline: Physics and Astronomy

Authors:

#1 Sunny Thomas

Abstract Name: Modeling the Dark Matter Halo with Rotational Dynamics

Dark matter remains one of the most significant unresolved questions in modern astrophysics, accounting for the majority of the universe's mass while remaining undetectable through direct electromagnetic observation. It is traditionally described as forming a diffuse, roughly spherical halo surrounding galaxies, providing the gravitational influence needed to explain why stars orbit faster than visible matter alone would permit. However, this conventional model may oversimplify the actual structure and behavior of dark matter. This project explores the theoretical possibility that dark matter may instead form a ring-like structure beyond the visible boundary of a galaxy, stabilized through rotational motion and gravitational interactions within the surrounding halo. In this framework, dark matter is also considered to potentially exert a weak repulsive

influence on regular baryonic matter, which could contribute to the separation and maintenance of distinct structural regions. Drawing on analogies to rotating fluid systems, such as atmospheric vortices, the project examines whether similar dynamical principles could apply on galactic scales. To evaluate this hypothesis, we will develop and run computational simulations in Python that model dark matter as a collection of particles influenced by gravity, angular momentum, and a tunable interaction term representing the proposed repulsive effect on baryonic matter. By varying mass density, velocity dispersion, and rotational characteristics, the model will test whether a stable ring-like structure can form and persist over time. While theoretical, this study aims to expand how dark matter distributions are conceptualized and may suggest new possibilities for interpreting galactic dynamics and observational data.

William Thomas

Discipline: Biology

Authors:

#1 Michela Saviana

#2 Daniel Del Valle Morales

#3 Meléna Paraoan

Abstract Name: Assessing miR-375 Targets and their Effects on Small Cell Lung Cancer Progression

Small cell lung cancer (SCLC) is an aggressive form of lung cancer often diagnosed in later stages when prognosis is poor. The mechanism behind SCLC metastasis remains unclear, though it is known that cellular plasticity is a driving force behind tumor cells transitioning between different states and promoting cancer progression. Previous studies have revealed miRNAs (miRs), small non-coding RNAs that regulate gene expression, as biomarkers that may play a role in SCLC progression. Our lab has previously shown that miR-375 expression is higher in advanced stage SCLC patients compared to control patients. However, the miR-375 role in this cancer is unclear. Characterization of SCLC cell lines for miR-375 expression has revealed that most SCLC cells have high expression of miR-375. In this study, we investigate the possible targets that drive SCLC progression. The H1048 cell line, a SCLC cell line with low miR-375 expression, was selected and transfected with an overexpressing miR-375 (oe375) or a control (Ctr) plasmid. RNA-seq and proteomics were performed and analyzed through IPA to uncover deregulated pathways involved in SCLC cell plasticity. Alamar blue, MTS, and colony assay were used to assess cell proliferation. Western blot, and RT-qPCR were used to evaluate protein and mRNA levels. Our study shows an enhanced cell proliferation in oe375 cells. Western blot analysis revealed an increase of E-cadherin and a decrease in YAP1 and Twist1 expression in oe375 cells compared to Ctr, suggesting a shift toward an epithelial phenotype. YAP1 is a direct target of miR-375. We hypothesize that miR-375 induces epithelial phenotype by targeting YAP1. We plan to re-express YAP1 in oe375 cells to validate this hypothesis. A second stable cell line was created to validate these data and provide further insight into how miR-375 overexpression drives cell growth and an epithelial phenotype.

Elisha Thomas

Discipline: English and Literature

Authors:

#1 Corrine Anderson

Abstract Name: Embodying the Game: Using Game Design Theory to Analyze Walter Tevis' The Queen's Gambit

Walter Tevis's novel *The Queen's Gambit* follows the orphaned chess prodigy Beth Harmon. On her journey to conquer the chess world, Beth battles with addiction, isolation, and emotional instability. Tevis uses chess as a metaphor for mastery and control, a framework readers can use to find success in their own lives. Beth uses the act of playing chess as a medium to gain autonomy over her life. The Queen's Gambit is an opening strategy in chess, with the core goal of gaining control over the center of the board, the most advantageous position. The novel shows how the mastery of chess cultivates focus, patience, and resilience, ultimately translating into Beth achieving command over her own narrative. This paper also considers *The Queen's Gambit* as Tevis's swan song. *The Queen's Gambit* is a literary rendering of Tevis's greatest desires -for freedom from alcohol, pills, and social isolation. Tevis infuses his life story within Beth's, allowing her to defeat and transcend the cyclical demons ever present in Tevis's life. The novel is a chance for the author to symbolically achieve the control and fulfillment that have eluded him from an early age, when he was routinely given Librium, an early benzodiazepine, at a convalescent center. Tevis's depiction of chess reveals his admiration for structure and foresight. Tevis closes his career with a message of self-mastery, demonstrating how discipline and dedication can transform suffering into autonomy and purpose.

Annalee Thompson

Discipline: Engineering

Authors:

#1 Mohsen Esteghamati

Abstract Name: Comparison of Seismic Performance and Economic Feasibility of Steel Special Moment Resisting Frame Building Designed for Deterministic and Probabilistic Ground Motions in Salt Lake City, Utah

In predicting seismic hazard for an area, ground motions are scaled either according to probabilistic seismic hazard analysis (PSHA) or deterministic seismic hazard analysis (DSHA). PSHA accounts for the recurrence interval of earthquakes on individual faults, whereas DSHA accounts for the maximum earthquake produced by a fault, independent of time. Current design codes use PSHA-based design spectra as the basis for seismic design. However, the seismic hazard in Salt Lake City, Utah, is dominated by the Wasatch Fault, which has long periods between events with the ability to produce magnitude M7.1 earthquakes. Due to this lower activity rate, PSHA results in lower seismic risk than DSHA, potentially leading to unconservative designs. In other words, buildings designed according to PSHA-based design spectra (i.e., code-based design) may have a higher risk of collapse under a deterministic scenario that is more likely to occur in Utah. This research compares the seismic performance and construction costs of designing special moment-resisting frames (SMRFs) for PSHA- and DSHA-based design spectra in Salt Lake City, Utah. A 4-story SMRF building archetype was designed individually based on both PSHA and DSHA design spectra. Finite element models of these archetypes were subjected to DSHA-based maximum considered earthquake (MCE)-scaled ground motions, and the results were processed to determine structural damage in terms of fragility functions. Upfront construction costs, including materials and erection, were estimated for each archetype to quantify the economic effects of designing according to DSHA compared with PSHA design. The results indicate that designing for a DSHA-based design spectra reduced the collapse risk while only incrementally increasing construction cost, providing an engineering solution to the potential seismic vulnerabilities on the Wasatch front.

Kelli Thompson

Discipline:

Authors:
#1 Alejandra Amaya
Veronica Arellano

Abstract Name: Finding High-Impact Undergraduate Experiences on your Campus: How to Find Opportunities Inside and Outside the Classroom

Access to high-impact research experiences can be a challenge for many undergraduate students interested in graduate school, especially those students at smaller campuses. For students who find themselves at large research institutions with faculty who have emphasis on applied clinical research this task may be made slightly easier, but nonetheless daunting. Given that research experience is one of the main factors for successful entry into graduate programs in clinical psychology and other professional medical schools, this challenge can become a potential barrier to entry for some (Keith-Spiegel & Wiederman, 2000; Privitera, 2014). As such, the purpose of the current oral presentation proposal would be to encourage networking opportunities and brainstorming ideas for undergraduates seeking high-impact research experiences on their campuses. The National Psi Chi Psychology Honor Society Faculty Advisor and Director of the McNair Undergraduate Research Program from Texas A&M University-Kingsville will lead an oral presentation which focuses on encouraging students how to find high-impact undergraduate research experiences on their own campuses. This will be useful for students that find themselves at big research institutions or even smaller liberal arts environments. Skills will be applicable and translatable in a range of academic settings and perspectives. The session will start with a brief introduction into the value of undergraduate research with recent studies about predictors of success to graduate school. We will then share personal narratives and success stories. Recent student research will be highlighted and summarized, showing attendees real-life examples of how to turn conference presentations into publications in undergraduate journals and other peer-reviewed spaces. This demonstrates how doable and manageable this task can be for you too! Attendees will learn practical ways to seek out and find opportunities and locally, regionally, and/or nationally for research engagement based on recent success stories and the research presented for discussion.

Lesley Thompson

Discipline: Health and Human Development

Authors:
#1 Leon Aksman
#2 Yingxu Liu

Abstract Name: Exploring sex differences in the relationship between CPR performance and SWM neurite density in an older Indian population

Despite growing interest in early markers of Alzheimer's disease (AD), the role of superficial white matter (SWM) in cognitive performance, especially apraxia, remains unclear. Apraxia, the ability to plan and execute movements, often emerges during AD progression and can be assessed using constructional praxis and recall (CPR) tests. Previous research indicates women perform better with praxis movements. Considering this, we hypothesize that the relationship between regional SWM neurite density and CPR scores differs by sex. We derived demographic, cognitive, and diffusion MRI (dMRI) data ($n = 221$) from Wave 2 of the Harmonized Diagnostic Assessment of Dementia for the Longitudinal Aging Study (LASI-DAD). SWM neurite density in the frontal, temporal, and limbic lobes was evaluated by neurite orientation dispersion and density imaging (NODDI) from T1-weighted and multi-shell dMRI. Linear regression analyses were conducted to examine the relationship between sex and WMN neurite density, controlling for age, education, scanning location, head motion during dMRI scan, and intracranial volume. We found that those with higher CPR scores had significantly higher ($T=2.26$, $P=0.02$) SWM neurite density in the frontal lobe. When examining sex interactions, women with higher CPR scores had significantly higher SWM neurite density in the frontal lobe

($T=2.93$, $P=0.004$) and temporal lobe ($T=2.76$, $P=0.006$) compared to men. Our findings suggest that women who had better CPR performance exhibited higher SWM neurite density than men, particularly in the frontal and temporal lobes. This relationship suggests that combining neuroimaging of white matter microstructure with cognitive assessments like CPR may enhance early detection of cognitive decline in women. Given known sex differences in praxis performance, such approaches may also support a need for sex-specific diagnostics.

Lesley Thompson

Discipline: Health and Human Development

Authors:

#1 Archana McEligot

#2 Lohuwa Mamudu

Abstract Name: The association between hypertension and Alzheimer's disease among African Americans/Blacks in NHIS 2019-2023 dataset

African Americans/Blacks are at a greater risk of developing hypertension, or high blood pressure, when compared to other demographic groups. What may be less investigated is the link between hypertension, which on average develops earlier within a person's lifespan, and Alzheimer's disease (AD); therefore our research question focused on examining the association between hypertension and AD in African Americans/Blacks. We utilized the National Health Interview Survey (NHIS) data and extracted the variables hypertension, AD, age, sex, race, employment, income ratio, education, general health status, and marital status. This study consisted of 15,531 African American/Black participants. Of the participants, 210 (1.1%) had AD and 15,321 (98.9%) did not. Weighted data was used to run a descriptive statistics test, a chi-square test of independence, and a multivariate logistic regression. In the multivariate logistic regression, we found that African Americans/Blacks with hypertension had significantly greater odds (aOR: 1.79 [1.05-3.03], $p=0.03$) of having AD compared to those without hypertension. We found that those with poor/fair health status were found to have significantly higher odds (aOR: 7.39 [3.80-14.38], $p<0.001$) for AD compared to those with excellent health status. Not being employed was significantly related to higher odds (aOR: 11.76 [5.37-25.79], $p<0.001$) of AD when compared to those who are employed. Finally, age was significantly associated with AD ($p=0.04$). These results may suggest that African Americans/Blacks with hypertension have a 79% higher risk odds of AD. By understanding how hypertension affects the increased odds of AD in African Americans/Blacks, we may be better equipped to develop interventions and prevention programs.

Mallory Thompson

Discipline: Biology

Authors:

#1 Laura Sipe

Abstract Name: Methionine Restriction Promotes Immunogenic Cell Death in Triple Negative Breast Cancer

When cancer cells are treated with chemotherapy, they can die in a way that alerts and engages the immune system, known as an immunogenic cell death (ICD). The dying cancer cell can release certain molecules, including ATP, that immune cells recognize in order to initiate an anti-tumor response. However, not all chemotherapies cause the release of these immunogenic signals as they kill the cell. This study aims to determine whether a specific deprivation technique, called methionine restriction, promotes or initiates the

ICD process when used in conjunction with chemotherapy. Methionine is an amino acid that is integral to all protein synthesis. Thus, when methionine is restricted, we expect to see a larger concentration of immunogenic factors that could promote an immune response. Breast cancer cells were incubated first with either methionine-restricted media or normal media before the addition of the chemotherapy cisplatin or oxaliplatin. The cells were then examined for overall death and signals for immunogenic cell death. In examining cell death, there was a significant increase in the proportion of dead cells treated with cisplatin or oxaliplatin in conjunction with methionine restriction when compared to treatment with chemotherapy alone. Furthermore, there was a significant increase in ATP release in cells treated with methionine-restricted media and oxaliplatin together when compared to baseline ATP release. This research supports the idea that methionine restriction could go to promote an immunogenic cell death. Thus, methionine restriction could increase the potency of chemotherapy by engaging the immune system, which could ensure a higher success rate of the current breast cancer treatment options available to patients.

Jack Thon

Discipline: History

Authors:

#1 Jack Thon

Abstract Name: Sick and Tired: Farlulu's Story in the Gambia

My research project explains how the exploitation and alienation of Liberated Africans led to their poor treatment in the Gambia from 1816 to 1843. More specifically, I explain how the facilities, religion, and childhood experiences of the Liberated Africans differed from the native African and European populations. This project builds directly off Kyle Prochnow's research on the Gambia, but goes deeper into the life histories of individuals instead of the larger themes Prochnow discusses. I also utilize several articles on Liberated Africans generally, namely by Richard Anderson and Érika Melek Delgado. While several authors write about the Liberated Africans in Freetown, Sierra Leone, I instead wanted to focus on the Liberated Africans in the Gambia since there is not much research on that niche. My methodology is based primarily on British parliamentary papers and the Registers of Liberated Africans. While both written by British officials, the parliamentary papers offer insight into the atmosphere of the areas the Liberated Africans were located in. The Registers of Liberated Africans provide the physical characteristics of every single Liberated African, which benefits my emphasis on individuals. Within my paper, I follow the story of Farlulu, a Yoruba person enslaved in Ouidah, "liberated" in the British colony of Sierra Leone, and disposed to the Gambia where he faced mistreatment and coerced labor, much like his prior enslavement. It is no secret that Liberated Africans still faced conditions like slavery, but my project focuses on the ones experiencing that mistreatment rather than the British and other Europeans who caused it.

Rebecca Thorley

Discipline: Environmental Science and Sustainability

Authors:

#1 Sukhmanjot Kaur

#2 Ty Wilson

#3 Amita Kaundal

Abstract Name: Plant Growth Promoting Rhizobacteria from Native Plants promote growth and induce drought Tolerance in Arabidopsis

Environmental stresses negatively impact crop production, and the increasing demand for food has led to the overuse of chemical fertilizers, which in turn harm soil health. Our lab's goal is to develop sustainable agricultural methods that increase crop production under varying environmental conditions. To achieve this, we are exploring the microbiome of native plants, such as *Ceanothus velutinus* (snowbrush ceanothus), to harness plant growth-promoting rhizobacteria (PGPR) for the development of biofertilizers. In this study, we screened previously isolated PGPRs from *C. velutinus* plant to evaluate their ability to enhance growth and improve drought tolerance in the model plant, *Arabidopsis thaliana* (thale cress). Each PGPR was cultured to an OD600 of 1.0, and 5 mL of it was applied to the roots of *Arabidopsis* seedlings three times with a week's interval in between. A total of six replicates (one plant per pot) were used for each treatment. The plants were grown for two weeks following the third treatment. After approximately six weeks of germination, the plants were harvested for both fresh and dry biomass measurements. The rosette diameter, number of leaves, and leaf surface area were also recorded. For the drought assay, the six-week-old plants were subjected to drought stress by withholding water for five days or until the control (non-treated) plants either died or wilted permanently. The plants were then rewatered for nine days, and the survival rates were subsequently assessed. We screened 13 notable PGPR strains for their effects on growth promotion, of which the five demonstrated a significant increase in plant shoot biomass. Additionally, of the eight isolates screened for drought tolerance, three showed a positive effect. The remaining isolates are being screened. Once screened in *Arabidopsis*, the positive isolates will be tested on various crops, including watermelon, tomatoes, maize, and wheat in both greenhouse and field conditions.

Sarahnur Thorpe

Discipline: Biochemistry

Authors:

#1 Andrea Aldrete

#2 Aaliyah Decillo

#3 Dr. Sunshine Silver

Abstract Name: Isolation and Characterization of Prokaryotic Riboflavin Kinases

Antibiotic resistance is a growing concern for human health that can be addressed through the discovery of new molecules designed to specifically target resistant bacteria by disrupting bacterial cellular processes. Riboflavin kinases (RFKs) synthesize the coenzymes flavin mononucleotide (FMN) and flavin adenine dinucleotide (FAD), which are required in life-sustaining cellular reactions that regulate cellular signaling, development, and defense against harmful reactive oxygen species across all life forms. Due to their prevalence and the specific structural differences between prokaryotic and eukaryotic isoforms, RFKs in prokaryotes are a potential target for the development of new antibiotics, as these differences can be exploited to create molecules that inhibit RFK activity in prokaryotes. Using various prokaryotic and eukaryotic RFKs, we have begun studies to investigate their differences using bioinformatics and laboratory methods. A sequence alignment was performed on the RFKs of various species using BLAST, Clustal, and ExPasy, and regions of high similarity and variance were identified for the active site amino acids. The RFKs were grown and purified using His-tag affinity chromatography, a technique that relies on the specific binding of the histidine tag to beads of a column. Thin layer chromatography (TLC) was used as a qualitative measure of RFK enzymatic activity, as the riboflavin substrate can be separated from the reaction intermediate (FMN) and the product (FAD) by differences in interactions with the solvent phase or TLC plate. As initial assays showed minimal separation, changes were made to the solvent system with butanol:acetic acid:water (40:10:50) v/v demonstrating the best separation. SDS-PAGE was utilized to determine the overexpression of various RFK prokaryotic samples and verify purification, as this technique separates proteins based on size differences. Ongoing work will examine observed differences in prokaryotic RFKs and explore various experimental conditions to optimize enzymatic activity.

Lillian Thro

Discipline: Interdisciplinary

Authors:

#1 Daeha Joung

#2 Brandon Daul

#3 Ryan Martin

Abstract Name: Bioprinted Scaffolds for Investigating Fibroblast Alignment and ECM Remodeling

Fibroblasts play a vital role in tissue repair, ECM remodeling, and maintaining structural integrity in human tissues. However, their behavior in engineered 3D microenvironments remains poorly understood. Traditional 2D cultures fail to capture the complex cell–cell and cell–matrix interactions that govern fibroblast alignment, migration, and proliferation in vivo. To address this gap, this project uses bioprinted scaffolds that mimic native ECM structures and provide a platform for studying fibroblast behavior in controlled microenvironments. The project focuses on varying scaffold channel properties—such as width, depth, and geometry—to investigate how physical cues influence fibroblast organization and collective migration. A biodegradable gelatin-based ECM material will be used to ensure biocompatibility and long-term culture stability while maintaining uniform surface morphology. By adjusting these geometric parameters, we aim to replicate physiologically relevant environments that guide fibroblast alignment and matrix remodeling, as observed in wound healing or tissue regeneration. This work seeks to overcome limitations in current bioengineering approaches that often fail to achieve consistent 3D cell organization and mechanical integrity. Through systematic comparison of scaffold designs, we expect to identify how fibroblasts respond to spatial confinement, stiffness variations, and surface topology. The resulting platform will enable the visualization and quantification of fibroblast dynamics, providing new insight into the role of physical cues in ECM synthesis and tissue architecture. Ultimately, these customizable scaffolds could serve as valuable models for studying fibrosis, wound repair, and soft tissue regeneration.

Annabel Thrush

Discipline: Gender, Ethnicity, Diversity, or Cultural Studies

Authors:

Abstract Name: Ancient Echoes - An Examination of Female Sexuality and Desire in Religion and Art within the Time Periods of Ancient Mesopotamia and Archaic Greece

Across a multitude of ancient cultures, female sexuality and desire have been expressed and documented, and yet remain quiet in the larger noise of historical scholarship. Female sexuality and the depiction of sexual desire and pleasure are intrinsically tied to the concepts of both religion and art; their importance to the creation of a collective cultural memory impossible to overstate. Religion, an area of focus within this essay with specific regard to Ancient Mesopotamia, provides a way to keep ancient women firmly situated within their culture, not separating them from their cultural context and the way in which they interacted with their society. Art, particularly the poetry and pottery examined in reference to Archaic Greece, is analysed in relation to religion through Sappho's works, while also being examined for cultural contexts in which religion is not explicitly referenced, with women existing in sexual contexts both independently and in conjunction with men. This essay also explores not solely the sexual expression of desire, but the romantic experiences of women towards objects of affection, both male and female. Through poetry, hymns, art, and religious practices, we can critically consider the powerful evidence that challenges the assumption that female desire and agency were wholly suppressed or invisible in ancient societies, and how even in patriarchal cultures, the

voices and experiences of women found their way into cultural memory, challenging norms and consequently enriching the modern understanding of the ancient world.

April Tian

Discipline: Biochemistry

Authors:

Abstract Name: Uncovering the Protective Mechanism of FAAH Inhibition in Cisplatin-Induced Nephrotoxicity

Cisplatin is a first-line potent chemotherapy drug used to treat a wide range of solid tumors. However, its clinical impact is limited by kidney injury at doses required for effective treatment. This nephrotoxicity affects quality of life and may require dose reduction or discontinuation of cisplatin therapy. Our recent research suggests that inhibiting fatty acid amide hydrolase (FAAH), the primary enzyme that degrades the signaling lipid anandamide (AEA) into arachidonic acid (AA), reduces cisplatin-induced renal cellular damage, but the mechanisms responsible for this protective effect remain unclear. This project seeks to determine how FAAH inhibition reduces cisplatin-related injury in kidney cells. Human kidney proximal tubular cells (HK-2) were treated with cisplatin, a selective FAAH inhibitor (PF-04457845), and/or drugs that block or activate specific endocannabinoid pathways to identify how FAAH inhibition alters cellular responses. Cell survival was measured using CCK-8 assays. Initial results showed that PF protected against cisplatin-induced cell death, and antagonists of AEA receptors did not affect this protection. However, protection was reversed using LM1413, a substrate-selective inhibitor to block AEA-COX2 but not AA-COX2, to inhibit cyclooxygenase (COX)-2, an alternative enzyme that converts AEA into prostamides. These initial findings indicate that protection by FAAH inhibition may occur through activation of the AEA-COX2 pathway independent of AEA receptors. We will use Western blotting and immunocytochemistry to measure changes in proteins related to stress and cell death to further compare cell viability and protein expression patterns across treatment groups, clarifying which pathways are altered when FAAH is inhibited in the presence of cisplatin. We expect to conclude whether FAAH inhibition protects kidney cells through receptor-related signaling, lipid-mediated pathways, or both. Understanding these mechanisms may lead to strategies that preserve kidney function during treatment and offer broader insights into preventing drug-induced nephrotoxicity.

Aleck Tiller

Discipline: Philosophy, Ethics, and Religious Studies

Authors:

#1 Aleck Tiller

Abstract Name: BrAInpower or ConstrAInt: The Importance of Human-Made Art and its Impact on Life in a Growing AI World

The spread of artificial intelligence (AI) in everyday life has caused a surge of uncertainty when determining what is human and what is not, especially in the realm of art. From this uncertainty, I decided to find out if AI artwork makes people react differently than art made by humans. This was determined by looking at scientific studies as well as the philosophical connection between humans and art. Previous research has looked at either the philosophical perspective or the scientific perspective, never both perspectives at the same time. It is by applying multiple scientific studies (KAUST and BGSU) and entropy scores (Khan and Kim) to

philosophers from the 19th and 20th centuries (Hegel and Langer) that demonstrates the positive impact on emotions and brain activity created by human-made art. AI art, while found to create emotion, was less influential on the individual than human made artwork. By conducting this study, our findings have shown that the numerous scientific experiments and research models line up with the ideas of the philosophers with regards to their opinions on art expressing a sense of freedom. This study demonstrates the importance of human made art in a rapidly growing AI world, with support from both science and philosophy.

Anisha Tiwari

Discipline: Chemistry

Authors:

#1 Anisha Tiwari

#2 Michael Justik

Abstract Name: A Benziiodoxathiole-Derived Hypervalent Iodine Polymer as a Versatile and Sustainable Oxidant

We report the development of a novel polymer-supported hypervalent iodine reagent incorporating the 1H-1-hydroxy-1,2,3-benziiodoxathiole 3,3-dioxide moiety. The synthesis begins with the transformation of commercially available 2-amino-5-nitrobenzenesulfonic acid into 2-iodo-5-nitrobenzenesulfonic acid via a classical diazotization–iodination sequence. Subsequent reduction of the nitro group using tin in aqueous HCl affords 2-iodo-5-aminobenzenesulfonic acid, which is then covalently attached to a styrene–maleic anhydride copolymer under reflux in acetic anhydride with sodium acetate as a catalyst. Oxidation of iodine to the hypervalent state is achieved by treatment with aqueous Oxone® under acidic conditions at room temperature. The resulting polymeric reagent was evaluated in a series of oxidative transformations, including the rearrangement of arylalkanones, generation and nucleophilic addition to polymer-bound alkynyliodonium species, and oxidation of phenols to quinones. Finally, we propose potential applications of this recyclable hypervalent iodine polymer in microfluidic “lab-on-a-chip” devices as a sustainable oxidant platform.

Chelsea Tjahjo

Discipline: Art History

Authors:

Abstract Name: Russian Designer Aleksandr Rodchenko’s Impact on Modern Design

This paper strives to explore the impact of Russian designer Aleksandr Rodchenko on design both in the past and its transition to modern day design techniques. This paper will go over the history of Russian design, specifically during the era of *faktura* and how it evolved into constructivist principles. It will identify the key characteristics of these design eras and explore why this era was influential in Russian design history. The paper will further explore these design eras by looking at and analyzing Rodchenko’s work, analyzing some of his most popular pieces. It will examine Rodchenko’s background as a designer and the different experiences that helped him create his own style of design that soon became very influential. It will also include the different materials and mediums he used to create visually stunning pieces. The main goal of this research paper is to explain in depth how Aleksandr Rodchenko influenced design.

Mya Tobias

Discipline: Political Science

Authors:

#1 Mya Tobias

Abstract Name: Innovation, Stagnation, and Risk: Analyzing the U.S. Navy's Readiness for Future Conflict

This research analyzes the evolution of U.S. naval capability from the conclusion of World War II (WWII) to the contemporary era, investigating how alternating cycles of technological innovation and institutional stagnation have profoundly shaped the current fleet's operational readiness and strategic posture. The study addresses the research question: How have U.S. naval technological, doctrinal, and logistical innovations during the Cold War, and the subsequent decline in innovation after 1991, combined to shape the strengths and vulnerabilities of today's fleet? Drawing on historical process-tracing and analytical theories of military innovation, the analysis identifies two distinct phases. The Cold War era (1945–1991) is characterized by threat-driven, transformative innovation, institutionalizing doctrines like peacetime forward deployment and pioneering technologies such as nuclear propulsion and robust anti-submarine warfare (ASW), culminating in the expansive 600-ship Navy build-up. This period established the technological and doctrinal foundation for enduring global maritime supremacy. Conversely, the Post-Cold War era (1991–Present) witnessed systemic stagnation. The absence of a peer competitor following the collapse of the Soviet Union initiated a "Peace Dividend" that resulted in deep budgetary cuts, significant fleet reductions, deferred maintenance, and a cultural shift toward administrative efficiency. The subsequent two decades of the Global War on Terror further focused naval assets on expeditionary support missions, exacerbating an aging fleet and creating chronic readiness and maintenance backlogs. The paper concludes that while the legacy of Cold War innovation provides the U.S. Navy with unparalleled strategic strengths, the sustained post-1991 retrenchment has created critical vulnerabilities, including an atrophied shipbuilding base and insufficient capacity to meet the demands of great-power competition. Sustaining maritime dominance now requires an urgent, systemic revival of innovation and sustained investment to overcome institutional inertia and match the rapid modernization efforts of near-peer adversaries.

Olivia Tobin

Discipline: Exercise Science and Nutrition

Authors:

#1 Kaitlyn Morgan

#2 Nevaeh Barnd

#3 Divya Bhaskaran

Abstract Name: Shoulder Strength Imbalances in Division III Collegiate Athletes

In the intense world of college athletics, shoulder stability plays a critical role in injury prevention and overall performance. Division III athletes, particularly those specializing in sports requiring significant upper body engagement, are at high risk for developing shoulder mobility deficits and muscle imbalances. This can lead to increased injury risk as well as reduced functional and athletic performance. In this study, we set out to investigate the prevalence of shoulder muscle imbalances and deficits in non-standard overhead athletes. These athletes perform overhead arm movements differing from those in typical overhead sports. Because of this, their shoulder adaptations and muscle imbalances are distinct from typical overhead athletes, creating a gap in current knowledge, warranting further careful exploration. Using a handheld dynamometer and the Athletic Shoulder (ASH) with a force plate, we assessed bilateral shoulder strength across multiple planes in female Division III track and gymnastics athletes aged 19 to 22. Preliminary results demonstrate significant

dominant to non-dominant muscle imbalances in track athletes, which were not observed in gymnasts. These findings align with existing literature, noting increased imbalances in single-arm dominant athletes. However, gymnasts demonstrated an increase in strength in the overhead planes, consistent with previous literature. Heatmaps have helped to enable clear visualization of asymmetries across different planes, facilitating the identification of potential injury risks, while also supporting individualized rehabilitation protocols. This research highlights the importance of individual assessment protocols for Division III athletes, promoting targeted rehabilitation and injury prevention strategies, ultimately aiming to enhance shoulder health and athletic performance in underfunded athlete populations.

Shraddha Todupunoori

Discipline: Biology

Authors:

#1 Alexia Zylko

#2 Javier Gonzalez-Maeso

#3 Amy Lasek

Abstract Name: Effect of Psilocybin on Perineuronal Nets in the Ventral Hippocampus

Psilocybin, a psychedelic compound found in ‘magic’ mushrooms, has shown promise in enhancing neuroplasticity and holds potential for treating neuropsychiatric disorders. Neuroplasticity, the brain’s ability to form and reorganize synaptic connections, is regulated in part by perineuronal nets (PNNs), which are specialized extracellular matrix structures that stabilize synapses and restrict plasticity in the adult brain, potentially hindering recovery from certain conditions. This study investigates how psilocybin impacts PNNs within the ventral hippocampus (VHPC), a region critical for memory and emotional processing. To test this, C57BL/6J mice were administered 1 mg/kg psilocybin intraperitoneally and were sacrificed 2.5 or 24 hours post-injection. In addition, we tested the effects of psilocybin in 5-HT2A knockout mice 2.5 hours after psilocybin. The VHPC was analyzed using Wisteria floribunda agglutinin (WFA) and an anti-PV antibody to identify PNNs and PV neurons. Density of PNNs and PV neurons and WFA staining intensity was quantified using Polygon AI. Our findings revealed psilocybin treatment resulted in a significant decrease in perineuronal net (PNN) and PV intensity in female mice 2.5 hours after psilocybin. While no significant changes were observed in the number of WFA or PV-positive cells, sex-dependent differences in WFA and PV intensity suggest that male and female brains may respond differently to psilocybin. There were no changes found in PNNs or PV neurons at 24 hours or in 5-HT2A knockout mice. These findings suggest that psilocybin causes a rapid decrease in PNN intensity in females that may be 5-HT2A receptor dependent. This may facilitate neuroplasticity, and highlights the importance of considering biological sex in understanding its mechanisms and therapeutic potential.

Eldad Tolla

Discipline: Computer Science

Authors:

#1 Eldad Tolla

#2 Kushagra Gupta

#3 Ufuk Topcu

Abstract Name: Jumpstarting Q-Learning with Suboptimal Pathfinding: Faster, More Reliable Learning in Pacman

Model-free reinforcement learning (RL) often learns slowly from scratch. We study a simple, practical way to speed it up: warm-starting tabular Q-learning with trajectories from suboptimal search agents. Using the UC Berkeley Pacman environment, we compare a cold-start baseline (all Q-values initialized to zero) to two warm-start agents initialized from demonstrations produced by (i) Depth-First Search (DFS)—systematic but path-length-heavy—and (ii) ClosestDotSearch—a greedy, Manhattan-distance heuristic tailored to food collection. All agents share identical hyperparameters ($\alpha=0.2$, $\gamma=1.0$, $\epsilon=0.05$) and training budgets (1,000 episodes; 15 independent runs) and are evaluated on two canonical layouts: smallGrid (7×7, 4 pellets) for rapid learning dynamics and mediumClassic (19×10, 240 pellets) for longer-horizon, strategy-heavy play. States are matched exactly by (Pacman position, food-bitmask) so initialization only affects the decision contexts actually encountered during play. Warm-starting is implemented by seeding $Q_0(s,a)$ along demonstrated state–action pairs (positive prior on taken actions, mild penalty elsewhere). The DFS prior provides broad state-space coverage; the ClosestDotSearch prior provides goal-directed, locally sensible action hints. Across layouts, warm-start agents learn meaningful policies earlier, exhibiting (i) faster convergence by standard stopping criteria ($\max \Delta Q \leq 0.01$; $\|Q_{\text{new}} - Q_{\text{old}}\| \leq 0.1$), (ii) higher average game score during early and mid training, and (iii) higher win rates under identical exploration. These gains are most pronounced on mediumClassic, where sparse rewards and long horizons penalize uninformed exploration. Intellectual merit. The study isolates a low-overhead mechanism demonstration-based Q-initialization—that measurably improves sample efficiency in tabular RL without changing the learning rule, policy class, or exploration schedule. Broader impacts. When unsafe or expensive exploration is a concern (e.g., robotics, education games), leveraging even imperfect behaviors to bias the initial value landscape can reduce time-to-competence, compute cost, and negative outcomes while remaining simple enough for classroom reproducibility.

Chole Tolle

Discipline: Environmental Science and Sustainability

Authors:

#1 Ali Nejad

Abstract Name: Degradation of Azithromycin and Gamithromycin in Water Using UV and UV/H₂O₂ Advanced Oxidation Processes

Antibiotic contamination in wastewater is a significant environmental and public health concern due to its role in promoting antimicrobial resistance (AMR). Macrolide antibiotics, specifically azithromycin and gamithromycin, are widely used in animal agriculture and persist in aquatic environments because conventional wastewater treatment processes often fail to fully degrade them. This study evaluates the effectiveness of ultraviolet (UV) irradiation and UV/H₂O₂ advanced oxidation processes (AOPs) for the degradation of these macrolides in water. Batch experiments are conducted using a 254 nm UV reactor. To ensure experimental accuracy, ferric oxalate actinometry is performed to calibrate photon flux and adjust UV production rates over time. Degradation efficiency is evaluated under varying operational parameters, including pH, contact time, and oxidant concentration, with quantification via liquid chromatography–tandem mass spectrometry (LC–MS/MS). While UV photolysis alone is assessed, hydrogen peroxide (H₂O₂) is introduced as an oxidant to generate hydroxyl radicals ($\bullet\text{OH}$), which significantly enhance degradation rates. It is expected that the combined UV/H₂O₂ process will exhibit substantially higher macrolide degradation efficiency than UV treatment alone, with performance influenced by oxidant concentration and water matrix composition. Optimized conditions are examined in both deionized water and synthetic wastewater to assess treatment efficiency across controlled aqueous matrices. This research aims to support the development of scalable water treatment strategies to reduce antibiotic residues, limit the spread of AMR, and improve environmental and public health outcomes.

Elijah Tomlinson

Discipline: Law and Legal Studies

Authors:

Abstract Name: Women on the Bench: Judicial Philosophies of Female Supreme Court Justices Across Ideological Lines through the Lens of the 14th Amendment

This study examines how the six women who have served on the United States Supreme Court have interpreted the Fourteenth Amendment, focusing on the Equal Protection and Due Process Clauses, to understand whether gender influences judicial philosophy. Through analysis of major opinions and dissents authored by Justices Sandra Day O'Connor, Ruth Bader Ginsburg, Sonia Sotomayor, Elena Kagan, Amy Coney Barrett, and Ketanji Brown Jackson, the study finds that their judicial reasoning aligns more strongly with ideological commitments than with gender. Conservative justices, such as O'Connor and Barrett, emphasize judicial restraint, originalism, and limited interpretations of substantive due process and equal protection. In contrast, liberal justices, like Ginsburg, Sotomayor, Kagan, and Jackson, advance a living constitutionalist approach that centers evolving standards of equality, lived experience, and substantive protections for marginalized groups. While gender shapes individual perspectives and sensitivity to issues of discrimination, the analysis shows that it does not produce a unified "women's voice" on the Court. Instead, the female justices collectively reveal that constitutional interpretation is driven primarily by interpretive philosophy, demonstrating that ideological diversity among women on the bench mirrors broader divisions in the broader landscape of legal theory in the United States.

Tony Tomljanovich

Discipline: History

Authors:

#1 Jeremy Zallen

Abstract Name: Land and Sovereignty: How Conflicting Perceptions of Land Influenced Cherokee/Settler Relationships and Actions in the Early 19th Century.

This paper uses land as a framework to unpack U.S. settler/Cherokee relationships and actions in the early 19th century. Land sat at the center of their motivations: for settlers, economic extraction of natural resources, and for Cherokee people, protecting their sovereignty, homes, and identities. Research for this paper is grounded in correspondence between U.S. and Cherokee individuals that demonstrate a contest over the meaning of land, arguing either protect it or possess it. The Jeffersonian Indian policy ethos, exemplified by the civilization program, was embraced by Cherokees who adopted beneficial European innovations and ideas while rejecting ones they found unappealing. The standards for Native Americans to become civilized—namely becoming commodity agriculturalists, capitalists, and Christians—were adopted by Cherokee society to such a degree that U.S. officials had trouble justifying removal on the basis of civility. Following the Creek War and the introduction of a less sympathetic Jacksonian democracy, Cherokee governance centralized with a focus on protecting territory. Cherokee leaders understood that land was central to the U.S. settler colonial project, and that protecting land meant protecting their sovereignty, therefore themselves, their families, and their identities. For instance, diplomatic correspondence demonstrates how the meaning of land was contested: for Cherokee people like Principal Chief Pathkiller, land represented a web of reciprocal relationships which informed identity, whereas for settlers like Tennessee governor Joseph McMinn, land represented divinely ordained economic opportunity. Like many other Native American ontologies, Cherokee people understand their relationships to land and the nonhuman world as being grounded in reciprocity—humans are not superior and removed from the nonhuman environment, as is so often encouraged by

colonialism. Thus, with a focus on how both settlers and Cherokee people understood land, this paper reveals a more intricate analysis of their relationship and actions in the early 19th century.

Samantha Tonini

Discipline: Education

Authors:

Emma Quayle

Heather Wright

Abstract Name: Mapping Student Pathways: Mixed-Methods Insights into Student Navigation of UT Austin Degree Plans

This study expands on previous inquiry by analyzing how measures of curricular complexity correspond to student experiences, and by identifying structural influences on student progression. The central research question is: How do quantitative indicators of curricular complexity correspond to individual student experiences of degree planning, course selection, and progression toward graduation? Curricular Analytics (CA), developed by the Association for Undergraduate Education at Research Universities, offers a quantitative approach to understanding curriculum structure through mapping complexity and centrality within degree programs. Using a mixed methods approach, the research question was addressed by generating curriculum maps and complexity-related metrics for the 141 undergraduate degree programs at The University of Texas at Austin. A “flexibility score” measuring the percentage of a degree program’s hours in which the student has course-selection agency was calculated for each degree program. The relationship between complexity and flexibility across degree plans was then analyzed, focusing on patterns by college-school-unit (CSU) and degree type. Initial results indicate that degree programs with high complexity tend to exhibit low flexibility, demonstrating that strictly sequenced, prerequisite-heavy curricula limit student agency in course selection. Complementing this quantitative work, 20 qualitative semi-structured interviews with UT Austin students were thematically analyzed to better understand their approaches to degree navigation, resource use, and factors outside the curriculum. Preliminary findings suggest that while faculty and staff may recognize curriculum bottlenecks, a gap exists in understanding between institutional perceptions of curriculum design and barriers students encounter. Interview data highlights that students frequently diverge from suggested pathways due to course unavailability, scheduling constraints, or setbacks in high-centrality courses. Many students therefore rely on informal tools rather than official institutional resources to stay on track. Together, these findings suggest that structural features of curriculum, not just individual student behavior, substantially influence time-to-degree completion.

Kaleb Toon

Discipline: Business

Authors:

#1 Gaia Rancati

Anaya Gary

Abstract Name: Lost in Translation: Neural and Visual Responses to Foreign Packaging

The present study investigates how consumers identify products when confronted with packaging written in unfamiliar languages. As global cultural and linguistic diversity increases, individuals encounter products more frequently whose textual information they cannot decode, raising questions about how consumers

extract meaning from packaging in the absence of linguistic comprehension. This research integrates eye-tracking data with survey responses to examine whether participants can accurately infer product identity when viewing items labeled in four non-Latin script or Germanic-based languages, and which visual cues guide their judgments. Participants viewed images of products paired with nutritional or informational labels, presented in one of four languages, and were subsequently asked to identify the product. Analysis of fixation patterns and self-reported strategies revealed that participants relied predominantly on the shape and structural features of product packaging when forming inferences. Survey responses further demonstrated that participants identified products more accurately when packaging conformed to familiar visual schemas, whereas products featuring unfamiliar or ambiguous packaging were frequently misidentified. These findings suggest that packaging shape functions as a primary heuristic in cross-linguistic product recognition, particularly when textual information is inaccessible. The study highlights the strategic importance of packaging design for marketers targeting increasingly diverse and international consumer segments. Products relying on non-distinctive or unconventional packaging are more likely to be overlooked or misinterpreted in multicultural retail environments. Consequently, attention to universally recognizable packaging features may enhance product accessibility, support market expansion, and reduce consumer confusion in a globalized marketplace.

David Torain

Discipline:

Authors:

Abstract Name: "Beyond Problem Solving: Harnessing AI for Mathematical Reasoning and Communication"

Large language models (LLMs) such as MathGPT represent a transformative development in mathematics education, offering novel modes of interaction between humans and computational systems. Beyond automated problem solving, LLMs provide a platform for mathematical discourse, enabling dynamic exploration of multiple solution pathways, natural language feedback, and adaptive explanations. This presentation examines the pedagogical potential of LLMs in fostering conceptual understanding, metacognitive reflection, and mathematical communication. At the same time, it addresses the technical and educational challenges inherent in deploying these systems, including issues of reliability, alignment with disciplinary standards, and the design of scaffolds that promote productive struggle rather than overreliance. The session will consider research-based frameworks for integrating LLMs into mathematics learning environments and outline directions for future investigation at the intersection of AI, cognitive science, and mathematics education.

Gabriel Torres

Discipline: Environmental Science and Sustainability

Authors:

#1 Matthew Wilson

#2 Shannon Thomas

Abstract Name: How do Invasive Plant Density and Herbicide Application Rates Influence the Success of Riparian Buffer Restoration Over a Two-year Period?

Riparian buffers are one of the most effective strategies for improving stream water quality, stabilizing streambanks, and supporting wildlife. Yet many restored sites experience inconsistent maintenance and invasive plant species succession, leading to reduced native vegetation diversity and loss of function over time. Herbicide is a common management tool for restored riparian buffer maintenance. This study examines how invasive plant populations respond to herbicide application rates and methods — which influence the success of riparian buffer restoration. We collected data on different types of herbicide treatments and compared target invasive plant relative density over a two-year period (2024-2025) across 16 restoration sites in Lycoming, Snyder, and Union Counties, Pennsylvania. Our results indicate herbicide management helps mitigate some invasive plant populations. For example, callery pear (*Pyrus calleryana*) populations declined from 0.05 occupancy rate across all sites from 2024 to <0.01 in 2025 ($p = 0.01698$, $R^2 = 0.1581$). However, this trend is not the case for all species, such as reed canary grass (*Phalaris arundinacea*; $p = 0.0877$, $R^2 = 0.066$). These findings suggest moderate herbicide use paired with consistent monitoring may gradually improve restoration outcomes by limiting invasive plant densities and promoting native plant biodiversity restoration. Next steps involve returning to sites that overlap across two years to measure diameter breast height of tree species to determine which specific tree species are showing significant growth to quantify riparian buffer success. Across three sites so far, we found that DBH is marginally significant over sites that use tree shelters over those that do not ($p = 0.0546$), suggesting that tree shelters may enhance early growth. In addition, we plan to compare tree DBH across all sites to invasive densities to test correlations, providing insight into whether invasive suppression is directly associated with native tree growth and overall buffer recovery.

Joshua Torres

Discipline: Physics and Astronomy

Authors:

#1 Joshua Torres

Abstract Name: Prediction, Synthesis, and Experimental Validation of Magnetic Order and Dimensionality in Cerium-Based Compounds Guided by Structural Characteristics, Tri-critical Exponents, and Unsupervised Machine Learning

Cerium (Ce), the most abundant and chemically versatile lanthanide [3], offers significant potential for addressing critical shortages in high-performance magnetic materials, particularly by enabling the discovery of novel compounds suitable for gap magnets [1, 2]. Predicting magnetic order and dimensionality in cerium-based compounds is essential due to their complex magnetic and electronic characteristics. In this study, we integrate structural descriptors (lattice symmetry, valency, bond lengths, coordination environments) and tri-critical exponents within an Ising Model-based framework to systematically explore and predict magnetic phenomena. Utilizing the Ising Model allows accurate simulation of spin interactions, thereby refining predictions of magnetic ordering and critical behavior. We further enhance predictive accuracy by coupling

unsupervised machine learning algorithms, specifically autoencoders trained on affinity-based features, with Monte Carlo simulations informed by the Ising Model. This innovative approach enables the automatic extraction of latent parameters crucial for determining magnetic phase boundaries and transitions, such as lattice-induced anisotropy and critical temperatures. Moreover, this method allows for scalable and generalized exploration beyond traditional models, providing deeper insights into phase behavior and the underlying physics of magnetic ordering. Selected cerium-based compounds predicted via this integrated computational framework are subsequently synthesized and experimentally validated. This synergistic approach establishes a continuous feedback loop, refining computational models and enhancing predictive fidelity. By extending existing methods through advanced feature construction and unsupervised learning techniques, we provide a powerful, scalable methodology for identifying new magnetic materials. Ultimately, this study deepens fundamental understanding of magnetism in cerium-based compounds and creates a robust platform applicable to exploring and engineering next-generation magnetic materials within the broader lanthanide [3] and actinide [4] families.

Eric Torres-Arranaga

Discipline: Engineering

Authors:

#1 Eric Torres-Arranaga

#2 Deepank Dhanger

Deepank Dhanger

Abstract Name: The Extent of Capabilities of Autoregressive and LightGBM Models in Forecasting Air Quality

Air pollution remains one of the leading threats to public health, with particulate matter and gaseous pollutants causing millions of premature deaths every year. In cities such as New Delhi, India, pollutant concentrations exhibit strong seasonal and temporal variability. This complicates efforts to issue timely public health warnings and prepare hospitals for pollution related cases. This study investigates which forecasting models can accurately predict seasonal Air Quality Index patterns using historical pollutant data. Inspiration had come from the paper “Air Quality Prediction using Machine Learning” by Rohit Kumar Singh and others. We had noticed some points of interest in their work on which we could improve upon by using better models and a wider data source. Some of these included the reading of seasonal trends with different models and the inclusion of meteorological data to more accurately predict pollutant fluctuations. Hourly pollution concentration data for major pollutants were first converted into monthly AQI indices to create a consistent time series for modeling. Meteorological variables such as temperature, relative humidity, wind speed, and rainfall were incorporated as external predictors due to their strong influence on pollutant formation and concentration. Two modeling approaches were developed: a Seasonal AutoRegressive Integrated Moving Average with Exogenous Variables (SARIMAX) model and a tree-based LightGBM model. The SARIMAX model was tuned through an expanded grid search using Akaike Information Criterion minimization and validated on out-of-sample data. In parallel, the LightGBM model employed lag features, rolling statistics, and utilized meteorological interactions. Results showed that SARIMAX achieved lower RMSE for PM_{2.5}, O₃, PM₁₀, and NO₂, indicating strong seasonal structure in these pollutants. LightGBM performed best for SO₂ and CO₂, reflecting greater nonlinear meteorological influence. Overall, both models captured key pollutant trends, with SARIMAX performing best with seasonal structures and LightGBM in exogenous-driven variability.

Merissa Tosello

Discipline: Biology

Authors:
#1 MerissaW Tosello

Abstract Name: Implications for Indirect ECS Modulation: CBD and CBG Inhibition of SCP-2 by Cannabinoids: A Fluorescent Lipid Assay for Anxiolytic Drug Development

Every year globally an estimated 301 million people suffer from anxiety without safe dependable medications. Recent research suggests that neurological mechanisms may offer alternative therapies. The endocannabinoid system (ECS), a signaling system modulating neurotransmitter activity, is supported by sterol carrier protein-2 (SCP-2), a ECS lipid-binding protein found in synaptic spaces that facilitate movement and action between pre- and post-synaptic neurons. Inhibiting SCP2's binding function in mouse models has shown evidence of reducing anxiety. Direct modulation of the ECS by the psychoactive ingredient in *Cannabis sativa*, reduces anxiety but leads to problematic behavioral side effects. Alternatively, nonpsychoactive compounds within *Cannabis*, Cannabinol (CBD) and Cannabigerol (CBG), are also anxiolytic, despite the lack of understanding in the mechanism. In previous studies, we observed that both CBD and CBG can interact with SCP-2, prohibiting its lipid binding which indirectly may affect the ECS. The goal of this study is to examine the effects of CBD and CBG on lipid trafficking across membranes, in SCP-2 cellular models. Human embryonic kidney cells (HEK) that express SCP-2 (HEK-SCP-2 cells) were used and incubated with fluorescent lipids (nitrobenzoxadiazole derivatives, NBDS) in the presence and absence of inhibitors (CBD, CBG and known inhibitor JWii2a). The cells were imaged using a fluorescent microscope and assessed via ImageJ. We compared fluorescence intensity between control cells and cells treated with an inhibitor. We expect to observe decreased fluorescence within cells with inhibitors compared to control cells. In future studies, custom compounds can be tested and analyzed using this cellular assay to make a new wave of anti-anxiety medications. These medications could be more effective than what is available on the market today. These improved pharmacological tools could reduce the effects of anxiety, leading to less isolation, depression, improved relationships, and improvement in individuals' ability to work and study.

Maya Totev

Discipline: Biology

Authors:

Abstract Name: From Bedtime to Bacteria: A Sleep Extension Pilot Study Revealing Gut-Linked Pathways

While the gut contains trillions of bacteria that influence the immune, nervous, and endocrine systems, its implications in health interventions and wellness are often underappreciated. Lifestyle factors, including sleep duration and quality, influence gut microbiome composition and are linked to adverse health outcomes. While sleep extension is known to benefit health, emerging evidence suggests the gut microbiome and inflammatory pathways may help clarify these underlying mechanisms. This pilot study examined the effects of a two-week sleep extension on the gut microbiome composition in healthy adult females as part of a larger investigation of sleep, stress, and systemic inflammation. Participants completed two weeks of baseline monitoring followed by two weeks of extended sleep, during which objective time in bed and total sleep duration significantly increased. Pre- and post-intervention assessments included stool sample collection for microbiome profiling. Although gut microbiome diversity remained unchanged, there was a significant increase of *Peptostreptococcus*, a genus producing short-chain fatty acids and the tryptophan metabolite indoleacrylic acid (IA), both of which support gut barrier integrity and modulate inflammation. These findings suggest that short-term sleep extension influences specific microbial taxa, highlighting the gut's role in mediating sleep-related health outcomes and its potential for guiding future gut-targeted interventions.

Jeremiah Toub

Discipline: Engineering

Authors:

Abstract Name: Utilizing the Abilities of Ultrasonic Sensors to Detect Objects Around Heavy Vehicles for Safety Purposes.

My project is an ultrasonic sensor designed to add safety measures to large vehicles by scanning the environment surrounding the vehicle for objects. The societal benefit of this product is the reduction in accidents surrounding heavy vehicles and an increase in environmental awareness in heavy vehicles as large vehicles often have trouble checking blind spots due to not having clear lines of visibility to certain areas of their environment. These sensors will give heavy vehicles a better spatial awareness of the environment closely surrounding it, which can be used to make decisions and warn drivers and operators of potential risks. The technical need for ultrasonic sensors compared to other leading sensors for the purpose of environmental analysis has to do with the high reliability at close range and the low cost of ultrasonic sensors. Ultrasonic sensors have strengths in economical cost and short-range accuracy. Many current vehicles safety systems rely on radar, LiDAR, cameras, or a combination of these three. These devices have relevant weaknesses that an ultrasonic sensor would better account for. My hypothesis is that these ultrasonic sensors will perform better during adverse conditions at close range object detection. This would make them a good sensor for close range environmental scanning for the safety of heavy vehicles. The methodology that I will use to test my hypothesis and gather data to support my claim will be a prototype model of an ultrasonic sensor that I will test for its strengths and weaknesses compared to the other sensor types under certain conditions. The expected results are that the ultrasonic sensors will outperform LiDAR at close range in adverse conditions. This will be quantified by the detection miss rate and distance measurement error.

Marisha Towner

Discipline: Environmental Science and Sustainability

Authors:

#1 Marisha Towner

Abstract Name: Finding the Perfect Microbial Partner for Peanuts

This research was conducted to screen rhizobia from long-term peanut stands in Georgia, aiming to identify isolates with potentially superior nitrogen-fixing abilities. The goal of this research is to identify superior strains that can be commercialized to enhance peanut yields and reduce the need for synthetic fertilizers, which can be harmful to the environment. The Random Complete Block Design (RCBD) was used in this experiment to minimize variation and reduce biases in results. 8 replicates of 10 treatments (8 new isolates + 1 commercial isolate + negative control), arranged in a randomized complete block design. Whole peanuts were inoculated with 1mL of 0.1 OD of rhizobia strain or 1mL PBS (negative control). Soil mixture, 4 parts sand, 2 parts field soil, 2 parts vermiculite (4:2:2). Duration of experiments: 62 days. Starting at week eight, 45 microliters of Hoss Micronutrients for each unit weekly. Plants were cut at the soil level, and the weight was measured above and below ground. Roots and shoots were dried and weighed to obtain dry weight. Based on the data analysis, the ANOVA and Turkey Test results, there were no statistically significant differences between any of the three groups. A P-value of 0.086 was obtained, indicating that further experiments with larger sample sizes are necessary to compare and lower the P-value, thereby demonstrating differences in plant sizes due to the presence of their rhizobia. Three of the negative controls were removed for nodule presence. Three samples were removed for irregular growth.

Gabriel Townsend

Discipline: Psychology

Authors:

#1 E. Scott Geller

Pooja Yedavalli

Abstract Name: Assessing Psychological and Physical Safety of Transgender Students at Virginia Tech: A Mixed Methods Approach

A place of psychological safety refers to a community or an environmental setting wherein one feels included and able to ask questions and contribute without fear of negative consequences. A physically safe environment is free from violence and threats of violence. Therefore, psychological safety is essential for a person's wellbeing. Previous studies of transgender college students discovered alarming levels of transphobic harassment and discrimination— conditions that create psychologically and physically unsafe environments wherein students are unable to flourish. Our research question: Do transgender students at Virginia Tech feel safe, and if not, what dimensions of their safety concern them most? Moreover, what can the Administration do to be more supportive? The present study applied a 60-question self-report survey to assess the perceived psychological and physical safety of 31 transgender students at Virginia Tech. A total of 57 cisgender students took a similar questionnaire for comparison. The results provided insight regarding where, at both a policy and community level, the University could better serve its transgender student body. As of Fall 2025, 19 survey sections displayed statistically significant differences in responses between trans and cis students, with an additional six survey sections displaying marginal significance. Of the transgender respondents, 84.6% had been in a situation on campus where they felt threatened because of their gender presentation, compared to only 17.9% of the cisgender respondents. Transgender participants felt less support by the Virginia Tech Administration, and they were more concerned about the negative behaviors of faculty, staff, and other students than were the cisgender students. This semester we continued qualitative one-on-one interviews with transgender respondents and analyzed seven completed interviews in order to gather more in-depth responses and categorize the survey results. Preliminary analysis revealed trans participants felt ignored, and that their concerns were not adequately understood nor addressed by the Administration.

Amelia Townsend

Discipline: Psychology

Authors:

Abstract Name: Investigation of the Effect of Relationship Status and Amount of Screenshot

This research aims to study screenshot usage between singles and people in romantic relationships. There are numerous challenges introduced by increased technology use in relationships, such as decreased intimacy, distancing, lack of trust, and a sense of loss of dedication (Hertlein & Ancheta, 2014). No matter the app being used, technology usage has grown exponentially in the past decade. It was hypothesized that those in a relationship will have higher screenshot averages than those who are single. Participants began by rating how frequently they engage in the following phone related behaviors: "I keep my phone on me at all times," "I use my phone during leisure time," "I pull my phone out when it rings or buzzes when I am engaging in conversation with someone," and "I keep my phone where I can see it when I am with company." They were also asked to report their weekly screenshot in minutes by looking it up in their phone's screenshot tracking

app. Results from an independent-samples t-test showed that there was no effect of relationship status on screentime ($p = .56$); however, singles were more likely to keep their phone on them at all times ($p = .03$). Additional correlational analyses showed that age was negatively associated with all phone related behaviors ($ps \leq .04$), and independent samples t-tests suggested trends that males were more likely to keep their phone on them at all times and reported higher screentime usage than females ($ps \leq .05$). These findings suggest that relationship status is not a strong predictor of screentime usage compared to age. Future studies should further investigate factors that lead to more screentime usage as these results could inform the development of interventions to reduce screentime and phone dependence.

Ellie Townsend

Discipline: Psychology

Authors:

#1 Ellie Townsend

#2 E. Scott Geller

Abstract Name: Assessing the Influence of Headphone Use on Gratitude Expression Following a Behavioral Prompt

Interpersonal gratitude—an expression of gratitude to another person—enhances the wellbeing of those who give and those who receive a “thank you.” The use of headphones has increased significantly and may reduce interpersonal conversations and expressions of gratitude. The first phase of this applied behavioral science (ABS) study found 30% of 6,123 dining-hall customers wore headphones, and customers not wearing headphones (55% of 6,116 customers) were substantially more likely to express gratitude than customers who were wearing one headphone (8% of 6,116 customers) or two headphones (13% of 6,116 customers). This naturalistic ABS study was designed to determine the impact of a behavioral prompt designed to decrease headphone use, thereby increasing expressions of gratitude. At two university dining facilities, trained research students systematically observed and recorded whether customers thanked their cashier and noted their headphone usage: none, one, or two headphones/earbuds. Similar to our previous findings, customers not wearing headphones were more likely to express gratitude (38% of 6,300 customers) than customers who were wearing one headphone (7% of 6,300 customers) or two headphones (12% of 6,300 customers). Unfortunately, the prompt was not successful at decreasing overall headphone use (32% of 6,300 customers) and did not increase expressions of gratitude.

Sofi Traina

Discipline: Biology

Authors:

#1 Sofi Traina

#2 Solomiia Kleban

Abstract Name: Effect of Leaf Wax on Feeding Preferences of *Pieris rapae* Caterpillars

The small white butterfly, *Pieris rapae*, is ubiquitous and feeds on plants in the Brassicaceae family. *Pieris rapae* caterpillars cause significant foliar damage in cruciferous crops, reducing yields and increasing pest-management costs. A previous study by Ueno et al. (2025) showed that cabbage leaf epicuticular wax deters female oviposition and larval feeding of *P. rapae*. They found that removing leaf surface wax (n-nonacosane) on cabbage significantly increased oviposition. This shows a strong role of physical leaf surface traits in

oviposition behavior, and underlines that leaf-type differences (wax content) may influence oviposition in this species. Studies have mainly focused on oviposition preferences in the *Pieris rapae* species. Our study expands on research on the feeding preferences of 4th-instar *P. rapae* caterpillars on collards (*Brassica oleracea*). We predicted that *P. rapae* caterpillars would consume more unwaxed leaves due to reduced surface barriers. Experiments were conducted with 10 replicates per trial, with one 4th-instar caterpillar per Petri dish containing one waxed and one unwaxed leaf disc. Wax was removed from leaves using cotton balls to create unwaxed samples. After 24 hours, leaf consumption was quantified using the LeafByte app, which measures total surface area consumed in percent. Control trials measured natural leaf shrinkage over 24 hours, averaging 0.01% for unwaxed leaves and 0.002% for waxed leaves. We found caterpillars consistently consumed more unwaxed leaves than waxed leaves. The average consumed across four trials was 6.34% for unwaxed leaves and 4.44% for waxed leaves. Our analysis confirmed a significant preference for unwaxed leaves ($p = 0.01$, T-test, two-tailed). These results support our hypothesis that wax reduces herbivory by *P. rapa*. Our study demonstrates the important role epicuticular wax plays as a plant defense mechanism in cruciferous crops, suggesting that maintaining or enhancing wax could help protect cruciferous crops on farms.

An Tran

Discipline: Chemistry

Authors:

#1 Tanvir Chowdhury

#2 Tyrese Boddie

#3 Hui-ting Lee

Abstract Name: Effect of pH on Transcription Efficiency in C-Rich DNA Constructs

Changes in pH can dysregulate transcription, which negatively impact overall gene expression. The promoter region, where transcription begins, often contains C-rich sequences that can fold into an i-motif, a stable secondary structure that forms under acidic conditions below pH 6.5. Low pH can also negatively impact the activity of RNA polymerase. As the result, it is important to understand how these factors influence transcription. We hypothesized that at acidic pH, changes in transcription are driven mainly by i-motif formation. Circular dichroism (CD), in vitro transcription assays, and single molecule Förster resonance energy transfer (smFRET) were used to study the dynamic folding of i-motifs in C-rich DNA sequences and their impact on transcription at different pHs. We confirm the formation of i-motifs at lower pHs (around 6.2-6.5) has a negative impact on the efficiency of transcription in-vitro, and the stability of i-motifs is dependent on sequence length, pH, temperature.

Daniel Tran

Discipline: Biology

Authors:

#1 Daniel Tran

#2 Skylar Carlson

Abstract Name: Inhibitory Activities of Surface-Associated Bacteria from California and Florida Algae

Marine algal surface-associated bacteria (SAB) inhabit highly competitive and diverse marine environments, where they face various stressors, including high salinity, osmotic pressure, and UV radiation. In response,

these bacteria produce secondary metabolites that may function as chemical defenses, including potential antibiotics active against human pathogens. In this study, we isolated and evaluated SAB from marine algae collected on two U.S. coasts, comprising 332 California isolates and approximately 200 Florida isolates. We screened these isolates for antibacterial activity against four clinically prevalent pathogens—*Escherichia coli*, *Bacillus subtilis*, *Staphylococcus aureus*, and *Salmonella* sp.—using pour-over assays for on-plate inhibition, Kirby-Bauer disk diffusion for extract activity, and a single-dose broth assay for liquid-phase confirmation. The 15 active strains were scaled in A1 medium, their metabolites were captured with XAD-16 resin, and the determination of the minimum inhibitory concentrations following solvent partitioning yielded 3 active fractions. The 3 active ethyl acetate fractions were then analyzed by HPLC and LC-MS, and phylogenetic identification was performed using 16S rRNA gene sequencing and Sanger sequencing. Altogether, this workflow provides a systematic analysis of algal SAB antibacterial activity and establishes a pipeline for the discovery of new secondary metabolites.

Nin Tran

Discipline: Economics

Authors:

#1 Shuoshuo Hou

#2 Vijiay Tida

#3 Reagan Hennen

Abstract Name: Forecasting Labor Market Inequality with Artificial Intelligence

Accurate unemployment forecasting is essential for economic planning and timely policy decisions. Traditional forecasting methods often rely on lagging macroeconomic indicators that fail to capture sudden changes in labor market conditions. Real-time digital behavioral data, such as job-related Google search activity, provides immediate signals of job-seeking behavior and labor market sentiment. This study develops a hybrid deep learning model that combines Long Short-Term Memory (LSTM) and Gated Recurrent Unit (GRU) networks to forecast the United States unemployment rate. The model integrates monthly unemployment rate, GDP growth, CPI growth, and seven job-related Google Trends queries. Data are scaled using MinMax normalization and evaluated with an 80/20 train-test split. Results show that the hybrid LSTM-GRU achieves lower prediction error compared to the standalone LSTM and GRU models, with an RMSE of 0.1438, MAE of 0.1111, and MSE of 0.0207. Although the models function as black-box neural networks without direct interpretability, the improvements in forecasting accuracy demonstrate the practical value of combining traditional economic indicators with real-time search data for short-term unemployment prediction.

Lamson Tran

Discipline: Biology

Authors:

Abstract Name: Validation of Transport and Golgi Organization 2 (TANGO2) Deficiency Models

TANGO2 Deficiency Disorder (TDD), first described in 2016, is a rare autosomal recessive disorder caused by pathogenic mutations in the Transport AND Golgi Organization 2 (TANGO2) gene. TDD tends to manifest in early childhood, leading to a wide array of clinical symptoms, including neurodevelopmental delay, gait incoordination, speech difficulties, and seizures. In addition, individuals are susceptible to life-threatening

acute metabolic and cardiac crises. Cardiac crises are defined by the development of ventricular arrhythmias, cardiomyopathy, or cardiac arrest during an acute metabolic crisis. Often, these ventricular arrhythmias are difficult to control and unresponsive to typical arrhythmic therapy, being the leading cause of death in these patients. This study aimed to establish the validity of TANGO2 deficiency models utilizing TANGO2 knockout (KO) mice and siRNA-treated AC16 human cardiomyocyte cells. Protein expression was quantified via Western blotting in ventricular, liver, kidney, and spleen tissues from both KO and wild-type mice. In parallel, RNA expression in these same tissues was assessed using quantitative PCR (qPCR). To extend this analysis, I also performed Western blotting on AC16 cells treated with siRNA, targeting TANGO2 exons 8 and 9, at varying concentrations. Across both systems, I observed either a complete absence or a significant reduction of TANGO2 expression at both the protein and RNA levels in experimental groups compared to controls. These findings confirm that the KO mouse model and siRNA-treated AC16 cells are valid models of TANGO2 Deficiency Disorder. Establishing these models provides a critical foundation for investigating the molecular mechanisms underlying TDD and supports future translational research aimed at therapeutic development.

Rilina Tran

Discipline: Health and Human Development

Authors:

#1 Rilina Tran

#2 Dat Tran

Abstract Name: Clinical Outcome for Fish and Shellfish Oral Immunotherapy

Introduction: The prevalence of seafood allergy (fish and shellfish) is 1-2% worldwide. There are limited clinical reports on seafood oral immunotherapy (OIT). A major challenge for seafood OIT is the lack of a protein source to develop the treatment. This case report describes the clinical outcome of 5 patients with seafood allergy treated with codfish or shrimp OIT. **Methods:** Patients from our allergy practice with fish or shellfish allergy were confirmed with SPT, specific IgE, and oral challenge. Informed consent was obtained. Dehydrated shrimp or codfish powder was used to develop the shrimp or fish OIT. The initial OIT protein dose was 2.5mg for shrimp and 5mg for codfish. The patients would ingest 5mL solution of the protein daily with weekly dose escalation over a 4-month period, then transition to eating per weight of cooked 500mg shrimp or 1000mg codfish daily followed by weekly dose escalation over a 3-month period to reach age-appropriate serving size. **Results:** Five patients (3 fish and 2 shellfish allergy, 1 female, 4 males, 5-18yo, 10-25mm wheal, 2-35 kU/L specific IgE) completed the treatment. Two patients reached full-serving size and three were maintained at one shrimp or fish stick (~10g) due to dislike of taste. Common adverse reactions were transient oral pruritis (~75%), localized lip swelling (~50%), and abdominal pain (~40%). No anaphylaxis or systemic allergic reaction requiring antihistamine or epinephrine. **Conclusion:** It is possible to treat seafood allergy using dehydrated shrimp or fish powder for OIT. The taste is tolerable and adverse reactions are mild with appropriate dose-escalation protocols.

Lily Trapp

Discipline: Political Science

Authors:

Abstract Name: The President and Media's Role in President Press Conferences

In this project I research how the media as its own institution carries the responsibility of holding the government accountable, but can also drive their own agenda by choosing how events are framed. The president on the other hand tends to consistently generate headlines as they work to set the government agenda, but rely on news coverage of speeches and statements, and the media's power to frame them. News conferences allow journalists to directly question the president on topics they want to cover, regardless of whether the issue is what the president wants to discuss. Presidential influence during press conferences occurs when they choose media outlets to call on for questions. To examine their dynamic further, I look at questions from news organizations towards the president during press conferences, specifically the first of President Trump's terms, and President Biden's term, to include a Republican and Democratic administration. I analyzed by coding the tone of the questions, whether the questions correspond to the topic of the president's opening statement, and how often follow-up questions occur. I discovered that questions towards the President with another foreign leader present tend to be less aggressive and stay on the same topic as the opening comments, when compared to press conferences where the president is being questioned alone. News organizations that lean the same way ideologically as the president in power tend to be less aggressive with their questioning, while news organizations that oppose the sitting president ideologically, are more aggressive in their questioning.

Carolina Trejo

Discipline: Physical/Occupational Therapy and Speech Language Pathology

Authors:

#1 Carolina Trejo
#2 Frida Sanchez
#3 Emily Saucedo
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#5 Esteban Garcia
#6 Akash Singh
#7 Carolina Valencia
#8 Alvaro N. Gurovich
#9 Priyanka Rana
Frida Sanchez
Emily Saucedo

Abstract Name: High-Intensity Interval Training and Pain-Related Psychological Factors: A Randomized Controlled Trial

Psychological factors, including optimism, pain catastrophizing, and perceived social marginalization, influence pain sensitivity and how individuals respond to exercise-based interventions¹⁻⁴. However, whether high-intensity interval training (HIIT) interventions can modify these psychological factors in healthy individuals remains unclear. This study explores whether multiple sessions of HIIT alter psychological factors associated with pain perception compared to a single HIIT exercise session. Twenty pain-free participants aged 18 to 50 were randomly assigned to either a Multiple Exercise Session (MES, n=8, 4 high-intensity interval training (HIIT) sessions) or a Single Exercise Session (SES, n=12, 1 HIIT session) over two weeks. Exercise intensity was individualized using a graded exercise test (GXT) performed at 90% of the participant's peak power output. Psychological measures were assessed pre- and post-intervention using validated instruments: Life Orientation Test-Revised (LOT-R), State Optimism Measure (SOM), Pain Catastrophizing Scale (PCS), and Perceived Social Marginalization Scale (PSMS). A two-way mixed ANOVA (group*time) examined differences between protocols. Significant between-group effects were observed for state optimism ($F=5.29$, $p=.027$, $\eta^2=.12$) and life orientation ($F=4.48$, $p=.041$, $\eta^2=.11$), reflecting baseline differences between groups rather than intervention effects. No significant time effects or group $\times$ time interactions emerged for any psychological variable (all $p>.05$) following both single and multiple HIIT sessions. These preliminary findings (ClinicalTrials.gov: NCT07083219) suggest that brief HIIT interventions do not substantially alter psychological factors in healthy adults over two weeks. The stability

of these measures is consistent with their trait-like nature, indicating that longer interventions, higher training volumes, or different populations (e.g., individuals with chronic pain) may be required to observe meaningful psychological change. The observed baseline group imbalances despite randomization underscore the importance of larger sample sizes in future research. Understanding the stability versus modifiability of psychological factors that influence pain perception has implications for personalized exercise prescription and pain management strategies.

Sebastian Trevino

Discipline: Psychology

Authors:

#1 Maria De Los Angeles Reyes

Abstract Name: Psychological Distress Among Professionals: Impacts on Performance and Daily Functioning

Mental health significantly influences how professionals think, feel, and perform, particularly under the ongoing demands of their work environments. This study investigated how stress, anxiety, and depression impact professionals' performance and daily functioning, emphasizing the importance of mental-health awareness for managing these challenges. Using a mixed-methods approach, the research combined a systematic literature review with a quantitative survey that assessed psychological distress and coping strategies across daily life and professional activities. Out of 44 survey respondents, 17 professionals completed the study, representing fields such as education, counseling, athletics, music, and medicine. Participants completed standardized assessments of depression, anxiety, and stress during performance, alongside self-reported measures of performance, daily functioning, and coping. Results showed generally low depression levels, but anxiety and stress were more prevalent and closely tied to job expectations and workload. Higher psychological distress was associated with lower performance and reduced daily functioning, indicating that work-related stressors frequently extend beyond professional tasks. Coping strategies varied and included exercise, hobbies, prayer, and setting boundaries between work and personal life. Correlational analyses revealed strong interrelationships among depression, anxiety, and stress, both during performance and in daily life, with higher distress linked to diminished functioning. Certain professions, particularly education, counseling, and music, showed greater variability and higher levels of stress and anxiety, suggesting occupational influences on mental health. Only a small proportion of participants had consulted mental-health professionals, highlighting the need for accessible support. These findings underscore the critical role of mental-health awareness in promoting professional performance, well-being, and decision-making. They suggest that workplaces and professional communities should prioritize mental-health resources, foster healthier coping strategies, and develop targeted interventions to mitigate stress and anxiety, ultimately enhancing both career and personal outcomes.

Juliana Trillo

Discipline: Art History

Authors:

Abstract Name: Mapping Modernism: Tracing the Market Valuation of Umberto Boccioni's Unique Forms of Continuity in Space

Unique Forms of Continuity in Space (1913), by leading Italian Futurist artist Umberto Boccioni, is a bronze sculpture capturing the vitality and movement of a new, modern world. Beyond its embodiment of the

Futurist aesthetic and philosophy, the original plaster's trajectory reveals the transnational market and networking that shaped how Futurism itself became valued and disseminated. By analyzing the 50-year journey that Unique Forms took from its conception in Milan to its current place in the Museu de Arte Contemporânea da Universidade de São Paulo (MAC USP) in São Paulo, Brazil, this presentation traces the sculpture's development from an avant-garde experiment to a commoditized landmark of 20th-century art. Through cultural and economic research, as well as a digital mapping of the plaster's acquisition history, this presentation critically identifies the different agents within the art market who assessed its value. After Boccioni's death in 1916, the plaster passed through the hands of Filippo Tommaso Marinetti, Futurism's founder, to Benedetta Cappa, a prominent figure of the movement and Marinetti's widow, to Francisco Matarazzo Sobrinho, a Brazilian collector of Italian heritage who donated the plaster to the MAC USP. This presentation explores why Unique Forms was desired by a Brazilian institution, the connection between Italian Futurism and Brazilian modernism, and what influenced Unique Forms' role as a quintessential modern sculpture. The global circulation of Unique Forms epitomizes how the reputation of Futurism in the modernist canon was shaped as much by the transnational art market as it was by its radical aesthetics.

Bellynda Trinh

Discipline: Biology

Authors:

#1 Bellynda Trinh

Abstract Name: Investigating telomerase expression in the sea star *Patiria miniata* and its implications on age-related diseases

Exploring telomerase expression may provide insight to alleviate age-related diseases. As humans age, they become more prone to age related diseases— this is in part due to the shortening of telomeres, the protective caps located at the ends of chromosomes that protect our DNA from degradation. Some organisms exhibit a unique mechanism where they are able to maintain telomerase expression, an enzyme that repairs telomeres, throughout their entire lifetime. This study aims to examine telomerase in the sea star, *Patiria miniata*, a largely unexplored organism, to determine if it exhibits this unique mechanism related to healthy aging. A telomerase repeat amplification protocol (TRAP) assay was conducted to measure the enzymatic activity of telomerase. Prior to metamorphosis, samples were collected at multiple developmental stages (blastula, gastrula, and larva). In adults, tissue samples were taken from distinct organs (gonad, digestive tract, and tube feet). The results show that enzymatic activity of telomerase is present in relatively high amounts, in both young and adult sea stars, which suggests *Patiria miniata* possess a molecular mechanism that allows them to remain healthy throughout their lifetime. By studying telomerase activity in *P. miniata*, we can gain valuable insight into the mechanisms that influence healthy aging. Understanding these processes will be valuable to inform future therapeutics aimed at alleviating age-related diseases in humans.

Ish Tripathi

Discipline: Sociology

Authors:

#1 Ish Tripathi

Abstract Name: Sociodemographic and Functional Determinants of Childhood Asthma Prevalence in the United States: Insights from National Health Statistics Data

Background: Asthma remains one of the most prevalent chronic diseases among U.S. children, influenced by socioeconomic, racial, and environmental disparities. Understanding the demographic and social correlates of asthma prevalence can guide targeted public health interventions. **Methods:** We analyzed data from the National Center for Health Statistics (NCHS) Data Query System using responses to the question, “Does [child’s name] still have asthma?” among children aged 0–17 years who were ever diagnosed with asthma by a healthcare professional. Asthma prevalence was stratified by age, sex, race/ethnicity, disability status, family structure, parental education, employment, insurance type, functional difficulty, and poverty level. **Results:** Children aged 12–17 had the highest asthma prevalence (8.5%) compared to ages 5–11 (7.3%) and 0–4 (2.4%, $p < 0.05$). Male children had higher prevalence than females (7.2% vs 5.7%, $p < 0.005$). Black children had the highest asthma rates (11.3%), followed by Hispanic (6.2%), White (5.6%), and Asian (3.3%, $p < 0.05$). Children with disabilities (11.8%) and functional difficulties (9.4%) had nearly twice the prevalence of their counterparts ($p < 0.005$). Higher prevalence was observed among children living with single parents (9.5%), those in households below the federal poverty line (8.6%), and those insured by Medicaid (8.0%) compared with privately insured peers (5.7%). Children from families with lower parental education and unemployment also had significantly higher asthma prevalence ($p < 0.05$). **Conclusion:** Childhood asthma disproportionately affects socioeconomically disadvantaged, minority, and functionally impaired populations. Addressing structural inequities, improving access to care, and enhancing environmental health interventions are essential to mitigate these disparities in pediatric asthma outcomes.

Carson Triplett

Discipline: Computer Science

Authors:

#1 Maha Elouni

Abstract Name: Designing and Implementing a Virtual Reality Platform for Education Students

This work presents a solution to improve the immersion of students taking the Classroom Management course at Randolph-Macon College. In this course, students participate in role-playing scenarios where one acts as the teacher delivering a lesson, while others act as their students-introducing distractions the teacher must manage. However, it can be difficult for some students to suspend belief and fully engage with these scenarios due to the limitations of a traditional classroom setting. To address this, the project introduces a virtual reality (VR) solution that recreates classroom scenarios in a fully immersive environment. The multiplayer VR platform RecRoom was chosen for its robust set of tools for creating custom virtual spaces or “rooms”, its built-in coding system, and its accessible cross-platform compatibility (including phones, tablets, and Windows computers). In addition, RecRoom’s inclusive avatar customization allows for representation of various ethnicities, cultures and even some disabilities, fostering a more representative and engaging experience. To test the platform, different teaching scenarios were created and performed. The platform has been improved based on test outcomes and notes from tests’ participants. The last tests were successful, with all the features working properly and the scenarios running smoothly. To support users in navigating this new environment, an instructional how-to guide is developed and is being used in the Classroom Management course this Fall. The guide includes instructions on how to perform actions either in virtual reality or on a touch screen device. In the end, the proposed VR solution improves student immersion in classroom management scenarios, while preventing unnecessary distractions. In the future, the platform can be further developed by implementing additional room layouts and improving user intractability with room objects to better simulate real-world classroom dynamics. Also, it could be used in other educational courses where students need to be fully immersed.

Aaditya Trivedee

Discipline: Economics

Authors:

#1 Aaditya Trivedee

Abstract Name: An Agent-Based Model of Monetary Policy Transmission: Comparing Quota System in a Corridor Based Interbank Market

An agent-based model (ABM) of the interbank market is simulated, aiming to test alternative monetary policy frameworks in the context of Nepal. The model is designed based on Bertrand Competition and Nash Bargaining Theory in a perfect information system with variables of liquidity assessment and risk pricing. Two distinct policy regimes are compared: a novel quota-based system, a hybrid price-quantity-based model, and the conventional corridor system. The findings indicate that the Quota model demonstrates superior efficacy in anchoring the interbank rate towards the policy target with greater stability. However, it transfers the cost to the central bank.

Carlie Trotta

Discipline: Chemistry

Authors:

#1 Emmalou Schmittzehe

Abstract Name: Assessing the Impact of Flavoring Additives on the Quantification of Nicotine in E-Liquids Using High Performance Liquid Chromatography (HPLC)

The accuracy of the reported levels of nicotine contained in e-liquids has been widely studied. Results often show significant inconsistencies in the amount of nicotine reported on e-liquid product labels and the amount of nicotine detected in the e-liquids, but there has yet to be any clear answers to whether or not the labeled nicotine content on e-liquids can be trusted. Due to the lack of regulatory oversight on the production of e-liquids, it is unknown what quality control standards e-liquid manufacturers have for their products. Accepted methods for the quantification of nicotine in e-liquids rely on external standards containing only nicotine for the quantification of nicotine in e-liquids, but this method does not account for the varying components in the matrix of e-liquids. Since e-liquids come in a wide variety of flavors, each has additional compounds that contribute to the matrix of the e-liquid that can potentially affect the quantification of nicotine when relying only on external nicotine standards. In this project, we have assessed the impact of various flavoring additives on the quantification of nicotine contained in e-liquids by HPLC.

Ciara Troy

Discipline: Biology

Authors:

Ash Baeck-Hubloux

Abstract Name: Gene Set Analysis Enhanced: A Large Language Model Approach to Biological Pathway Discovery

Current Gene Set Analysis (GSA) methods often struggle to pinpoint the true biological pathways from

Differentially Expressed Genes (DEGs). These tools rely on rigid statistical models and incomplete databases. This can limit mechanistic understanding of complex biological phenomena, especially when considering tissue-specific gene activity. Our study addresses this challenge by developing a new bioinformatics pipeline that integrates the Large Language Model (LLM) to strengthen pathway discovery in GSA. After statistical filtering of over 600 genes of interest, we found significant enrichment in neural/brain tissue. Using this information, we constructed a Python pipeline featuring a two-stage enrichment process specifically focused on developmental pathways. This process used structured prompt engineering to specifically instruct the LLM to mitigate the possibility of hallucinations and to focus on highly relevant dynamic processes and pathways. The initial stage involved tissue-enrichment filtering to identify a dominant neural signature within the 3'UTR genes. This was followed by a second round of functional enrichment focused on the developmental mechanisms specific to the Central Nervous System (CNS) including, neurogenesis and synaptic pruning. Crucially, a self-verification step was used at each stage, forcing the LLM to check its proposed findings against curated biological databases, ensuring grounded biological interpretations. We anticipate that this LLM-augmented pipeline will significantly outperform current statistical GSA methods and help uncover pathways that are often overlooked. This work establishes a robust framework for using LLM to bridge critical knowledge gaps in genomics research, leading to discovery of previously obscured pathways and offering mechanistic insight into neurodevelopmental processes.

Alexis Truta

Discipline: Biology

Authors:

#1 Jocelyn Hsu

#2 James LaBelle

Abstract Name: Assessing the Impact of BH3 Mimetics on Mitochondrial Dynamics in Activated Human T Lymphocytes

The BCL-2 family of proteins regulates intrinsic apoptosis and mitochondrial dynamics. BH3 mimetics are small-molecule inhibitors that engage anti-apoptotic BCL-2 family members to induce apoptosis in malignant cells at the level of the mitochondrion. However, little is known about how these drugs affect healthy immune cells, which contain the same family of proteins but can be resistant to BH3 mimetics. We investigated how BH3 mimetics alter mitochondrial morphology and function in human T cells expanded and activated *ex vivo* in the presence of these compounds. Confocal microscopy revealed that inhibition of BCL-2 with venetoclax or NW-123 promoted mitochondrial fission, whereas inhibition of MCL-1 with S63845 induced mitochondrial fusion. Flow cytometry analysis further showed that treatment of CD8⁺ T cells with venetoclax or S63845 at sublethal doses (IC₂₀) for two days increased both mitochondrial mass and membrane potential. Future work will test whether these morphological changes are mediated through Drp-1 phosphorylation and translocation, and whether distinct BH3 mimetics alter protein-protein interactions between BCL-2 family members and mitochondrial dynamics regulators such as Drp-1, MFN2, and Opa1. This work will uncover how BH3 mimetics alter mitochondrial structure in immune cells, shedding light on their non-apoptotic immunomodulatory potential.

Cristal Tshunza

Discipline: Biology

Authors:

Sabrina Douglas

Abstract Name: Visualizing Satb Protein Dimerization Using Bimolecular Fluorescence Complementation Assay

Eukaryotic cells regulate the expression of their genes through a variety of mechanisms including organization of their DNA. Architectural proteins such as Satb1 and Satb2 play a key role in the compaction of chromatin into regions of heterochromatin - where genes are typically silent - and euchromatin - where genes are typically active. Satb1 is involved in T-cell development, and binds to DNA as a homodimer, while Satb2 is critical for osteogenesis and is presumed to bind DNA as a homodimer based on structural homology with Satb1. Although these proteins are usually expressed in a mutually exclusive manner, a few cell types such as embryonic stem cells express both proteins. In these cells, it is possible that Satb1/Satb2 heterodimers are able to form, however this possibility has not yet been tested. Here we utilize a Bimolecular Fluorescence Complementation (BiFC) assay to determine if heterodimers can form. This assay features a yellow fluorescent protein (mVenus), which is split into non-fluorescent halves and individually fused to either the N- or C-terminus of Satb1 or Satb2. Fluorescence is restored when the mVenus fragments are positioned on the same side of a dimer. In this way, the assay can determine whether dimers form and the relative orientation of monomers within the dimer. HeLa cells were co-transfected with pairs of plasmids encoding these constructs and observed under a fluorescence microscope. Fluorescence from mVenus was visible only when both mVenus fragments were fused to the N-terminus of Satb1 and Satb2, demonstrating the formation of heterodimers in a parallel orientation where the N-termini of both proteins are in close proximity to each other.

Chloe Tsinya

Discipline: Biology

Authors:

#1 Asia Bayat

#2 Melville Vaughan

#3 Alex Matsayko

#4 Mohammad Hossan

Abstract Name: Investigating the Biocompatibility of PCL - Bi2O3 Composite Samples for Endovascular Implants

Angiographic visibility of endovascular implants is critical for appropriate placement and avoiding vascular injury. This research investigates the biocompatibility and radiographic visibility of PCL and Bismuth trioxide composite materials for potential applications of endovascular implants. The biocompatibility and cell functions experiment was conducted using Human Umbilical Vein Endothelial Cells (HUVEC). The 10 mm by 10 mm square with 1 mm thick samples were 3D printed using pure PCL medical grade filament as controls and medical grade PCL – Bi2O3 composite filament as study. The cells were thawed out and then allowed to reach 100% confluency after which they were subcultured with appropriate HUVEC media and reagents. The cells were then plated into a 48-well plate with PCL control samples and PCL - Bismuth trioxide samples. The plate was then placed in an incubator and media was changed every 24 hours. After 48 hours of being in the incubator, the cells were fixed using Paraformaldehyde and stained using the PECAM-1 stain as primary antibody and Goat Anti-Mouse Alexa 488 as secondary antibody. The samples were then stored in a freezer for a day, and images were taken using a fluorescent microscope. The images show that samples treated with bismuth trioxide appeared to be proliferating and formed tight junctions around one another. This was made visible by using the PECAM-1 stain. The cells also showed proliferation, and this was quantified using ImageJ software and reported into bar graphs for both the control and the treated samples. Results were compared and there were no statistical differences in the cell functions and viability between the control and study samples. Hence, the result suggested that the PCL – Bi2O3 composite materials could be safely used in the human body as endovascular implants materials.

Joshua Tsui-Teng

Discipline: Engineering

Authors:

#1 Dennis Boettcher

Abstract Name: FLEXIBILITY AT THE COST OF OPTIMIZATION: AN ANALYSIS OF ATM TILES

An ATM (Arrival Time Monitor) is a crucial tool utilized by all hutchches within the Linac Coherent Light Source (LCLS) at SLAC National Laboratory. It manages two beams, an X-ray and a pump laser. The current ATM operates within a TILE (Table Integrated Laser Enclosure), a modular laser system that is in the process of being installed at LCLS. Our project focuses on reducing the size of the TILE while prioritizing performance, part count, size, cost, and weight. The original TILE design was constrained by a fixed requirement of 11.75" by 34" and a beam height of 3.5 inches. These specifications limited efficiency. The chosen board features 0.19-inch holes every inch for flexibility, with each lens, filter, and mirror equipped with its own clamp and post, leading to increased cost and assembly times. In the second version of the TILE, we plan to eliminate these clamps and posts to improve stability, improve performance, and lower costs. The primary focus will be on improving beam performance by reducing the beam height, which enhances both performance and stability. With a secondary priority being to reduce part count, ultimately lowering costs, assembly time, and weight. The new design significantly enhances handling and maneuverability. Following an iterative process, the first version was remade with only optical mounts and the beam path, leading to brainstorming for the second version. The final design resulted in substantial reductions: beam height decreased from 3.5" to 1.4", parts were cut from 272 to 75—a 71% reduction—while overall size was compacted from 11.75" by 34" to 12" by 19". Further, costs dropped by 7% and weight was cut by 55%. Although still conceptual, the implementation of TILES that prioritize performance could significantly aid scientific research at LCLS.

Xiaoxuan Tu

Discipline: Health and Human Development

Authors:

#1 Shannon Jordan

Abstract Name: Landing Mechanics and Muscle Activation in Modern Dancers

Previous literature has largely focused on ballet dancers and their risk of lower extremity injury. Even though modern dancers differ from ballet dancers in their body movements and biomechanical demands, few studies exist addressing modern dance. In the few previous studies addressing modern dance, tests of postural instability have not been paired with electromyography (EMG). This study integrates multiple tests for postural instability (One- legged broad jump, single-leg drop landing, single-leg hurdle landing, and a single-leg squat) paired with a measurement of muscle activation, EMG, to gain insight into postural instability in modern dancers. Utilizing both the EMG and Force Plate allows for measurement of time to stabilization (TTS) and identifies muscular deficits. This data can be used to provide strength and conditioning recommendations to prevent lower extremity injuries in modern dancers. To date, 12 participants have been fully assessed, ranging in age from 18 to 35 years. Of these, 7 were recreationally active individuals, and 5 were trained modern dancers. Only five participants met the criteria for the single-legged broad jump test, three of whom were dancers. However, based on experience, it seems the only dancers who met the criteria

had several years of training. In both the drop and hurdle landing tests, there also seems to be an experience component to improved time to stabilization (TTS). No pattern was observed in the recreational group. Data from EMG will be analyzed at a later date to identify any differences in muscle activation patterns between the two groups. Further data collection is ongoing to increase the sample size in order to confirm the trend of experience with dancers and TTS.

Peggy Tu

Discipline: Computer Science

Authors:

#1 Mahfuza Farooque

Adam Lee

Robert Pitsko

Abstract Name: AI-Enabled Browser Tool for Early Detection of Cognitive Changes

Early identification of cognitive decline is often limited by infrequent clinical evaluations, which capture only small snapshots of a person's day-to-day functioning. Since people regularly interact with digital media, these online behaviors may offer an unobtrusive way to observe early changes in working memory, processing speed, and attention. Our project explores whether AI-based techniques can help monitor these behaviors in a safe and privacy-preserving manner. As undergraduate researchers, we developed a Chrome browser extension that observes how users interact with online video content and periodically presents brief comprehension questions. The extension records accuracy, response time, and viewing patterns, such as pausing or replaying. These measures provide lightweight indicators of cognitive processes that are often affected in the early stages of dementia. All data is stored locally and can be exported only by the user, ensuring personal control and privacy. In addition to the behavioral data, the system extracts transcripts from the videos and analyzes them with a natural language model to identify emotional tone and recurring themes. This allows us to explore whether the emotional nature of viewed content corresponds with changes in user engagement or response performance. By combining behavioral indicators with linguistic analysis, the tool creates a more complete picture of a user's digital interaction patterns. Our goal is to evaluate whether these combined signals can supplement traditional screening tools and offer clinicians early insight into cognitive changes. This work represents an initial step toward creating accessible, noninvasive technologies that help individuals and caregivers monitor cognitive well-being in everyday settings.

Rithika Tudmilla

Discipline: Physics and Astronomy

Authors:

Abstract Name: Developing Cryogenic Infrastructure for SPT-3G+: Next-Gen CMB Instrumentation

Modern cosmology relies on high-precision measurements of the cosmic microwave background (CMB - the faint afterglow of the Big Bang) to investigate fundamental questions about the universe's origin, structure, and fate. One of the leading instruments in this effort is the South Pole Telescope (SPT), which has undergone several upgrades, including the SPT-3G and the upcoming SPT-3G+, to improve sensitivity and resolution. A crucial component of these telescopes is the cryostat, which cools sensitive detectors down to near 0 Kelvin to minimize noise. My project contributes to this larger research effort by repurposing the original SPT-SZ cryostat to serve as a testbed for new optical components for the SPT-3G+ upgrade. Our work fills a critical

gap in experimental cosmology, as this updated telescope has a much denser array of detectors observing at higher frequencies, which will distinguish B-modes (circular polarization patterns in the CMB) caused by primordial gravitational waves or foreground matter lensing. My methodology is to design, manufacture, and install infrared filters and optical components of the SPT-3G+ optics tube into the SPT-SZ cryostat and then test its ability to cool down and block radiation from the outside. I have already completed diagnostic testing of the original cryostat, in which I determined the system can still reliably reach temperatures sub-4 Kelvin. To do this, I integrated a new Lakeshore thermometry system into the cryostat and checked the functionality of the existing diode thermometers. I am currently installing additional diodes to monitor more points within the cryostat. Next, we need to adapt a snout design for the SPT-3G+ cryostat to fit the SPT-SZ system, which will interface with the optics tube. When the optics tube is finished, it will be deployed to the South Pole and installed in the telescope.

Mason Tulacz

Discipline: English and Literature

Authors:

#1 Mason Tulacz

Abstract Name: A Different Type of Vampire

This research paper explains the role John Polidori's "The Vampyre" has played in shaping our understanding of vampires, as well as uncovering the origin of this style of vampire. This will provide insight into particular types of human behavior that persist to this very day. By reviewing accounts of the story's inspirations and creation, we can learn more about what characters represent and why it matters. By evaluating the lasting impacts of the story and its derivatives, we can understand more about what the story tells us on the societal scale. This paper asserts that vampires are more than a simple monster; they are a reflection of the worst human habits. As the mysterious, the elite, and the brooding drain the life force of those around them, they become ever-more alluring to some, and more monstrous to others. Monsters have often been created to dramatise real humans and their darker nature, yet vampires retain all the positives of a normal human, and twist them to their dark agenda. From the early days of European folk tales and disease, to Dracula's takeover at the turn of the 20th century, the mystics of Vampirism are something seen time and time again in our society. The work of Polidori has remained influential through countless adaptations, and much of his work has been revered and interpreted. This paper seeks to strip away much of the extra noise, so we might get at the heart of how "The Vampyre" did not simply tell a fantastical tale, but gives a reflection of human sociality.

Aryan Tummala

Other/Institution Not Found

Discipline: Chemistry

Authors:

#1 Aryan Tummala

#2 Anshi Kothari

#3 Aryav Kaushik

Anshi Kothari

Aryav Kaushik

Abstract Name: Enhancing Chitin Deacetylation with Dielectric Barrier Discharge (DBD) Plasma and

Chitosan, processed through the deacetylation of chitin, is an important biopolymer with applications in wound healing, drug delivery, and tissue engineering. Conventional industrial methods for chitosan production rely on high heat and large amounts of harsh chemicals, making it inefficient and environmentally unfriendly. This study examines dielectric barrier discharge (DBD) plasma as a sustainable alternative to current methods. Our hypothesis is that dielectric barrier discharge (DBD) plasma, especially when paired with carefully chosen operating conditions and additive gases, can reduce the degree of acetylation (DA) more effectively than current methods. Potentiometric titrations with chitin dissolved in NaOH and HCl were initially performed to connect observed pH with DA. However, due to chitin's low solubility, N-Acetylglucosamine, the monomer of chitin, is used as a model compound. Samples were exposed to helium and argon-based DBD plasma jets (16 slpm, 7-10kV/20-50 kHz), under varying operating conditions. Controlled oxygen flows were introduced as additive gases to assess their influence on reactive species generation and deacetylation efficiency. DA was quantified using UV-Vis spectrophotometry, with peak reductions indicating the removal of acetyl groups. Preliminary results show a measurable decrease in DA after two minutes of plasma exposure, with some conditions producing up to a 22% reduction. The introduction of oxygen as an additive gas shows potential for increasing deacetylation, suggesting that gas composition and plasma parameters can be optimized to improve efficiency. Ongoing work focuses on varying additive gas mixtures and plasma operating conditions to determine the most effective strategies for sustainable chitosan production. These findings indicate that DBD plasma is a promising and environmentally friendly alternative to biopolymer processing. Future studies can build on this work to study further plasma-biomaterial interactions.

Zachary Tung

Discipline: Biology

Authors:

#1 Charlie Kirby

#2 Hana Minsky

#3 Luis Garza

Abstract Name: Improving Human Skin Explant Viability and Regeneration

In 2024, CeraVe released a survey stating that 40% of people visited a dermatologist that year, though 80% experienced skin concerns. In vitro skin cell and animal models allow researchers to investigate human skin behavior, providing a broadly efficient platform for research, cosmetics testing, and other applications. However, while cell culture and animal models provide insights into skin responses to specific treatments, they do not fully recapitulate the structure or functions of human skin. This project has 2 main aims. Aim 1 will develop a protocol to maximize human skin explant viability in different types of growth media and growth media contact. I will assess multiple growth media to determine which best extends the viability of the explants. Additionally, I will use several methods of medium contact for the explant: direct submersion, porous membrane suspension, gelatin sponge embedding, or agar media embedding. Explant viability will be characterized by RT-qPCR and Ki67 staining and TUNEL assays, which detect signs of proliferation and apoptosis, respectively. By comparing Ki67 staining and TUNEL assays, I will determine which media and form of contact have maximized the viability of the explants. Aim 2 is to examine wound healing in the presence and absence of an injection of the immune stimulant poly I:C using my optimized ex vivo model from Aim 1. Poly I:C is a synthetic dsRNA; in wounded mice, poly I:C injections have shown hair follicle growth, while topical poly I:C has accelerated the regeneration process of wounded human skin. However, poly I:C injections in human skin remain untested. I expect that the injection of poly I:C into wounded human skin will induce regeneration rapidly compared to a control group. These findings will help create a replicable design for researchers to maximize the contribution of scarce resources like human skin explants.

Discipline: Environmental Science and Sustainability

Authors:

#1 Sloan Coats

#2 Susannah Heller

Abstract Name: Stationarity of El Niño Southern Oscillations (ENSO) Teleconnections: Evidence from the North American Drought Atlas and a Reconstruction of the Pacific Walker Circulation

The El Niño Southern Oscillation (ENSO) has a large influence on weather and climate globally, through so-called atmospheric teleconnections. Over North America ENSO teleconnections provide a critical source of seasonal hydroclimate predictability. This predictability is predicated on there being a consistent (i.e., stationary) linkage between ENSO and hydroclimate, our understanding of which is limited by a short and incomplete record of observations. Here we revisit the question of how stationary ENSO's impacts are on North American hydroclimate. To do so, we utilize recent developments from high-resolution paleoclimate, in which indirect (i.e., proxy) observations have been used to extend the record of both ENSO and North American hydroclimate over much of the last millennium. These state-of-the-art paleoclimate reconstructions are the North American Drought Atlas, which uses tree-ring proxies to quantify spatiotemporal variability of hydroclimate, and a multi-proxy reconstruction of the Pacific Walker Circulation (the atmospheric component of ENSO). Here, we examine the relationship between the Pacific Walker Circulation and North American hydroclimate in discrete 100 year intervals (the length of the observational record) spanning the last 800 years. We first correlate the Pacific Walker Circulation to hydroclimate over each 100 year interval, as this quantifies the associated teleconnection pattern, and then we employ pattern correlation statistics to assess consistency of these patterns through time. This approach allows us to determine whether the strength and spatial structure of ENSO's influence on hydroclimate have remained stationary or varied significantly across centuries. We find substantial nonstationarity in ENSO teleconnections and thus investigate the underlying causes. While we cannot rule out that the nonstationarity results from true physical changes in the climate system, it appears likely that paleoclimate reconstruction uncertainty plays an important role in producing apparent nonstationarity.

Katherine Tupac-Yupanqui

Discipline: Engineering

Authors:

Abstract Name: Supporting Neurodivergent Learners in Undergraduate Engineering Programs

Engineering courses are often designed with standard lecture formats, fast pacing, and high-stakes assessments. While these structures may work well for some students, they can create barriers for neurodivergent learners, including students with ADHD, autism, dyslexia, dyscalculia, and similar cognitive differences. Research shows that neurodivergent engineering students often bring highly valuable strengths such as systems thinking, creative problem-solving, visual-spatial reasoning, and pattern recognition, yet these strengths are not always engaged or supported in typical classroom environments. Instead, support is often limited to accommodations, which do not address deeper questions of course design, engagement, or belonging. This research explores how undergraduate engineering students experience learning in their programs and aims to identify teaching practices that better support neurodivergent learners. The study uses a mixed-methods approach. First, a survey distributed to collect data on learning experiences, instructional preferences, and perceived challenges. Students who wish to share more volunteer to participate in recorded, semi-structured interviews conducted over Zoom. Interview recordings are transcribed and analyzed

thematically to identify common needs, successful strategies, and opportunities for change. The anticipated outcome of this work is a set of inclusive teaching practices designed to better support neurodivergent learners and likely benefit all students. Rather than focusing on “fixing” students or asking them to adapt to rigid models, this project aims to offer guidance on redesigning learning environments to activate student strengths. This work contributes to ongoing national efforts to broaden participation in engineering and aligns with the National Academy of Engineering’s Grand Challenge to advance personalized learning.

Becca Tupy

Discipline: Engineering

Authors:

#1 Becca Tupy

#2 Lucien Jay, M.D.-Ph.D. student

#3 Leigh Griffiths, Ph.D., MRCVS

Abstract Name: Optimizing Ovine Arterial ECM Scaffolds for Coronary Artery Bypass Grafting (CABG)

Coronary artery disease, characterized by progressive occlusion of the heart’s vascular supply, remains the leading cause of morbidity and mortality worldwide. Coronary artery bypass grafting (CABG) is the gold-standard surgical intervention for patients with significant coronary occlusions and relies on the availability of suitable autologous vessels to restore perfusion to the myocardium. Unfortunately, a substantial proportion of patients lack usable vessels due to diffuse vascular disease, prior harvest, or comorbid conditions, highlighting the critical need for a reliable, biocompatible, small-diameter alternative graft. This project aims to address this unmet clinical need by developing an ovine (sheep-derived) small-diameter extracellular matrix (ECM) arterial scaffold as a potential off-the-shelf CABG conduit. Because use of xenogeneic tissues in humans requires thorough removal of antigenic components to prevent graft-specific adaptive immune responses, Aim 1 focused on optimizing antigen removal (AR) strategies to minimize immunogenicity while preserving essential ECM structure and function. Ovine carotid arteries were processed using sequential antigen solubilization (AR) and compared with sodium dodecyl sulfate (SDS) decellularization. AR-treated scaffolds demonstrated markedly reduced antigenicity relative to native tissue and SDS-treated controls. Importantly, AR preserved native collagen and elastin architecture and maintained physiologic ECM composition, whereas SDS decellularization resulted in substantial collagen disruption. Mechanical testing further confirmed that AR scaffolds retained native-like tensile strength and elastic properties, supporting their capacity to withstand physiologic hemodynamic forces. Collectively, these findings indicate that AR-processed ovine carotid ECM scaffolds achieve low antigenicity while maintaining critical structural and mechanical integrity. These results support the potential of AR-derived small-diameter vascular grafts as promising candidates for future translational development and clinical use in coronary artery bypass surgery.

Becca Tupy

Discipline: Education

Authors:

#1 Becca Tupy

#2 Rachel Olson, Ph. D., M.S.

#3 Shekitta Acker, P.A.-C., Ph.D., M.S.

#4 Anna Ribikawskis, M.S.

#5 Danielle O’Laughlin P.A.-C., M.S.

Abstract Name: The Influence of High-Impact Practices on Academic and Clinical Success in Traditional vs. Accelerated Mayo Clinic Physician Assistant/Associate (PA) Students

High-impact practices (HIPs)—such as research, global learning, service-learning, mentorship, and leadership—are known to strengthen student engagement, deepen learning, and improve long-term academic outcomes. However, little is known about how these practices influence success in Physician Assistant/Associate (PA) education, particularly for students in accelerated pathways. The Mayo Clinic PA Program recently added a 3+2 accelerated track in which students matriculate at a younger age and with fewer undergraduate years than traditional applicants. Early outcomes suggest performance differences between pathways, including lower first-time Physician Assistant National Certifying Exam (PANCE) pass rates among the first accelerated cohort. These trends raise important questions about whether differences in HIP access or participation contribute to academic and clinical readiness in PA students. This study aims to (1) survey Mayo PA alumni to identify their engagement in HIPs prior to matriculation, and (2) determine which HIPs are most strongly associated with academic performance and perceived clinical preparedness, comparing results across pathways and demographic groups. We developed a survey informed by HIP literature and PA educational competencies, including measures of GPA, first-time PANCE pass rates, and validated self-report indicators of clinical readiness. Following IRB approval, the survey was recently distributed to alumni from the four most recent cohorts. Quantitative analyses will examine relationships between HIP engagement and outcomes, with subgroup comparisons by pathway, age, gender, race/ethnicity, and first-generation status. This project addresses a gap in PA education research by evaluating how experiential learning opportunities shape readiness for rigorous clinical training. We expect that greater HIP engagement will correlate with stronger academic outcomes and increased confidence entering clinical rotations. Findings may inform advising, admissions practices, and curriculum design—supporting more equitable access to HIPs and promoting student success across both traditional and accelerated PA pathways.

Max Turkovich

Discipline: History

Authors:

#1 Max Turkovich

Abstract Name: Tracing Land Ownership in Merced's Lost Chinatown 1872-1921

Chinese communities have existed in the City of Merced since its establishment in 1872 up until the 1950s, when the Chinatown was demolished to make way for a section of California Highway 99. Tracing ownership from the creation of Chinatown in 1872 to 1921 reveals how ownership reflected legal precedents in state law and population trends. To better understand land ownership in Merced's Chinatown, I have utilized multiple different primary & secondary source collections to track the land transfers between several figures. This includes newspaper columns noting land transfers, deed sales, and purchase records from the Merced County Clerk's Office, as well as tax data ranging from 1872 to 1899. I supplemented these sources with census data from 1860-1920 as well as fire insurance maps to locate specific structures within the lots being sold and purchased. The results contrast with the California Alien Land Laws of 1913, showing land ownership in Merced's Chinatown was transferred away from Chinese immigrants several decades before any broader legal actions were taken by the State of California. Tracking the ownership of land in Chinatown contributes to a better understanding of Merced's Chinese community and how the space reflects attitudes towards Chinese immigrants at the time.

Kyla Turks

Discipline: Psychology

Authors:
#1 Kyla Turks

Abstract Name: Healthy and Unhealthy Depictions of Love in Black vs. White Romance Films

The purpose of this study was to examine how race influences the portrayal of romantic love in films, using the social learning theory as a framework. Specifically, it explored whether patterns of healthy and unhealthy dynamics differ in romantic movies featuring White versus Black main characters. Past research (e.g., Ward et al., 2023) indicates that Black women are often portrayed as the strong Black woman, hypersexual Jezebel, or aggressive Sapphire. These depictions contrast with that of White women, who are more frequently shown as soft, hyper-feminine, which aligns them with the “damsel in distress” trope. Such portrayals can shape audience perceptions, leading to assumptions that Black women are less feminine or friendly. Past research (Moss et al., 2022) also suggests that these stereotypes can increase acceptance of intimate partner violence (IPV) towards Black women and reduce sympathy for victims. This study contributes to the literature by comparing characteristics and relationship quality in romantic films across racial groups. The hypotheses predicted that Black romance films would depict more unhealthy dynamics and White romance films would have higher relationship scores. Three Black romance films and three White romance films with similar plots were selected based on a student pilot where popular romance films were identified. A chi-square analysis in SPSS partially supported the hypotheses. Differences in unhealthy and healthy dynamics between the two races were insignificant; however, overall relationship scores showed marginal significance, with White couples having higher relationship scores. Future studies should examine larger and more diverse groups of films. These results highlight the need for more socially responsible portrayals as well as introduce interventions that can help initiate positive change for couples and families who may base their behaviors on what they have seen in the media.

Olivia Turks

Discipline: Psychology

Authors:
#1 Alexandria Viegut
Ella Spencer

Abstract Name: Fraction Learning Starts Early: Frequency of Fraction Information Included in First- and Second-Grade Math Textbooks

Fraction knowledge is an essential building block for learning algebra and success in STEM fields (NMAP, 2008). Although formal fraction introduction doesn't occur until third grade (Common Core State Standards, 2010), recent work shows that children have some informal fraction knowledge in 1st grade, which predicts their later math achievement (Viegut et al., 2023). Little is known about where this early fraction knowledge comes from. As a starting point, we are investigating textbooks, as children's math knowledge is closely related to the structure and content of their textbooks (Siegler, 2024). Our primary goal is to discover how often and in which contexts fraction-related information is included in three popular first- and second-grade math textbooks used nationwide in the U.S.: McGraw Hill's Reveal Math, Savvas Learning's enVision Math 2.0, and Amplify's Desmos. Each content page of these textbooks is being coded for containing explicit fraction information (e.g., fraction words or symbols), implicit fraction information (e.g., quarters when referring to money), possible fraction opportunity (e.g., start with 4 bees and 4 bees join; teacher would have to expand on the content to include fraction information), or no fraction information. We expect to find a higher proportion of pages that contain fraction information in second grade textbooks (compared to first grade ones), as well as a higher proportion of fraction information-containing pages in chapters relating to measurement (including lengths, time, money, etc.), geometry, and equal sharing. We also expect to see variability across series, but overall, a higher frequency of implicit and possible fraction information than

explicit fraction information. So far in our coding, we have seen only possible fraction information. Our results will characterize how fraction-related activities are integrated into early curricula, informing future teacher interviews, and identifying plausible opportunities where teachers may expand to build strong foundational skills in fractions.

Lauren Turner

Discipline: Psychology

Authors:

#1 Lauren Turner

#2 Amanda McGraw

Abstract Name: The Relationship between Learning Strategies of Students and Intelligence Mindsets

Intelligence mindsets (e.g., fixed or growth) describe beliefs about whether intelligence is static and unchangeable or malleable and can expand over time (Yeager & Dweck, 2020). Individuals with growth mindsets believe intelligence can change over time with effort and work, whereas individuals with fixed mindsets believe intelligence is not malleable. Many studies indicate mindsets are related to academic success of students (Claro et al., 2016). Similarly, study strategies utilized by students are also linked to academic success (de Jesus Silva et al., 2022). We analyze the relationship between study strategy and intelligence mindset. Participants from a college sample will respond to a self-report measure related to their intelligence mindset (Dweck et al., 1995). This measure examines two subscales: growth mindset and fixed mindset. Additionally, participants will complete the study strategy scale to determine their most used study habits (MSLQ; Pintrich & De Groot, 1990). This measures four subscales: Rehearsal, elaboration, critical thinking, and help-seeking strategies. Our research questions include, 1) Are certain study habits predictive of fixed intelligence mindsets?, and 2) Are certain study habits predictive of growth intelligence mindsets? We predict that rehearsal and elaboration study habits will be positively correlated with fixed mindsets and critical thinking, and help-seeking study habits will be positively correlated with growth mindsets. Findings from this study can be used to help educators create interventions aimed at promoting use of study strategies used by individuals with growth mindsets. This may help to improve overall academic outcomes in students.

Kristen Tweedy

Discipline: Biology

Authors:

#1 Maddie Murphy

#2 John Mersfelder

#3 Jennifer Larson

Abstract Name: Stress and the Oral Microbiome: *S. mutans* and *C. albicans*

Psychological stress has been linked to changes in the oral microbiome. To understand these changes, specific pathogens and bacteria were targeted to investigate the relationship between perceived stress and the oral carriage of *Streptococcus mutans* and *Candida albicans*. *S. mutans* are a primary species found in correlation with dental caries, with previous studies showing evidence of both physiological and psychological stress influencing colonization and activity of the bacteria. *C. albicans* is a pathogen found in the oral cavity and has been detected in the biofilms formed on teeth. Correlations between stress and *C. albicans* have been explored with animal models and are hypothesized to have a significant influence in humans as well. *S. mutans* and *C.*

albicans have been known to interact mutually, increasing each other's persistence in biofilm found on teeth, thus heightening oral disease risk. Because stress has been implicated to cause shifts in bacterial and fungal populations, studying both oral carriages offers more insight into how psychological stress may affect oral health. For this study, college student participants provided saliva samples via sterile cotton swabs, which were plated on two separate media that were selective for *C. albicans* and *S. mutans*, and were incubated and observed for 48 hours. This process allowed student investigators to observe growth and analyze the relative abundance of both microbial species. To further confirm the presence of *S. mutans*, another saliva sample via cotton swab was collected for PCR testing as participants completed the Perceived Stress Scale (PSS). The findings will be discussed in the context of perceived stress and oral health, highlighting the relationship between dental caries and perceived stress. This research aims to contribute to the broader understanding of the human oral microbiome and its psychological influences.

Christy Tyndall

Discipline:

Authors:

#1 Christy Tyndall

#2 Burhan Buttar

Burhan Buttar

Abstract Name: Flourishing Together: Reciprocal Growth through Peer Mentorship in Wellbeing Education

For nearly a decade, HONR 150 Flourishing: The Applied Science of Wellbeing has served as a cornerstone of the Virginia Commonwealth University Honors College first-year curriculum. This one-credit, semester-long course introduces students to evidence-based practices drawn from positive psychology and cognitive behavioral science to support personal wellbeing, resilience, and purpose. Beyond developing self-awareness and healthy habits, the course fosters community belonging through shared reflection and experiential learning. The incorporation of trained peer mentors has proven to be a key catalyst for achieving these goals. Grounded in Sociocultural Learning Theory and Self-Determination Theory, the program situates learning within a supportive, relational context that emphasizes autonomy, competence, and connectedness. While extensive research has documented the academic and social benefits of peer mentorship for mentees, less attention has been given to the developmental outcomes for the mentors themselves. In this session, a student/mentor team will share research exploring the reciprocal learning that emerges through the peer mentorship model in HONR 150. Drawing upon qualitative feedback and reflective reports collected over five years, analyses highlight consistent themes in mentor growth, including enhanced interpersonal communication, confidence in group facilitation, relational empathy, and deeper integration of wellbeing concepts. Beyond pedagogical and interpersonal gains, mentors developed crisis intervention competencies, including emotional support and deescalation skills. Mentors report that guiding others through discussions of flourishing strengthens their own self-regulation, self-compassion, and sense of purpose. The findings position the HONR 150 peer mentor initiative as a sustainable, low-cost, high-impact model for enhancing both student education and community wellbeing in honors and first-year programs. By emphasizing mutual growth rather than hierarchical teaching, the program exemplifies a proactive approach to holistic student development and offers a replicable framework for institutions seeking to integrate peer educators into the undergraduate experience.

Zoe Uchenna

Discipline: Environmental Science and Sustainability

Authors:

Abstract Name: Building a Sustainable Future: HKUST's Influence on Student Awareness in Hong Kong

This research examines how sustainability initiatives at the Hong Kong University of Science and Technology (HKUST) are perceived and experienced by students, faculty, and staff, and compares these findings with global best practices from PRME (Principles for Responsible Management Education) Champion institutions. The purpose of this study is to understand how effectively HKUST's sustainability efforts raise awareness, foster engagement, and develop sustainability literacy across different faculties, while identifying cultural and institutional factors that shape student participation. Universities globally are expected to serve as leaders in advancing sustainable development, yet research consistently shows a gap between institutional efforts and student involvement. At PRME Champion schools, sustainability is strategically embedded across curricula, student culture, and governance. HKUST, while not a PRME Champion, has developed initiatives such as sustainability core courses, a green campus plan, and student leadership programs. However, limited research exists on how these efforts translate into actual awareness and engagement among the university community. This study adopted a mixed methodology approach, analyzing semi-structured interviews with students, faculty, and sustainability staff at HKUST. Thematic coding identified five major themes: (1) Understanding and Awareness of Sustainability Initiatives, (2) Curriculum Integration and Literacy Development, (3) Student Motivation, Engagement, and Culture, (4) HKUST Campus as a Living Laboratory, and (5) Institutional Support. Findings highlight that while students possess a broad conceptual awareness of sustainability, their engagement remains largely "passive," shaped by convenience, cultural expectations in Hong Kong, and perceived career priorities. Compared with PRME Champions, HKUST lacks systematic SDG integration across faculties, sustainability literacy assessments, and strong recognition mechanisms for student leadership. The results suggest that embedding sustainability across the curriculum, fostering experiential learning, and addressing cultural barriers are critical next steps. This research contributes to the broader discussion on how Asian universities can strengthen sustainability education and align with international best practices.

Kaya Uchimura

Discipline: Psychology

Authors:

#1 Krista Hill-Cummings

Abstract Name: The Effects of Early Parental Absence on Adult Romantic Relationships

Research has highlighted the lasting influence of early attachment experiences on an adult's relationships. The present study examines the contribution of early parental absence- occurring before birth or during early childhood- to adult romantic attachment styles and partner trait preferences. 200 participants who had lost a parent early in life filled out the BFI-Short for themselves, their partners, their absent parents, and present parents. They also completed an attachment questionnaire for themselves. Survey data collected was used to assess parental characteristics, relational histories, attachment orientations, and the attributes of current romantic partners. This study investigates how an absent parent shapes an individual's later partner selection. This project also explores whether the narrative context (e.g. silence, idealization, or negative portrayals of the absent parent) mediates or moderates the link between parental absence and adult relationship patterns. Preliminary analyses suggest that early parental absence will contribute uniquely to adult romantic preferences in ways not accounted for by personality traits alone and that partner seeking motives may condition the relationship between attachment and partner selection. The discussion focuses on the psychological mechanisms through which early absence shapes an adult's intimacy.

Shauryib Uddin

Discipline: Business

Authors:

#1 Aaron Van Klyton

Abstract Name: The Trump Effect on the Symbolic Economy (Pre-Post Tariff): Semiotic Analysis on Luxury Cars Marketing

This study examines how the reinstatement of President Trump's import tariffs reshapes the symbolic economy of luxury automotive marketing, with a focus on how brand meaning, cultural codes, and value propositions change across different economic conditions. Symbolic economy is the system in which products derive value from both functional performance and symbolic meanings, identity expressions and social signals (Wang et al., 2022). The research question is: As tariffs introduce cost pressures, geopolitical tension, and supply-chain uncertainty, to what extent do luxury automakers adjust how they communicate to their customer base? Prior research indicates that luxury brands remain resilient during downturns by adjusting strategies to shifts in consumer behavior and perceived value (Reyneke et al., 2012). Perceived brand global-ness also strengthens luxury appeal in crisis conditions (Hassan et al., 2015). When governments raise trade barriers, luxury advertisers shift from emotional, image-driven appeals to more factual, simplified messaging that still heightens exclusivity and global prestige through visual cues (Ahn and Mundel, 2018). These insights show how macroeconomic shocks and trade policies reshape luxury brand symbolism, offering a basis for analyzing how Trump-era tariffs may influence luxury car semiotics. The research employs a semiotic analytical framework to compare the semiotic construction of luxury in YouTube advertisements during the pre-tariff period (2022-2024) and the post-tariff period (2025) in luxury automotive messaging across 11 automakers. The method involves identifying emerging patterns using the systematic coding approach outlined by Kucuk (2015), identifying and coding visual, verbal and symbolics elements to extract the basic semiotic codes embedded within brand meaning systems (Kucuk, 2015), how these symbols function within broader cultural narratives. By comparing message structures: verbal cues, color cues, and visual symbolism across both time periods, the study reveals how luxury brands strategically negotiate economic uncertainty and political discourse through their communication strategies.

Stephen Ude

Discipline: Engineering

Authors:

#1 Bjorn Vaagensmith

#2 Jesse Reeves

Evan Mow

Matthew Shao

Abstract Name: Real Time Signal Processing Using Field Programmable Gate Arrays

This project contributes to the High Voltage High Frequency initiative at Idaho National Laboratory, which aims to develop a real-time Non-Intrusive Load Monitoring system capable of identifying electrical behavior on a 145 kV power line. A custom sensor collects current data at 14 million samples per second, producing massive datasets that require a highly efficient analysis method to process. To meet these demands, the project focuses on implementing a signal processing technique to achieve 1 hertz spectral resolution with microsecond-level temporal resolution on a Field Programmable Gate Array (FPGA). The pipeline uses the Sliding Window Infinite Fourier Transform algorithm, which computes spectral information recursively. This approach provides continuously updated frequency bins, supports an unlimited observable spectrogram

window, and avoids the power-of-two constraints that restrict traditional FFT pipelines. These properties make SWIFT better suited for handling high-volume, real time data while preserving the fine spectral and temporal resolution needed for signal analysis. The hardware platform selected is the UltraScale+ ZCU102 FPGA, which provides high parallelism and computational speed needed for real-time spectral analysis. For this project, implementing a signal-processing algorithm on the FPGA follows a three-phase development process. First, an Intellectual Property (IP) core is created to represent the SWIFT algorithm and define its computational behavior. Second, the custom IP is integrated into a larger hardware design that includes supporting infrastructure such as the DMA engine and memory interfaces. Third, programming the System on chip is done to manage data transfer protocols, configure DMA transactions, and handle storage of input and processed data. Completion of these stages is expected to produce a functional real-time processing pipeline.

Emilia Ullom

Discipline: Biology

Authors:

Abstract Name: Cryptic Diversity in Excirolana Isopods from the Indo-Pacific

With over 10,000 species, isopods are amongst the most speciose crustacean higher taxonomic groups. They are found across all habitats on Earth except polar habitats and those at extreme elevation. Isopods are also known to exhibit high degrees of endemism, perhaps as a result of their biological characteristics that limit dispersal ability and may lead to local speciation. Despite this, many isopod groups remain poorly studied which limits our understanding of the biodiversity of these crustaceans. This is important, as recent molecular studies have uncovered high levels of previously unknown species in various isopod groups including genera such as *Ligia*, *Alloniscus*, *Tylos*, and *Excirolana*. The latter genus is a genus that is found world-wide and that consists of about 15 described and currently valid species. This likely represents an underestimate, as genetic lineages likely representing new and undescribed species have been found in *Excirolana* isopods in the Americas. These findings suggest *Excirolana* isopods in other regions may also harbor such lineages. Herein, we use mitochondrial markers to explore whether *Excirolana* populations from the Indo-Pacific harbor highly divergent genetic lineages that likely correspond to various species. We report the presence of multiple such lineages in a region currently thought to harbor two *Excirolana* species. Our findings expand our knowledge of the biodiversity of this genus specifically and the Indo-Pacific more generally and thus may be of importance for the conservation of biodiversity in this region.

Peter Ulrich

Discipline: Engineering

Authors:

#1 Peter Ulrich

#2 Vansh Varak

Vansh Varak

Abstract Name: Flightless Eagles and the Redbull Flugtag Experience: How We Built a Manned Low-Speed Glider out of Foam and Cardboard

This project documents the iterative engineering, design, and construction efforts behind 2 20-foot human-carrying gliders developed by a team of Embry-Riddle students for the Red Bull Flugtag competition. The challenge required balancing aerodynamic performance, structural efficiency, and themed creativity while adhering to strict dimensional and weight limits

Sarah Ulsberger

Discipline: Sociology

Authors:

#1 Sarah Ulsberger

Abstract Name: Digital Aesthetics and Identities of UW Stout Students: Perceptions of Authenticity in Identity-Driven Marketing

Gen Z is often described to value “unfiltered” authenticity on social media yet also engages regularly with aesthetic trends that are reliant on the curation of idealized visuals. Aesthetic subcultures on social media, ranging from curated lifestyle “vibes” to niche anti-modern styles, have become central online communities where Gen Z negotiates self-presentation and community belonging. This research asks, “how do Gen Z college students’ engagements with digital aesthetics influence their identity formation, sense of community, and perceptions of authenticity online?” As an exploratory mixed-method study, this study draws conclusions from a survey of 119 UW-Stout students and a follow-up virtual focus group involving 10 survey participants. Survey data suggests that students feel a general blend between their online and in-person identities, with low pressure to curate personas online, but a strong preference for authenticity on social media. Content cues such as “raw and unedited” visual representations of reality or transparent and vulnerable communication of ideas are the most impactful on students’ positive perceptions of brands and influencers. The focus group contextualizes these survey data patterns by highlighting a nuanced distinction between digital “subcultures” and “aesthetics.” The key distinction students made is that they can be connected to create value-based communities, but aesthetics cannot define entire subcultures. This narrative broadly suggests that, in Gen Z college circles, authenticity is judged more simply on consistency of character. The paradox between their value of unfiltered authenticity and their popularization of curated aesthetics may be partially explained by noting that the social media experience is structured to be curatorial and idealized, but this is not necessarily something that Gen Z likes or approves of despite their participation in it. This study, though limited to self-reported data from UW-Stout students, contributes to cultural conversations on Gen Z’s changing sense of digital identity and community belonging.

Allison Underwood

Discipline: Interdisciplinary

Authors:

#1 Luke Bradley

#2 Timothy Moyers

#3 Michael Baker

Anya Sharma

Abstract Name: The Sound of Synthesis: Using Data Sonification as a Model for STEM Education in Molecular and Cellular Biology

Although interest in STEM careers is growing, many students face academic barriers, especially when learning abstract molecular biology concepts like protein synthesis and folding, which are often difficult to grasp and not presented in engaging or intuitive ways. To address this, our undergraduate research team developed an interactive educational tool that uses data sonification to make these invisible processes more accessible. The tool translates protein sequences into music, assigning each amino acid a note based on its hydropathy value. This allows learners to “hear” how proteins are built, reinforcing their understanding through auditory and creative pathways. Our software also models disease-associated mutations by introducing audible dissonance, highlighting how even small molecular changes can significantly impact biological function. By blending molecular biology with music, this tool encourages cross-disciplinary thinking and supports diverse learning styles, particularly for students who may not thrive in traditional science instruction. To evaluate the tool’s impact, we conducted demonstrations with middle and high school students, followed by surveys measuring STEM interest, comprehension, and engagement. Preliminary results show increased curiosity, improved conceptual understanding, and enthusiastic responses from participants. These outcomes support our hypothesis that sound-based, interactive learning tools can improve student attitudes and performance in STEM subjects. This work is part of a broader transdisciplinary effort involving neuroscience, music, and genomics. Future directions include expanding the tool into a web-based app, applying it to real genomic data from cancer studies, and developing immersive 3D audio experiences

using AlphaFold-predicted protein structures. Ultimately, our goal is to transform how students experience molecular biology, making science not only more understandable, but more memorable, engaging and meaningful.

Houytieng Ung

Discipline: Health and Human Development

Authors:

#1 Martina Bazzaro

#2 Stefani Thomas

#3 Mihir Shetty

#4 Asumi Hoshino

Abstract Name: Proteomic Analysis of Mitochondrial Protein Expression in ARID1A-Deficient Ovarian Clear Cell Carcinoma

ARID1A-mutated ovarian clear cell carcinoma (OCCC) is a rare and aggressive subtype of ovarian cancer, with a 5-year overall survival rate below 15%. Current treatments, including paclitaxel and carboplatin, are ineffective due to chemoresistance. Our previous work demonstrated that ARID1A deficient cells develop increased reliance on mitochondrial respiration, suggesting a potential therapeutic vulnerability. While targeting mitochondria is promising in treating chemoresistant cancers, existing mitochondrial inhibitors cause severe side effects due to their broad activity against both cancerous and healthy cells. Moreover, development of FDA-approved mitochondrial inhibitors is hindered by limited data on how ARID1A loss influences specific components of the mitochondrial electron transport chain (ETC). To address this, our study focuses on identifying which ETC components ARID1A-mutant OCCC cells depend on for a more targeted therapeutics approach. Thus, we are conducting whole-cell proteomic analysis on ARID1A-knockout clones derived from the RMG1 OCCC cell line. Metabolic stresses are induced on these cells to shift energy production toward mitochondrial respiration. This strategy activate mitochondrial pathways, allowing us to assess mitochondrial respiration through global proteomic profiling using mass spectrometry. Findings from this study may uncover differences in ETC protein expression in ARID1A-deficient cells, offering more data toward a targeted mitochondrial approach treating ARID1A-mutated OCCC.

Mantrana Upadhyay

Discipline: Philosophy, Ethics, and Religious Studies

Authors:

#1 Mantrana "Moon" Upadhyay

Abstract Name: Brown, Queer, and Not from around here: Epistemic Injustice and an Intersectional analysis of Queer International Students in America

Historically, prejudice materializes and perpetuates in many forms. The systemic discrepancies in society steer the prejudice and push marginalized communities away from having a reaction to the absurd experiences which they are subjected to. One such way this happens is through Epistemic Injustice, which refers to the act of undermining an individual in regard to their ability and status as knowers, interpreters, and relayers of knowledge, whilst also violating their status or agency for arbitrary reasonings that are unnecessary to attain, cultivate knowledge. Such an injustice arises from discrimination, biases towards specific races, genders, sexualities, nationalities, and so on. One example would be people of color being

perceived as less credible and more likely to be persecuted and criminalized despite substantial evidence suggesting otherwise. There is a gap between credibility that these individuals are seen to possess in our current societal systems and the credibility everyone deserves inherently. As a brown, queer, and international student in the United States, after having faced various anecdotal experiences from my own intersectional complexities, make me a representative of this sort of injustice. My research aims to construct and clarify the basic framework as well as the state of epistemic injustice faced by queer, people of color, and marginalized individuals in the United States; specifically, by putting the experiences of such non-immigrants in the educational, academic context under a microscope. Through extensive literary review, my research would separate itself from other works in the field by capturing unique experiences and filling in a large gap that exists in the global acknowledgement and understanding of marginalized experiences that have failed to be captured by non-intersectional sources.

Lydia Uptain

Discipline: Biology

Authors:

#1 Cynthia Stenger

Abstract Name: Investigating the implications of VUS in the RNA binding protein FUS

Frontotemporal dementia (FTD) is the most common cause of dementia for individuals under the age of 60. It commonly co-occurs with amyotrophic lateral sclerosis (ALS), and when co-occurring, these diseases cause a combined syndrome called ALS-frontotemporal spectrum syndrome (FTD-MND). This syndrome is associated with a buildup of an RNA-binding protein known as the fused in sarcoma (FUS) protein in motor neurons and brain tissue. This buildup is associated with mutations in the protein that cause protein mislocalization and subsequent cytotoxic effects. This study investigates uncharacterized missense mutations in the PY-NLS domain of this protein, with a focus on arginine to glycine swaps. The goal of this investigation is to determine if a mutation will lead to a cytotoxic buildup of this protein and cause a pathogenic phenotype. The impact of these mutations is assessed using in silico prediction tools, protein modeling, conservation prediction, and molecular dynamics simulations. A total loss of function in this protein will not display a pathogenic phenotype, but a partial loss of function will. Results from these various tools and methods will be used to determine if a pathogenic phenotype will be observed.

Madison Upton

Discipline: Psychology

Authors:

#1 Gregory Parks

Abstract Name: The Socioemotional Impact of Child Maltreatment and the Protective Role of Resilience

Thousands of children in the United States are subjected to child maltreatment each year, often incurring severe damage to their socioemotional development as a result. To better identify and aid these victims, an understanding of the basic socioemotional effects of child maltreatment is critical. Thus, this literature review focuses on the socioemotional impact of child abuse and neglect. Three categories of socioemotional development were studied: personality, attachment, and self-esteem. Articles regarding child maltreatment's influence on socioemotional development were compiled and analyzed to determine abuse and neglect's socioemotional impact. Maltreated children exhibited greater externalizing and internalizing issues and more

traits associated with poor adjustment, especially high neuroticism. In addition, insecure attachment, which can interfere with relationship quality, was highly associated with child maltreatment. Among those who were abused and neglected, self-esteem was also lower. Overall, child maltreatment has a generally negative impact on all three domains. However, numerous children demonstrated resiliency by not showing serious socioemotional deficits. Even so, maltreated children are less likely than nonmaltreated children to show resilience. This lack of resiliency was linked to the personality traits and insecure attachment styles associated with child maltreatment. Ergo, personality and attachment may be promising targets for future interventions aimed at reducing the negative effects of maltreatment. While the socioemotional impacts of child maltreatment are commonly severe, enhancing resiliency by focusing on certain personality traits and insecure attachment styles may be effective in mitigating its devastating consequences.

Justin Uralil

Discipline: Biology

Authors:

#1 Mark Parker

Abstract Name: Effect of NBCe1 Mutation on Molar Development in Mice

The NBCe1 gene encodes a sodium–bicarbonate cotransporter that plays a key role in maintaining systemic acid–base homeostasis. In humans, NBCe1 mutations result in an unusually low blood pH and various systemic issues, including weakened dental enamel. The renal isoform, NBCe1A, is expressed only in the kidney, where its action stabilizes normal blood pH, while the NBCe1B and NBCe1C isoforms are expressed in non-renal tissues, including ameloblasts, which are responsible for enamel formation. It has been previously hypothesized that low blood pH is responsible for enamel defects. However, in mice, incisor enamel abnormalities are present even when only NBCe1B,C are knocked out, despite normal plasma pH, suggesting a direct role for these isoforms in tooth development. In this study, we analyzed mice lacking NBCe1B,C to determine whether defects in molar enamel also occur independently of systemic acidosis. We hypothesized that NBCe1B,C directly contribute to molar development and that the loss of NBCe1 from ameloblasts would result in significant structural defects in molars. Our objectives were to: [1] compare enamel structure between NBCe1B,C knockout and wild-type molars, [2] identify developmental abnormalities present in the knockout strain, and [3] define the specific role of NBCe1B,C in molar formation. Molar morphology and mineralization were assessed using micro–CT imaging and analyzed in ImageJ. We measured the mesial root length and enamel density of the first molar. On average, root length for the wild type was 0.0137 mm, while for the knockout it was 0.0097 mm. In addition, the average enamel density for the wild type was 1863.6084 MgHA/cm³, compared with 1623.9568 MgHA/cm³ in the knockout. We conclude that NBCe1B,C contributes to normal root growth and enamel mineralization.

Delia Urbina Tezen

Discipline: Engineering

Authors:

#1 Ameer Alarab

#2 Delia Urbina Tezen

#3 Mehdi Amiri

Ameer Alarab

Abstract Name: Tensile, Compressive, and Fatigue Behavior of TPMS Gyroid Structures Made from PLA

This study examines the relationship between tensile, compressive, and fatigue of gyroid Triply Periodic Minimal Surface (TPMS) structures with the unit cell density TPMS structures are widely recognized to be useful because of their superior strength-to-weight-ratios, as they can distribute load effectively, minimize the amount of material used, and can be easily additively manufactured. However, limited research has been done to evaluate their mechanical behavior under different types of loading conditions, specifically in monotonic tension and fatigue tension. Gyroid TPMS specimens with densities of 100%, 90%, 75%, 65%, and 50% are additively manufactured and tested in tension, compression, and fatigue. All specimens are manufactured from PLA with the same print parameters. This study aims to unravel the static and fatigue properties of Gyroid TPMS in relation to their unit cell density. Fracture surfaces in monotonic tension and fatigue tension will be observed under optical and electron microscope to further understand the mechanisms for crack initiation and growth in these structures. Results of this study can shed light to applications of TPMS structures in several areas of engineering, such as biomedical, aerospace, automotive, and civil and structural engineering. Further, results of this study set a ground for understanding static and fatigue behavior of other types of TPMS structures than Gyroids.

Angela Uriyo

Discipline:

Authors:

#1 Angela Uriyo

Abstract Name: Guiding the Emerging Designer: Mentorship Practices That Build Research Confidence and Creative Agency

This paper reflects on my approach to mentoring undergraduate students as they grow into confident, research-minded design scholars. My mentoring philosophy is rooted in the belief that students' lived experiences, cultural backgrounds, and creative instincts are legitimate and vital sources of research insight. In the studio, I guide students in transforming intuitive making into intentional, research-driven design by scaffolding ideation, integrating reflective practice, and encouraging risk-taking through iterative experimentation. Drawing on the Functional, Expressive, and Aesthetic Consumer Needs Model (Lamb & Kallal, 1992), I help students build conceptual grounding for their work, connecting theory to process in ways that feel authentic and personally meaningful. Much of my mentoring focuses on giving students access to museum archives, textile collections, exhibitions, and industry networks so they can experience research as active, hands-on, and connected to real communities. Through structured critique, transparent dialogue about my own research paths, and preparation for opportunities at design exhibitions at professional conferences and on campus research symposia, students learn to articulate their design decisions, frame their inquiries, and see themselves as emerging scholars with something to contribute to the discipline. Over time, students gain confidence in situating their designs within larger cultural and social conversations, developing both research literacy and a strong sense of academic agency. Ultimately, my goal is to cultivate a studio environment where discovery feels possible. Where students recognize their own potential and step forward as thoughtful, critically engaged designers ready to shape the future of the field. Lamb, J. M., & Kallal, M. J. (1992). A conceptual framework for apparel design. *Clothing and Textiles Research Journal*, 10(2), 42–47. <https://doi.org/10.1177/0887302X920100020>

Aline Usanase

Discipline: Law and Legal Studies

Authors:

Abstract Name: Pioneering Justice: Prosecuting Genocide from Nuremberg to Rwanda

Following the atrocities of World War II, the International Military Tribunal at Nuremberg indicted major Nazi war criminals. This established a new, international precedent for prosecuting war criminals and directed future international law. Half a century later in 1994, this trial would be used as a model to help shape the International Criminal Tribunal for Rwanda (ICTR) that prosecuted the highest level of perpetrators who organized and carried out the genocide my own family experienced in Rwanda. While Nuremberg provided a structure for prosecution, it did not define genocide or other forms of war crimes. The ICTR expanded early Nuremberg concepts, making it the first tribunal to define genocide and conceptualize sexual violence as a method of genocide. This research will examine the structural frameworks from Nuremberg that influenced future international tribunals. Using the trial records, transcripts, and photographs within the Nuremberg Tribunal Papers and Photographs, 1945–1946, at the University of Kentucky Special Collections Research Center, research will explore how Nuremberg served as an original framework for future international tribunals, such as establishing fundamental concepts like crimes against peace, war crimes, and personal accountability within the realm of international law. Using the Nuremberg and ICTR trial records and transcripts, this research project will link Nuremberg’s basic foundation to the International Criminal Tribunal for Rwanda, which was the first international tribunal since Nuremberg to hand down a judgment against a head of government. ICTR then expanded early Nuremberg concepts, making it the first tribunal to define genocide and conceptualize sexual violence as a method of genocide. Understanding this linkage invites further research into how later courts, notably the International Criminal Court (ICC), build upon the ICTR’s advancements to meet the needs of emerging atrocities.

Mariam Usman

Discipline: Psychology

Authors:

#1 Mariam Usman

#2 Mía Estés

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Mía Estés

Abstract Name: Effects of acute stress and estrogen treatment on spatial performance in female rats

Our previous findings suggest the presence of stress response during learning impairs acquisition of female rats across various estrous phases in high-naturally cycling estrogens. The present experiment examined the interactive effects of acute restraint stress and estrogen treatment on ovariectomized (OVX) female rats' ability to acquire, retain, and utilize spatial information using the Open-Field Tower Maze task. Thirty-two ovariectomized (OVX) female rats were used. Estrogen was manipulated via subcutaneous implants containing either estradiol (10% in cholesterol) or cholesterol only (controls). Half of each group underwent 30 minutes of bright-light restraint stress before acquisition training. The final groups were: Estrogen-Non Stress (n=8), Estrogen-Stress (n=8), Cholesterol-Non Stress (n=8), and Cholesterol-Stress (n=8). Spatial learning was assessed using the Open-Field Tower Maze (OFTM). In a circular arena, rats learned to locate food on one of four elevated towers. Trials ended when the rat found their food or after three minutes. Each rat had a consistent “correct” tower across trials, receiving 50 acquisition trials (with/without stress) and 25 retention trials at 48 hours and 21 days (no stress). All trials were recorded and scored for the number of errors before choosing the “correct” tower. An a priori set learning criterion of 8/10 consecutively first-choice correct response was used. Videos were analyzed with EthoVision XT (animal tracking software by Noldus), providing movement and behavioral measures. Stress was found to enhance acquisition of hippocampus-dependent spatial learning in OVX-cholesterol rats but impair it in OVX-estrogen rats. Additionally, stress appeared to reduce the rate of re-acquisition during the 48-hour retention test, with no significant effects

observed on long-term retention. Estrogen-treated rats' learning in stressed environments exhibited greater fear responses compared to cholesterol-treated rats.

Alexis Uwechi

Discipline: Biology

Authors:

Abstract Name: Myc gene region rearrangements in newly sequenced *Drosophila* species

Myc is a proto-oncogene and plays significant roles in cell proliferation, programmed cell death, metabolism, growth regulation, and tissue regeneration. Aberrations which upregulate Myc signaling occur in numerous cancers and are often related to rearrangements within the genomic neighborhood of the Myc gene. Myc family genes encode transcription factors which regulate expression of many other genes needed for normal cell division and are found across different taxa. The study of Myc structure and its genomic neighborhood in closely related species provides unique insights into the changes that affect the gene and its surroundings over the course of evolution. This knowledge is highly valuable in context of the fact that Myc –related rearrangements are frequently found in cancers. This project focuses on identifying and characterizing the Myc gene and its genomic neighborhood in recently sequenced species of the *Drosophila* genus. We hypothesize that the overall structure, location, and genomic neighborhood of Myc would be conserved. To identify the location and the degree of conservation of Myc and its neighboring genes, we analyze their genomic sequences and protein sequences in *Drosophila melanogaster* and the related species. We determine whether the order and orientation of nearby genes is preserved and compare the gene expression data with the automated gene prediction models. Our results indicate that, while a substantial portion of the Myc gene is conserved, parts of the gene structure and significant portions of the surrounding genomic neighborhoods present in the newly sequenced species show extensive genomic rearrangements, including potential inversions, deletions and translations.

Eduardo Vaca

Discipline: Engineering

Authors:

#1 Jaya Dofe

Abstract Name: Expanding Education and Access to Weather Satellite Imagery with Affordable Antennas

Access to live weather satellite data is constrained by the high costs of specialized equipment and inadequate signal reception, creating barriers for students and individuals interested in satellite communications. This project addresses these issues by developing a low-cost 120-degree V-Dipole antenna constructed from readily available materials, including 0.5-inch copper pipe, PVC, and 50-ohm coaxial cable. Utilizing open-source satellite tracking, recording, and demodulation software, the design successfully received imagery and data from low-Earth-orbiting weather satellites, such as NOAA-15 and Meteor M2-4. Additionally, the antenna demonstrated versatility by receiving local NOAA weather radio broadcasts at 162 MHz. Compared to a traditional double-cross antenna, the V-dipole antenna delivered a much clearer signal, with less background noise and stronger reception. In our tests near 100 MHz, the double-cross antenna produced weaker results, while the V-dipole achieved about a 13 dB improvement in signal-to-noise ratio, resulting in a noticeable boost in clarity. It means the V-dipole is more effective at capturing cloud cover and infrared imagery broadcasts. Beyond the technical gain, the work demonstrates how affordable, DIY antenna systems

can expand access to real-time satellite data, supporting education, STEM outreach, and communities in remote areas that lack reliable weather forecasting infrastructure.

Meghana Vadlamudi

Discipline: Biology

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Abstract Name: A Data-Driven Approach to Fine-Tuning Photochemical Immunogenic Cell Death via Verteporfin-Lipid Nanoparticles

Immunogenic cell death (ICD) is a key mechanism for generating antitumor immunity. Photodynamic therapy (PDT) has been cited as an effective method for inducing ICD by activating photosensitizers with specific wavelengths of light, which leads to the generation of reactive oxygen species (ROS). In this study, we evaluated several attributes that modulate photochemically induced ICD, including photochemical reaction type, cellular uptake efficiency, subcellular localization, and degree of phototoxicity. We formulated a panel of verteporfin-based lipid nanoparticles (V-LNPs) and analyzed their attributes in relation to the exposure of ICD markers HMGB1, HSP-70, and calreticulin. Given the large number of variables analyzed, we leveraged principal component analysis (PCA) to reduce dataset dimensionality and identify key V-LNP attributes associated with ICD marker exposure. Type I and Type II photochemical reactions were assessed through ROS production using the Singlet Oxygen Sensor Green (SOSG) and fluorescent hydroxyphenyl fluorescein (HPF) probes post 690 nm irradiation. Subcellular localization was assessed using confocal microscopy and quantified with Pearson's coefficient values. ICD markers were assessed following light activation at IC25, IC50, and IC75 doses with a panel of V-LNP constructs, and PCA was used to correlate V-LNP type with ICD marker expression. Using PCA, we identified that Type I ROS production, high cellular uptake efficiency, and subcellular localization to the ER and mitochondria were strongly associated with ICD marker exposure at all inhibitory concentrations. Conversely, Type II ROS production was the least associated with ICD marker exposure. These findings provide insights into the multiparametric processes that govern photochemical ICD by V-LNPs. These data-driven studies offer a framework for the rational development of V-LNPs, emphasizing the role of specific attributes in inducing photochemical ICD. Future work will include detailed analysis of cell death pathways and assessment of therapeutic performance in vivo.

Vedansh Vaidya

Discipline: Psychology

Authors:

#1 Rhea Chatterjee

#2 Aditri Balaji

Abstract Name: Addressing Loneliness and Cognitive Decline: The Role of Art Therapy and Mental Stimulation in Nursing Centers

Loneliness and depression have impacted over 60% of elderly adults living in nursing centers; however, studies have investigated the effects of art therapy in residents, underscoring its role in emotional well-being, behavior, and reducing cognitive decline. We aim to critically analyze prior studies, determine methodological limitations, and identify key knowledge gaps to inform future research directions and improve non-therapeutic approaches to aging within long-term care facilities. To address gaps in existing research, various peer-reviewed, edited, and scholarly research papers were analyzed. Various restrictive search factors and keywords were utilized to reduce excessive search engine feedback and target studies applicable to the thesis. The findings, results, and conclusions of each study were critically analyzed and expanded upon. Findings suggest that art therapy and cognitive interventions such as arithmetic packets and memory tests, are effective at combating the effects of cognitive decline, especially when used in group settings. By regularly working on math and reading packets, nursing home residents are consistently using problem-solving skills and critical thinking. Art therapy has shown to enhance memory through recall and image visualization and group therapy improves social wellbeing in senior citizen populations. The therapies allow seniors to communicate and create connections with researchers and fellow community members as they complete activities. Through this systematic review of this research, we found that senior citizens that engage with art and cognitive interventions can improve both emotional well being and cognitive function. To strengthen the current research, we suggest that further studies should include large and more diverse participants and explore the combination of different intervention strategies. Further, standardized outcome measures can be used to assess the real effectiveness of these two interventions and can pragmatically benefit our aging population.

Lauren Vaillancourt

Discipline: Sociology

Authors:

#1 Lauren Vaillancourt

Abstract Name: De-influencing You: The Effect of Social Media Comments on Responses to Overconsumption

I aim to analyze how comments on social media overconsumption content could either suppress or encourage our own consumption patterns. The rise of overconsumption on social media is well-documented, but a lack of solutions persists. Researchers recognize comments influence a user's perception of content, but I uniquely evaluate this as an overconsumption intervention. Current solutions/interventions include frameworks, online courses, and social media posts, but these methods are either difficult to scale or time-intensive. Social media comments are accessible, commonly read, and polarizing (encouraging or disapproving of overconsumption), and simply seeing negative comments on social media could inspire people to reduce materialistic desires. However, when positive comments encouraging overconsumption are most prominent, we may further encourage an excessive lifestyle. All data will be gathered through a survey. Participants first watch a 40-second overconsumption video (a skincare organization video with 150+ products displayed) alongside comments under 3 conditions; positive, negative, or a control (no comments). Next, I control for users' connection to the influencer/their lifestyle. Finally, participants complete a 10-minute guided reflection and craft a comment of their own to the discussion. Through topic modeling and sentiment analysis of written content, I evaluate what topics/behavioral traits emerge by condition and the emotional charge of responses to

evaluate alignment of condition (positive or negative) and written response sentiment. I expect the negative group will exhibit stronger reactions than the positive group to overconsumption content, and will more frequently intend to reduce consumption or re-evaluate consumption habits. However, the positive condition may encourage materialistic thinking, with participants lamenting their lesser consumption compared to the video. Final recommendations will be presented to social media stakeholders to display effects of comments, and managers of comment algorithms to display how they prioritize comments influences user response to overconsumption.

Seyedeh Parnian Vakili

Discipline: Biology

Authors:

- #1 Dr. Nikki K. Lytle
- #2 Dr. Priyanga Jayakrishnan
- #3 Dr. Michael B. Dwinell
- #4 Dr. Victor X. Jin
- #5 Dr. Kun Fang
- #6 Donovan Drouillard

Abstract Name: Investigating the Impact of Midkine in Pancreatic Cancer Progression and Liver Metastasis

Pancreatic cancer is the third leading cause of cancer deaths in the United States. As with most cancer-related fatalities, metastasis is the primary cause of death in cases of pancreatic cancer. Patients diagnosed with advanced metastatic disease have a 5-year survival rate below 5%. Our lab previously showed that oxaliplatin (chemotherapy)-treated mice displayed accelerated liver metastasis, and identified Midkine (MDK), a growth factor, as significantly upregulated in midlobular hepatocytes. MDK is a secreted protein involved in various cellular processes such as survival, proliferation, and cancer progression, but its role in pancreatic cancer liver metastasis remains unclear. This study aims to investigate the role of MDK in pancreatic cancer progression and establishment of liver metastasis. Analysis of publicly available data reveal that high MDK expression is associated with the more aggressive basal subtype of pancreatic cancer and MDK is upregulated in liver metastases as compared to primary disease. Additionally, single-cell RNA sequencing datasets from pancreatic cancer patients revealed that pancreatic cancer cells express MDK and high levels of the MDK receptors SDC1 and SDC4. Our data further indicate that human pancreatic cancer cell lines overexpress MDK and its receptors, SDC1 and PRKCD, as compared to normal immortalized pancreatic epithelial cells. Furthermore, pancreatic cancer cells treated with recombinant Midkine (rMDK) showed increased migration compared to the vehicle control, while cells treated with the Midkine inhibitor (iMDK) showed reduced migration. These results suggest that MDK can promote tumor cell migration and potentially support metastatic progression. Our overarching goal is to test if MDK may represent a novel therapeutic target for preventing metastatic progression and, ultimately, improving patient outcomes.

Suryatej Vakkalanka

Discipline: Health and Human Development

Authors:

- #1 Shreya Ravi
- #2 Leah Harris
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- #5 Joann Truong

#6 Prasanna Padmanathan
#7 Hannah Tran

Abstract Name: Investigating the Prevalence of Hypertension, Hyperglycemia, and Associated Lifestyle Factors in the Homeless Population of Dallas, Texas

Cardiovascular disease remains one of the most significant health concerns in the United States, and its effects are often magnified in underserved populations. In Dallas, individuals experiencing homelessness face unique challenges that put them at higher risk for poor cardiovascular outcomes. Limited access to healthcare, unstable living conditions, and inconsistent access to healthy food, safe environments, or substance use resources all contribute to this risk. The UT Dallas chapter of Hearts for the Homeless (H4H) is launching a study to examine how lifestyle factors influence hypertension and elevated blood glucose levels in this vulnerable population. This study will involve collecting blood pressure and blood glucose readings and administering a survey-based questionnaire that asks about participants' lifestyle habits using questions from nationally recognized surveys such as the Pittsburgh Sleep Quality Index, AUDIT-C, and U.S. Household Food Security Survey Module. Data will be gathered through screening events conducted in collaboration with local homeless shelters and food pantry centers throughout Dallas. The goal is to identify specific patterns between behavior and health to better understand the challenges this population faces. H₁: Individuals who regularly smoke or use substances will have a significantly higher prevalence of hypertension ($\geq 140/90$ mmHg) compared to non-users Substance Use $\rightarrow$ Hypertension. Variables: Substance use (binary) vs. Hypertension (binary). Statistical test: Chi-square test (one-sided). H₂: Individuals with poor sleep quality (≤ 4 hours/night or frequent sleep interruptions) will have significantly higher blood glucose levels than those with ≥ 6 hours of uninterrupted sleep Sleep Quality $\rightarrow$ Blood Glucose. Variables: Sleep quality (binary) vs. Blood glucose (continuous). Statistical test: Independent t-test (one-sided). H₃: Individuals reporting inability to afford balanced meals will exhibit elevated blood pressure and blood glucose readings compared to those with higher food security Food Security $\rightarrow$ BP/Glucose. Variables: Food security (binary) vs. BP (continuous). Statistical test: Independent t-test.

Antoine Valadon

Discipline: Computer Science

Authors:

Abstract Name: Python-Based Hybrid BB84-Kyber Simulator: Quantum-Resistant DoD Network Keys vs. MITM Attacks

The rapid advancement of quantum computing has brought the "harvest now, decrypt later" problem to the forefront, making quantum-resistant security a national priority for critical infrastructure, particularly within Department of Defense (DoD) networks. This urgent need to achieve quantum-readiness by 2035 necessitates innovative cryptographic solutions. This research simulates a hybrid quantum key system combining BB84 Quantum Key Distribution (QKD) and CRYSTALS-Kyber (a NIST-selected post-quantum cryptography algorithm) using Python and Qiskit. The primary goal is to test the system's resilience against man-in-the-middle (MITM) and denial-of-service (DoS) attacks in a simulated military network environment. The approach merges BB84's inherent quantum detection of eavesdroppers—modeled by simulating light particle states—with Kyber's robust, quantum-safe key encapsulation for data encryption. A custom Python network simulator introduces real-world channel noise, interference, and active attack scenarios, alongside necessary error correction protocols. Key metrics being quantified include Quantum Bit Error Rate (QBER), key generation speed, security strength, and communication delay under combined cyber-quantum threats. Expected results will focus on quantifying the system's performance using these key metrics. We hypothesize that the hybrid system will maintain a significantly lower QBER compared to classical methods during MITM attacks, and that Kyber's key exchange efficiency will enable faster overall communication

latency under DoS pressure than the use of BB84 alone. This approach is anticipated to show strong promise for Army Cyber Command operations in defense against mixed cyber-quantum threats. This simulation effort connects physics-based security with network defense, directly addressing national quantum migration risks using accessible, open-source tools, demonstrating a contribution to military quantum readiness.

Julianne Valdepenas

Discipline: English and Literature

Authors:
#1 Sid Ray

Abstract Name: Captain Kidd and the Power of Rhetoric

From Long John Silver to Captain Jack Sparrow, pirates have long held a special place in the Western imagination. When we think of pirates, images of daring sword fights, adventures to far-away lands, and treasure chests piled high with gold come to mind. This popularization disregards the truth of seafaring and obscures that piracy and commissioned sailing was essentially a way for the rich and powerful to make extra money. In this project, I examine how primary sources (from paper and digital archives) and secondary sources (public-facing and academic) present two different version of Capt. William Kidd: the legendary pirate, hanged and gibbeted in London, and the married-with-children, slightly mean New York City privateer. A circumstantial account of Kidd's life written in 1810 describes him as "neither remarkable for the excess of his courage, nor for the want of it." The debate regarding the truth of Kidd's career continues with maritime historians who either conclude that Kidd was indeed guilty of the charges laid against him or exonerate him completely. This debate largely stems from his 1701 trial, when varying perspectives on Kidd's character and activities would converge. The trial ultimately illustrates the power of rhetoric to characterize a legacy. I analyze the testimonies of Kidd's crew, Kidd's own defense for his actions, and the poetry of broadside ballads immortalizing him to reveal the fault-lines of these varying perspectives. This project examines a historical figure with nuance beyond the sensationalized image now cemented in the popular imagination.

Lexie Valdez

Discipline: Health and Human Development

Authors:
#1 Joel Frees

Abstract Name: Uncovering the Intersection of Occupational Therapy and Maternal Health: A Study on the Needs, Interests, and Awareness Among Pregnant and Postpartum Women

The emerging field of Maternal Occupational Therapy presents a valuable opportunity to enhance support, resources, and education for pregnant and postpartum women. This study aims to assess the awareness, interests, and needs related to maternal occupational therapy among women in the Oklahoma City metropolitan area. Participants consisted of women within the Oklahoma City metropolitan area who were pregnant or had given birth in the past 5 years. A self-report survey focusing on experiences and perceptions of pregnancy and postpartum regarding participants' most recent pregnancy or birth was given. Data analysis revealed significant gaps in awareness of occupational therapy services and access to relevant support resources. The most significant and consistent gaps shared by participants include awareness of maternal occupational services, consistency of healthcare, mental disorder treatment, and treatments for pelvic floor

complications. These findings highlight a disconnect between available occupational therapy interventions and maternal health needs. In order to truly impact maternal health outcomes and help reduce the elevated maternal mortality rate in the United States, it is essential not only to expand maternal occupational therapy services but also to ensure that women are aware of and can access these resources through targeted education and outreach efforts. Keywords: maternal health, occupational therapy, maternal care, postpartum, pregnancy, Oklahoma City metropolitan

Kristell Valdivia

Discipline: Criminology/Criminal Justice

Authors:

#1 Anjel Stough-Hunter

Abstract Name: Student Perceptions of Fairness in AI Policies

Faculty are increasingly addressing AI usage in the class through syllabus policies. However, faculty policies vary dramatically and little is known about students' perceptions of these policies. Using Tom Tyler's conceptualization of procedural justice, this study examines the impact of types of AI policies on perception of justice in the classroom. Surveys that randomly assigned one of three types of syllabi policies, one that encourages AI use, one that limits AI use and one that forbids AI use, were distributed to current college students. Fairness was measured using a modified version of a procedural justice scale. SPSS was used to analyze the relationship between AI policy type and perceptions of procedural justice, as well as how these perceptions varied by race, gender and major. The results will be discussed in this presentation.

Carolina Valencia

Discipline:

Authors:

Abstract Name: Mentor-Student Partnerships: Applying Evidence-Based Practice through The \$100 Solution

This session highlights the integration of high-impact learning practices within the curriculum through The \$100 Solution, a model that transforms service-learning experiences into research opportunities. Designed for undergraduate students in the Bachelor of Science in Rehabilitation Sciences program, this approach promotes civic engagement, critical thinking, and evidence-based practice by empowering students to identify and address real-world community needs. Working in small groups, students apply the five pillars of The \$100 Solution, partnership, reciprocity, capacity building, sustainability, and reflection, to assess community needs, implement creative interventions, and evaluate outcomes. Guided by the central question, "With this \$100 bill, what can we do to enhance the quality of life in your community?", students design and execute projects that create measurable and sustainable change. The impact of this initiative is assessed across three dimensions: (1) Participation, number of participants, hours contributed, and type of engagement; (2) Student Learning, growth in analysis, problem solving, civic responsibility, and collaboration; and (3) Community Impact, number of community members served, project effectiveness, and sustainability of partnerships. Survey results from students indicate strong outcomes: 100% agreed or strongly agreed that community service increased their awareness of community needs and enhanced their course learning; 97.1% reported greater awareness of personal biases; and 100% agreed that the experience strengthened their problem-solving skills. By merging service-learning with undergraduate research, this faculty-mentored initiative not only advances student learning and community engagement but also fosters a culture of

innovation, reflection, and collaboration, demonstrating how evidence-based practice can extend beyond the classroom to create meaningful societal impact.

Rishita Valluru

Discipline: Computer Science

Authors:

Sophia Schwartz

Anthony Pozo-Aranda

Abstract Name: LLM Usage in SCADA Systems

Supervisory Control and Data Acquisition (SCADA) systems support critical infrastructure where security and dependability are crucial, like industrial manufacturing, water treatment, and power distribution. As Large Language Models (LLMs) rapidly advance, there is growing interest in using them to assist SCADA operators by summarizing system data, identifying irregularities, and providing natural-language explanations of system behavior. While these capabilities offer clear operational benefits, integrating LLMs into such sensitive environments introduces significant security challenges. LLMs can respond unpredictably to adversarial prompts, unfamiliar data, or ambiguous instructions, creating risks that are unacceptable in high-stakes industrial contexts. This project investigates the security considerations involved in applying LLMs to SCADA environments. To conduct this assessment, we created a controlled, isolated testing environment using Kali Linux and deployed an open-source LLM locally through Ollama to avoid any external dependencies. Within this setup, we developed a structured prompt-testing framework aimed at evaluating common categories of LLM vulnerabilities. These include susceptibility to prompt injection attacks that could override system-level instructions, the potential for unintended information leakage, and the possibility of bypassing built-in model safeguards through indirect or manipulated prompts. By analyzing how the model behaved across these controlled scenarios, we gained early insights into the types of weaknesses that could impact safety, reliability, and integrity within a SCADA system. These initial results highlight the need for specialized security controls when adapting LLMs for industrial environments. The findings from this phase will guide the next stage of our research: designing a SCADA-focused LLM configured with stronger guardrails, improved predictability, and enhanced protections tailored to critical-infrastructure use.

Fiona Valorz

Discipline: Environmental Science and Sustainability

Authors:

#1 Fiona Valorz

#2 Kristen Brown

Abstract Name: Securing the Future Grid: Evaluating Strategies and Challenges to Maintaining Energy Availability Amidst Increased Projected Energy Demand in Texas

As global energy demand rises, exacerbated by heightened electrification, digitalization, globalization, population growth, increasingly severe and frequent extreme weather events, and the scaled development of data storage centers and transmission lines to power emerging technologies, energy grids must adapt to anticipated surges in operational strain. Concurrently, integrating intermittent renewable energy sources into grid systems, an expectation established in response to shifting consumer and stakeholder preferences that prioritize sustainable development, energy availability, and to remain technologically competitive on the

world stage, will introduce variability and complexity to an already labored and unreliable grid. The existing literature present that such challenges are driving more prevalent and prolonged blackouts, with notable cases taking place in Texas, California, and the Northeastern United States in recent years. This paper aims to evaluate the effectiveness of existing strategies to maintain grid security as electricity demand increases by investigating aspects such as the physical reliability, resilience, and load forecasting mechanisms of energy system infrastructure in the state of Texas. To do so, we will conduct a mixed methods analysis with comparative case studies of government reports, the academic literature, and system performance assessments in the United States. Using the E3-US energy-environment-economy model developed by Cambridge Econometrics, we will then forecast the secondary impacts of energy system changes at the state-level, providing insight for economic outcomes and strategic planning. Preliminary findings reveal that key bottlenecks exist in the limited adoption of advanced metering technologies, enhanced storage, regulatory constraints- as in the case of delayed environmental clearances, and underinvestment in adaptive infrastructure modernization- all impeding a transition to a more reliable energy system. Anticipated results will include a lanscape analysis of projected energy demand in Texas, as well as recommendations for regulatory reform and municipal, utility or source operator best practices to support long-term grid resilience and sustainability.

Hannah Van Hise

Discipline: Education

Authors:

#1 Hannah Van Hise

Abstract Name: The Capacity of AI to Assist in Learning: A Rhetorical Analysis

Generative artificial intelligence (AI) has become increasingly popular among undergraduate students for the systems' apparent ability to answer any question imaginable. As such, it becomes necessary to understand how AI systems like ChatGPT affect student learning. Existing research largely falls short, measuring 'learning' according to higher marks or assuming students use AI 'ethically' in practice. In contrast, this paper examines the ways in which AI impacts student knowledge acquisition and critical thinking. It factors in differences between student academic goals, considers studies of expertise and active vs. passive learning, and utilizes Edward R. Tufte's theory of cognitive style to illustrate how AI is detrimental for undergraduate student learning. The research emphasizes the need for prior knowledge and sufficiently developed cognitive skills in order to use AI effectively. The paper concludes by contemplating the long-term drawbacks of overreliance on AI, underscoring both the deterioration of analytical skills and the subsequent fungibility of AI-reliant recent college graduates in the job market.

Roman Van Meter

Discipline: History

Authors:

Abstract Name: United under Torchlight: Valparaiso University's Student Strike of 1970

The student strikes of 1970 were the zenith of student activism, causing the closure of nearly a hundred American universities. Some strikes were deemed a threat to campuses and violently suppressed, such as the shooting at Kent State. While many studies have researched the origin of these national strikes and incidents at larger schools, this paper examines the unique case of Valparaiso University. A small Christian university

that experienced and then quickly diffused, a moment of fiery violence. By examining newspaper archives, this paper argues that Valpo's quick recovery was due to the administration maintaining regular communication channels and working with students on their concerns. Unlike universities where protests became a national tragedy after a careless university response, Valpo protected students' right to protest and the university through collaboration. This case study offers a model for fostering student-admin relations during times of student unrest, which is grounded in dialogue and mutual respect.

Rachel Vandersea

Discipline: Interdisciplinary

Authors:

#1 Karina Vázquez

Abstract Name: Stories from Healthcare Providers: Narratives Behind Service

Medically uninsured patients in the US continue to experience crucial barriers to accessing healthcare. These barriers are notably higher for Spanish-speaking populations, who must overcome not only financial hurdles but also cultural and linguistic challenges when seeking care. Such inequalities are exacerbated by the reduction in funding for Medicare and restrictive policies for healthcare. These often contribute to poorer outcomes and increased disparities. Many uninsured patients rely on the initiatives of free, volunteer-based clinics running in many communities across the country, to meet their basic healthcare needs. This presentation will provide a close view of the work done by volunteer healthcare providers working in these clinics, with a particular focus on those that work with Spanish-speaking patients. My academic research draws from my experience working as a volunteer Spanish interpreter at several Richmond (VA) clinics, from conducting qualitative research that includes interviews with volunteer physicians, nurses, and administrative staff, and from my knowledge of narrative-based and narrative medicine theory. I will delve into the emotional and interpersonal complexities of serving in this environment by revealing professional experiences and realities through narratives. I will focus on the intercultural competence, empathy, and communication skills required to provide equitable care in under-resourced communities. In this presentation, I aim to emphasize the critical role of volunteer providers in bridging healthcare inequities as cultural mediators and listeners and will advocate for increased understanding of these professionals' work.

Natepy Vann

Discipline: Nursing and Public Health

Authors:

#1 Lily Xu

#2 Lena R Hann

Abstract Name: Advancing Sex Education and Health Outcome: The Impacts of Education and Support Programs in Cambodia

In Cambodia, approximately 9% of girls aged 15-19 experience pregnancy, leading to mental health challenges, educational disruption, and limited socioeconomic opportunities. While research has documented various causes of adolescent pregnancy, there is limited synthesis examining how educational barriers, including the pressures surrounding academic failure, intersect with cultural norms, economic pressures, and healthcare gaps to create pathways toward early motherhood. Additionally, the effectiveness of current interventions and the adaptability of evidence-based strategies from other contexts remain underexplored.

This literature review addresses these gaps by systematically analyzing the psychological and socioeconomic effects on Cambodian adolescent mothers. Drawing on reports from NGOs and UNFPA, as well as peer-reviewed research from databases like PubMed and Google Scholar (2014-2024), this study examines how multiple interconnected factors contributed to adolescent pregnancy. The findings reveal that lack of comprehensive sex education, educational pressures that position early marriage as an alternative when girls leave school, cultural norms that frame marriage as family security, and healthcare barriers create challenges where young mothers experience severe emotional distress, educational setbacks, and intergenerational poverty. Critically, this research demonstrates that current interventions, including the Cash Transfer Programme, address immediate financial needs but fail to tackle the underlying educational, cultural, and healthcare factors that perpetuate early pregnancy. The research proposes three culturally-grounded solutions: implementing comprehensive sex education that includes life-planning and reproductive health, strengthening community support systems that provide economic alternatives to early marriage, and improving maternal healthcare access while reducing stigma. By comparing Cambodia's context with the UK's successful Teenage Pregnancy Strategy, this analysis evaluates how evidence-based interventions might be culturally adapted for Cambodia. Future research should evaluate culturally-adapted interventions' long-term impact, investigate media's role in sex education, examine community engagement strategies, and explore policy reforms addressing educational barriers, economic pressures, and cultural factors while respecting family values.

Tvisha Vanteru

Discipline: Engineering

Authors:

#1 Amanda Johnson

#2 Leigh-Ann Antczak

#3 Taylor Hendrick

#4 Rebecca Heise

Abstract Name: Evaluating Genipin as a Low-Toxicity Crosslinker for Hybrid Lung ECM Gels to Improve In-Vitro Disease Modeling

Interstitial lung diseases (ILDs) are characterized by fibrosis and stiffening of the lung interstitium, leading to impaired gas exchange and non-physiological cell behavior. The native viscoelasticity and biochemical environments of lung extracellular matrix (ECM) cannot be replicated through traditional tissue culture flasks. Previously we have developed ECM-derived hybrid gels composed of a hydrogel embedded within a cryogel backbone, better mimicking lung tissue microenvironments. However, the majority of hybrid gels utilize glutaraldehyde, a cytotoxic crosslinker that disrupts cell adhesion. To address these limitations, genipin has emerged as a natural crosslinker with significantly reduced cytotoxicity. Despite this potential, its use in lung ECM-derived hybrid gels remains largely unexplored. This project evaluates genipin as a safer, more biocompatible alternative to glutaraldehyde for crosslinking ECM-derived cryogel-hydrogel hybrids. To create ECM gel solutions for both components, human healthy lung tissue is decellularized, lyophilized, cryomilled, enzymatically digested, and neutralized. A fixed ECM concentration and different crosslinker concentrations are used to create cryogels, including a glutaraldehyde control and genipin concentrations of 0.1%, 0.3%, 0.5%, and 0.625%. Pore structure is evaluated using scanning electron microscopy and ImageJ software. Cytocompatibility is assessed using live/dead staining A549 cells seeded into each gel. Mechanical properties are characterized through nanoindentation. In comparison to glutaraldehyde gels, we expect genipin-crosslinked cryogels will exhibit reduced cytotoxic activity and improve cell adhesion while maintaining similar pore size. ECM-derived cryogel hybrids that are safer and physiologically relevant will be defined by identifying the genipin concentration that optimizes biochemical and mechanical properties, including viscoelasticity, stiffness, and water content. The goal of this study is to enhance disease modeling and preclinical testing for ILD research by increasing biocompatibility in lung culture platforms. Future works include incorporation of hydrogel into cryogel backbone and cell proliferation studies.

Arielle Vargas

Discipline: Education

Authors:
Juliana Ayala

Abstract Name: Centering Student Voices through the Co-Design of Authentic Mathematics Digital Clinical Simulations for Teacher Practice

Abstract: As calls grow for mathematics teachers to engage in ambitious and equitable instruction, opportunities to rehearse these practices in meaningful ways are essential. Digital Clinical Simulations (DCS) are emerging as a powerful mechanism for this, offering educators a structured environment to step into complex classroom scenarios, react intuitively, practice high-stakes decision-making, and reflect critically on their instructional approach. This vital need for simulated practice, however, leads to a critical and often overlooked question: Who is designing these sophisticated practice spaces, and whose perspectives are embedded within their structure? In most industries user feedback is essential to evaluating effectiveness and promoting innovation. Yet, in education students rarely have the opportunity to provide feedback, much less be part of the design process for teacher practice. To address this gap, we co-designed DCS with students of color, centering their lived experiences and perspectives on equity as the foundation of teacher practice scenarios. Through our design institute, students surfaced their mathematical struggles, insights, and cultural funds of knowledge to shape simulations that more authentically represent the complexities of equitable instruction. Preliminary findings highlight the emergence of *sonder* which is students' recognition that each peer's learning experience is as vivid and multifaceted as their own. After co-designing DCS, students were interviewed to reflect on their experience. Students mentioned how through designing DCS, they fostered a greater sense of empathy and understanding for teachers' work in supporting diverse learners. Students also reported feeling empowered as their narratives became sources of expertise, reframing past challenges as contributions to more humane and contextually grounded teacher learning tools. This co-design approach illustrates how centering student voices within DCS development can strengthen both the authenticity and the equity-driven aims of mathematics teacher education.

aileen vargas

Discipline: Nursing and Public Health

Authors:
#1 Aileen Vargas
#2 Maria Fuentes
#3 Gabriel Ibarra-Mejia

Abstract Name: Heat Stress Effects and Electrolyte Balance on Construction Workers in El Paso Texas: A Casey Study

Health issues caused by heat stress have emerged as a global public health concern. In the United States, heat exposure is responsible for as many as 2,000 worker fatalities and 170,000 injuries annually. Construction workers are a vulnerable population, who are recurrently exposed to extreme ambient heat conditions and are at high risk for electrolyte imbalance, heat-related illness (HRI), and organ dysfunction, particularly of the heart and kidneys. Exposure to high ambient temperatures challenges the kidneys' ability to regulate blood pressure, minimize fluid loss associated with severe dehydration, and excrete nitrogenous waste, leading to chronic kidney disease (CKD). CKD is one of the most common and severe complications of heat stroke and frequently reported as an epidemic occurring in regions with extreme heat (40-80% mortality rate), notably affecting young male workers exposed to intense heat conditions daily. In this study, we ask, how does high

workplace ambient temperature affect hydration and electrolyte balance? Methods: An observational, quantitative, descriptive field study was conducted on construction workers (n=4) during the month of September 2025 in El Paso, Texas. Ambient temperature was measured using the ATMOS41 Gen2 weather station. Analysis of hydration status and electrolyte loss was performed through vital signs and sweat tests using NIX Biosensors™. Results: Under a high ambient temperature of at least 85°F, the average sweat rate was 660.2 ± 460.9 ml/hr., and the average electrolyte loss rate was 882 ± 974 mg/hr. Potassium was found to be particularly high in all participants, which could be an indicator of HRI and a marker for early renal tubular disease. Conclusion: These findings can help us recognize early warning signs of electrolyte imbalance induced by ambient heat exposure with potential kidney health effects and guide workplace prevention policies that protect construction workers in high temperature environments.

Aiden Varghese

Discipline: Health and Human Development

Authors:

Abstract Name: The Gendered Heart: Closing the Gender Gap in Heart Disease Diagnosis and Treatment

Cardiovascular disease (CVD) continues to be the primary cause of death for both men and women in the United States, being characterized and treated in a historically male-centric manner. This research paper will address the disparities in risk factors for heart disease between genders, gender differences in diagnosis, and gender differences in management/treatment, thereby demonstrating the critical importance of incorporating sex specific factors into the field of cardiology. It has been demonstrated that lifestyle changes such as physical activity and smoking cessation can reduce CVD risk universally. This signifies a necessary shift toward being proactive in the prevention of CVD. However, this does not prove that these universal factors will yield fruitful outcomes when the stigma of unique female risk factors are ignored. Unique female risk factors include aspects of reproductive history (i.e., pre-eclampsia and gestational diabetes) and anatomical differences (i.e., microvascular arterial structure and distinct genetic regulation). Most importantly, this research will demonstrate the gender gap in clinical practice, which includes the underrepresentation of women in clinical trials, delayed diagnoses resulting from atypical symptomology of women, and less aggressive medical management (i.e., lower guideline-recommended medication and diminished cardiac rehabilitation enrollment). These systemic biases provoke this disparity and therefore contribute to higher mortality rates and poorer long-term outcomes for woman than their male counterparts. To eliminate the gender gap and decrease CVD mortality, cardiology must move beyond general models. It is recommended to enhance the development and implementation of sex-specific diagnostic thresholds, risk stratification tools, and comprehensive, holistic care protocols that take into account the unique biological risk factors for women, as well as any biases that are part of institutionalized processes.

Celestina Vasquez

Discipline: Interdisciplinary

Authors:

#1 Maura Krestar

Abstract Name: First Responders and Communicating with Individuals with Dementia

First responders, such as police officers, firefighters, EMTs, and other emergency personnel, often interact with individuals who may be confused, frightened, or unable to communicate clearly during a crisis. Because

of this, the way first responders communicate can greatly influence the safety, comfort, and overall outcome of an emergency situation. As individuals age, the likelihood of developing a mental illness such as dementia or related neurocognitive conditions increases. The number of people living with the condition is projected to rise by nearly triple by 2050, from 55 million to 139 million worldwide. This study aims to better understand how first responders perceive their preparedness and communication strategies when working with individuals who have moderate to severe dementia. Using an online survey, first responders from multiple departments answered questions about their past experiences, the type of training they have received, and how confident they feel when responding to calls involving people with significant cognitive impairment. Initial results show that communication approaches vary widely across departments. Many first responders reported limited or inconsistent training on how to communicate effectively with individuals experiencing severe dementia. However, those who had received specialized training, either through their job or personal experience, expressed more confidence in their ability to communicate safely and effectively during real emergencies. These findings highlight a need for more consistent, accessible, and role-specific dementia training for first responders. Improving training in areas such as communication strategies, de-escalation, safe assistance, and reducing confusion during transport may help responders feel more prepared and may improve outcomes for individuals with dementia. By identifying gaps in current knowledge and training practices, this study provides insight that can support the development of better training programs. Strengthening first responder competence in this area may lead to safer interactions and more effective emergency care for people living with dementia.

Lindsay Vasquez

Discipline: Health and Human Development

Authors:

#1 Lindsay Vasquez

Faika Zanjani

Abstract Name: Dementia: Community Education Wider Impacts

Dementia is not a normal component of aging; it is a clinical syndrome characterized by progressive decline in memory, communication, reasoning, and other cognitive functions resulting from neuronal damage. Common etiologies include Alzheimer's disease, vascular dementia, frontotemporal dementia, and Lewy body dementia. Although most forms are irreversible, certain cases linked to medication effects, metabolic disturbances, infections, or depression may improve with appropriate treatment. Dementia affects multiple domains of daily functioning, influencing attention, problem-solving, behavior, and social engagement. As of 2024, fourteen modifiable risk factors — including untreated hearing loss, hypertension, smoking, and social isolation — have been identified as significant contributors to dementia risk and can be targeted through early intervention. As part of this project, I contribute to community-based prevention efforts by creating bilingual (Spanish and English) educational videos that have received positive public feedback, and by administering the Montreal Cognitive Assessment (MoCA) to older adults as part of early cognitive screening initiatives. In addition to reporting video development process, frequency of use, inquiry about MoCA screenings, findings will also identify themes from the video feedback. Together, these efforts underscore the importance of accessible education and proactive screening in promoting brain health and reducing dementia risk.

Ekaterini Vassiliadi

Discipline: Social Work and Human Services

Authors:

#1 Catherine Vassiliadi

Abstract Name: Improving disaster aid supply chain performance in domestic hurricane responses: Where AI Comes In

Hurricanes are historically the deadliest and most destructive weather disasters in the United States, according to the National Oceanic and Atmospheric Administration (NOAA). Because logistics activities can account for up to 60 to 80% of total humanitarian costs and past disasters have shown that weak logical strategies can create bottlenecks and poor decision-making, this research evaluates whether Artificial Intelligence (AI) can strengthen these processes. It explores the question: “How can Artificial Intelligence-driven methods improve disaster aid supply chain performance in domestic hurricane responses?” AI has demonstrated strong capabilities in interpreting complex, multidimensional data in dynamic environments such as supply chain disruption, making it well-suited for disaster contexts. Considering up to 30% of delivered aid lost due to inefficiencies in past crises, opportunities exist for AI to enhance resource prioritization, allocation, and overall responsiveness. This study uses a comparative analysis to examine the differences in decision processes by Artificial Intelligence. A large language model (LLM), OpenAI’s ChatGPT-4, was tested by prompting it to develop a response plan for simulated hurricanes based on historical meteorological data from NOAA’s National Hurricane Center Data Archive and financial constraints from the American Red Cross’s publicly available Consolidated Financial Statements. The LLM’s recommendations were then compared to the American Red Cross’s Post-Hurricane Response reports. The goal is to assess whether the LLM proposes more efficient or adaptive strategies than those used historically. If so, the findings may support future integration of AI-assisted decision-making within government and non-profit disaster response operations.

Za’Kenzie Vaughn

Discipline: Gender, Ethnicity, Diversity, or Cultural Studies

Authors:

#1 Erik Huneke

Abstract Name: Dehumanized Desire: How Pornography Shapes Perceptions of Womanhood

This research explores how women’s representation in pornography has affected attitudes toward women in modern society. With the evolution of pornography from magazines and VHS to today’s digital platforms, sexual content has become more accessible than ever. Its recurring portrayals of women as objects of consumption rather than autonomous beings contribute to the perception of women as inferior, subhuman, and objectified. Mainstream porn often depicts women through themes of degradation, objectification, and infantilization. These portrayals are especially harmful to youth, as they negatively shape their perceptions of gender, intimacy, and the value of women in everyday life. These influences function on both conscious and subconscious levels, though often going unnoticed. Analyzing these depictions is necessary as digital media becomes an increasingly integral part of global society. This research examines how these portrayals affect Millennials and Gen Z’s ideas of gender and intimacy, and how access to sexual content at a younger age influences their social development and views of intimate relationships. Conducting surveys and interviews with Millennial and Gen Z participants provides insight into how exposure to pornographic stereotypes influences their expectations, behaviors, and attitudes. This analysis also assesses how existing research explains its findings, the language scholars use when discussing women’s portrayal in pornography, and how scholarly bias may overlook key perspectives. Understanding these influences offers important context in guiding strategies that support healthier social and relational development among youth exposed to sexualized media. Together, these elements demonstrate how pornography reinforces misguided patriarchal understandings of women, fundamentally highlighting the urgency for culturally informed media literacy and more accurate representation in digital spaces.

Chloe Vautrin

Discipline: Health and Human Development

Authors:
#1 Judy Folmar

Abstract Name: An Assessment of Interactive Fiction Software as a Teaching Tool for Counseling Skills

Currently, there is an increased demand for quality mental health providers due to widespread burnout, rising mental health needs, and insufficient funding. Additionally, there has been a growing reliance upon technology-based counseling and mental health supports such as telemental health due to COVID-19. However, there is a lack of focus on integrating technology-based teaching tools that align with those utilized by telemental health professionals. While empathy development is essential for mental health professionals, a gap exists between the spheres of teaching empathy and technology. Therefore, this study seeks to identify the use of interactive fiction software as an effective tool for counselors' education and skill development. More specifically, the researchers of this study are interested in how the interactive nature of a choose-your-own-adventure counseling fiction software tool can impact student learning experiences, given the power and moral decision-making qualities inherent in this tool. Prior research on this topic has examined various age groups and fields such as nursing and medicine; however, there is a gap in the literature specifically addressing undergraduate counseling students, the focus of this research. This study employs a mixed-methods design, incorporating interviews and survey responses from students and faculty of Elon University's counseling families and individuals course in Fall 2025. The study aims to identify higher levels of engagement, reflection, and preparedness for future client interactions among respondents, which is crucial in discussions regarding the development of future educational tools. Findings from qualitative data analysis of students' reported experiences with the interactive tool will help shape future counseling pedagogy.

Bianca Vazquez

Discipline: Psychology

Authors:

Abstract Name: The Impact of Early-Onset Alzheimer's Disease on Creativity and Style in the Fiction of Terry Pratchett

This study investigates how early-onset Alzheimer's disease influenced the creative writing style and thematic elements in the works of Terry Pratchett, a renowned fictional author. Using a comparative textual analysis of novels written before and after his 2007 diagnosis, the research examines linguistic shifts, narrative complexity, and thematic evolution to understand the relationship between neurodegenerative illness and literary creativity.

Yasaswi Veera

Discipline: Computer Science

Authors:
#1 Luana Carvalho
#2 Amy Lasek

Abstract Name: Identifying RNA Splicing Changes During Alcohol Withdrawal Using an Optimized RNA-Seq Analysis Pipeline

Alcohol use disorder (AUD) produces lasting changes in the brain, including shifts in gene expression and RNA splicing that contribute to the neuroadaptations observed during withdrawal. The ventral hippocampus, a region involved in motivation, emotional processing, and stress regulation, is particularly sensitive to alcohol-related molecular changes. To investigate these processes, this project analyzes RNA-Seq data from the ventral hippocampus of rats exposed to chronic alcohol followed by withdrawal, with a focus on identifying transcript-level and splicing-related alterations. A reproducible RNA-Seq pipeline was developed and refined using tools such as STAR, FeatureCounts, edgeR, and WGCNA, enabling efficient processing of more than 50 million sequencing reads across 25 datasets. Pipeline improvements increased runtime efficiency by 25 - 40% and strengthened consistency across analyses. Through statistical modeling, dimensionality reduction, and functional enrichment approaches, the analysis identified expression and splicing patterns associated with neural signaling and stress-response pathways that may underlie behavioral and physiological changes during withdrawal. To support continuity within the research group, a complete RNA-Seq training guide was also created to standardize data processing and improve reproducibility across projects. Overall, this work advances efforts to characterize transcriptomic changes associated with alcohol withdrawal and provides an optimized computational framework for future neurogenomics studies. The project highlights how integrating efficient computational pipelines with transcript-level analyses can deepen our understanding of AUD-related molecular adaptations and offers attendees insight into both the biological findings and the data-science approaches used to uncover them.

Mahitha Veeram

Discipline: Psychology

Authors:

#1 Lauren Lindsey

#2 Sarah Sant

#3 Donna Murdaugh

Abstract Name: Parent-Performance Discrepancies in Executive Functioning Among Pediatric Oncology Patients

Pediatric patients with non-central nervous system (CNS) origin cancers are at elevated risk for executive functioning (EF) difficulties due to chemotherapy neurotoxicity, stress, and early cognitive disruptions. EF challenges affect daily life, school performance, and independence skills. These difficulties are best quantified with self-report measures and objective cognitive testing; however, the degree to which these methods align in childhood cancer survivors remains understudied. This study investigated the correspondence between parent-reported EF and performance-based EF tasks among childhood survivors of non-CNS cancers receiving neuropsychological evaluation. Parent perceptions of EF were measured using the BRIEF Global Executive Composite (GEC), reflecting behavioral regulation and metacognitive functioning. Performance EF was assessed using two D-KEFS tasks aligned with BRIEF domains: Color-Word Inhibition (inhibitory control) and Design Fluency Total Correct (nonverbal cognitive flexibility). Demographic variables included age, sex, parent education, and cancer diagnosis. 61 participants were included (mean age = 12.1 years, female = 51%). Diagnoses included leukemias (54%), lymphomas (18%), and solid tumors (28%), with acute lymphoblastic leukemia (ALL) representing the largest subgroup (51%). Results demonstrated no significant associations between BRIEF GEC and either Color-Word Inhibition ($r = -.13$, $p = .33$) or Design Fluency ($r = -.09$, $p = .49$) utilizing Pearson correlations, indicating weak correspondence between parent-reported and performance-based EF. A paired-samples t-test comparing standardized scores showed no significant difference in impairment between methods, $t(56) = .03$, $p = .97$. A regression predicting BRIEF GEC from performance EF and demographics was significant, $F(5,51) = 2.68$, p

= .032, but neither D-KEFS task predicted parent-report EF; only parent education was significant ($\beta = -.39$, $p = .004$). Findings demonstrate limited alignment between parent perceptions of EF and structured EF task performance, suggesting that each captures distinct aspects of cognitive functioning. Results highlight the need for multimethod EF assessment in pediatric oncology to support accurate identification of cognitive challenges and clinical care.

Neha Veeramalla

Discipline: Psychology

Authors:

#1 Neha Veeramalla

#2 Wyatt Brown

#3 David Chester

Wyatt Brown

Abstract Name: Differential Associations Between Narcissistic Antagonism, Narcissistic Neuroticism, and Negative Empathy

Narcissism is reliably linked to increases in cognitive facets of empathy– the ability to understand the emotions of others. The relationship between the two facets of Narcissism (i.e., Narcissistic Neuroticism and Narcissistic Antagonism), which are associated with externalizing behaviors and negative empathy, is the ability to understand or vicariously experience the negative emotions of others, remains understudied. Participants ($N = 191$) completed self-report measures of Narcissistic Neuroticism, Narcissistic Antagonism, and negative empathy. Correlational analyses were conducted to examine the associations between Narcissistic Neuroticism and Narcissistic Antagonism related to negative empathy. A statistically significant positive correlation emerged between Narcissistic Neuroticism and negative empathy ($p = .002$). A numerically positive, but not statistically significant, correlation emerged between Narcissistic Antagonism and negative empathy ($p = .358$). Counter to our pre-registered prediction, the positive association between Narcissistic Neuroticism and negative empathy was not statistically significantly stronger than the association between Narcissistic Antagonism and negative empathy ($p = .05$). Importantly, we were underpowered to detect the size of the difference between the two dependent correlations (i.e., $r = 0.16$). Future research might use experimental manipulations of affect or examine empathic behaviors to further examine these relations.

Jonathan Velasquez

Discipline: Psychology

Authors:

Kiara O'Neal

Abstract Name: Listening to Voices: Student, Faculty, and Administrator Perspectives on Course-Based Undergraduate Research Experiences (CUREs)

Course-based Undergraduate Research Experiences (CUREs) embed authentic research projects into existing courses, enabling students to contribute to real scientific investigations while developing transferable skills and earning course credit. CUREs expand access to research opportunities for students that were once limited, allowing broader participation in research and project-based learning. While prior studies have emphasized student outcomes, fewer have qualitatively examined how students, faculty, and administrators with and without CURE experience perceive the implementation and impact of CUREs. Understanding these

perspectives is essential, as faculty play a central role in course design and delivery, administrators influence institutional funding and resource allocation, and students are the recipients of these experiences. This NSF-funded study investigates how students, faculty, and administrators in STEM fields at Kennesaw State University view the benefits, challenges, and logistics of integrating CUREs into the curriculum. Seven focus groups were conducted with participants who have and have not been involved in CUREs. The qualitative data are currently being analyzed in NVivo using a structured codebook encompassing themes such as student benefits, accessibility, institutional support, teaching logistics, and barriers encountered before and during a CURE, among others. Although analysis is ongoing, this study seeks to identify areas of alignment and divergence across participant groups to better understand the opportunities, constraints, and long-term sustainability of CUREs within STEM education. By examining these perspectives, this research aims to deepen our understanding of how CUREs can be better designed and supported, ensuring that both students and faculty benefit from meaningful, accessible research experiences.

Jayred Velasquez

Discipline: Biology

Authors:

Abstract Name: Shifting Baselines in Urban Nature: Long-Term Monitoring of Zebra Longwing Butterflies

Insect populations are declining globally, yet these losses often go unnoticed in everyday landscapes. Urban development accelerates this disconnect, fostering shifting baseline syndrome: the tendency for each generation to accept a progressively degraded environment as “normal,” making long-term biodiversity losses less noticeable. The Florida International University (FIU) Nature Preserve is a small forest fragment surrounded by campus infrastructure. From 2011 to 2017, its forested area decreased by about 33%, shrinking the perimeter from 998 m to 703 m. During this period, a community science project used mark-recapture methods to monitor zebra longwing butterflies (*Heliconius charithonia*), revealing population declines alongside habitat loss. In 2025, we repeated the survey using the same approach. Forest measurements confirmed no further clearing since 2017, yet the estimated population was only 32 individuals, lower than the minimum recorded in 2018. This suggests continued decline despite habitat stabilization. By combining updated population estimates with historical imagery, this study demonstrates how infrastructure expansion and fragmentation can have lasting impacts on urban biodiversity. Beyond documenting changes, the project engages students and local residents in fundamental research, emphasizing the conservation value of small urban preserves and the risk that shifting baseline syndrome will normalize butterfly population declines.

Mia Velasquez

Discipline: Sociology

Authors:

#1 Daniel Morales

#2 Gabriela León-Pérez

Auder Reyes-Morales

Ashley Diaz

Abstract Name: The Latino Virginia Oral History Project: An Analysis of the Latino Immigrant Experience Through Resilience

Based on a report conducted in recent years from the National Institute of Minority Health, from 2019 to

2023, the percentage of Latinos in Virginia has increased to 10.6%. With this comes a blend of culture and a shared experience among Latinos who face different realities from their home of origin compared to the United States. The Latino Virginia Oral History Project aims to preserve these stories of resilience and showcase the various ways Latinos have contributed to this country and our state of Virginia. Through our interviews, participants recount their stories of childhood, migration journeys, hardships, and their interactions within those of the Latino community and those in the greater public. Our digital archive is a repository for the experiences of Latinos to document the community for engagement and enrich the archives to serve multidisciplinary research. In light of this objective, our research question is as follows: How does resilience among Latino immigrants in Virginia serve as a lens for understanding the shared structural challenges faced by Latino immigrants and Latino communities? Secondly, we aim to understand how the experiences of Latinos in Virginia intersect and how they relate in resiliency. Shining a light on the topic will raise awareness and increase public understanding which in turn should encourage behavioral changes, shift the stigma surrounding Latino immigrants, and foster social or political change. In this study, we will be focusing on 5 participants from our project to further explore the effects of resilience when facing similar challenges among Latinos. We have decided to use a smaller sample size to delve deeper into each story and components of resilience. Possible findings may include difficulties in employment other than labor, language barriers, family struggles, trouble adapting, and financial difficulties while immigrating to the U.S.

Yashodhara Velayudam

Discipline: Health and Human Development

Authors:

- #1 Katherine English
- #2 Muthukumar Karuppasamy
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Abstract Name: Evaluation of Chronodisruption in Duchenne Muscular Dystrophy Patients and Mice

Background: Duchenne muscular dystrophy (DMD) is a progressive, X-linked neuromuscular disorder that is caused by a pathogenic variant in the DMD gene, resulting in the failure to produce a functional dystrophin protein. DMD can result in muscle atrophy and fibrosis, cardiomyopathy, and respiratory failure. Chronodisruption refers to the chronic disruption of the body's circadian rhythm that is moderated through transcription of thousands of CLOCK-controlled genes. These genes regulate muscle function and mitochondrial metabolism, which are both severely disrupted in DMD-affected tissues and organs. **Hypothesis:** While dystrophin loss is the cause of DMD, circadian rhythms also affect muscle health, and their disruption might worsen DMD patient outcomes. **Methods & Results:** To study circadian disruption in DMD, the expression of circadian rhythm genes and the circadian transcriptome in wildtype and mdx (DMD) mice were analyzed. Diurnal behavior analysis was also performed to study activity during light phase, activity onset, and quantified by a periodogram power score. Mdx mice exhibited increased activity onset, phase shift of activity onset, increased activity in subjective night, and significantly less robust rhythmic behavior. In parallel DMD patient studies, we used wrist wearable actigraphy monitors to measure activity and chronicity in DMD ambulatory and non-ambulatory patients of mixed aged cohorts. Significant sleep disruption, decreased sleep duration, as well as poor sleep efficiency in DMD patients were observed over a continuous two-week interval in correlation with age and dystrophic disease progression. **Conclusion:** DMD mice have progressively disrupted circadian rhythms. Our findings provide initial evidence for

investigating a novel role of dystrophin in disrupting the circadian rhythm in DMD mice and patients. Further experimentation through RNA-sequencing and Dmd conditional knockout (KO) mice may provide insight into how circadian rhythm impacts DMD disease progression.

Benjamin Velez

KY - University of Kentucky

Discipline: History

Authors:

Abstract Name: Dominance From Within and Abroad: U.S. and Russian Socio-Political Memory in the Aftermath of Nuremberg

Following the end of World War Two, an international tribunal was held in Nuremberg, Germany to prosecute Nazi officials for their crimes against humanity during and prior to the war. In the aftermath of the verdicts, the Soviet Union and United States constructed distinct socio-political memories of the Nuremberg Tribunal and WWII. In both countries, images shaped the constructed and institutionalized collective memory of these historical events. The formation of the USSR's representation of the war, named the Great Patriotic War, served as a tool for the Russian Soviet Republic to unite social memory within multiple Soviet Republic identities. The United States, comparatively, used its representation of its involvement in WWII to justify and establish military and political presence abroad. Utilizing the archival photographs in the Nuremberg Tribunal Papers and Photographs collection at the University of Kentucky Libraries Special Collections Research Center, this research will explore the difference between the creation of socio-political memory in the United States and Soviet Union in the aftermath of the Nuremberg Tribunal. Comparisons between Russian and American popular photographs, films, and other media from 1945-1950 and 2020-2025 will be used to illustrate differences in the formation of social-political memory between the two countries. This investigation will provide insight into tensions in modern-day U.S.-Russian political relations, opening avenues for understanding and diplomacy.

Sanchith Velmurugan

Discipline: Computer Science

Authors:

#1 Sanchith Velmurugan

#2 Gopichandh Danala

Abstract Name: Developing Efficient Segmentation and Radiological Tool for Stroke Outcome Prediction

Acute ischemic stroke (AIS) is caused by an arterial blood clot that reduces oxygen supply and potentially causes permanent neurological damage. Millions suffer from AIS annually, often leading to disability or death. Early prediction of patient outcomes is essential for guiding treatment decisions and rehabilitation. Traditional methods, such as the Alberta Stroke Program Early CT Score (ASPECTS), are often qualitative, semi-automated, and time-consuming. They rely on subjective assessments that require human intervention, making them susceptible to inter- and intra-reader variability. This project evaluated the deep learning model SAM-Med3D for the automated segmentation of intracranial and ischemic brain regions, aiming to improve stroke prognosis. A comprehensive dataset was first assembled, containing over 500 scans of stroke patients treated between 2019 and 2022 at participating medical centers. The dataset, including images and ground truth labels, was organized into two categories for the two stages of required segmentation: stage one for

identifying total brain volume (TBV) and stage two for isolating cerebral infarct volume (CIV). The datasets were preprocessed by resampling and standardizing input shapes through zero padding and resizing. TBV data were split into 363/91/45 cases (train/val/test) and CIV data into 106/27 (train/test). The two-stage SAM-Med3D models were trained. Models were trained for 100 epochs with a batch size of 4 for each task. During evaluation, the TBV model achieved Dice scores of 0.9231 (validation) and 0.9373 (testing), while for CIV, it yielded a test Dice score of 0.4146. Overall, the findings suggest that the model performs well in preliminary testing and holds promise for enabling physicians to quantitatively assess stroke severity while reducing human intervention and expediting the process. However, a limited number of infarct-containing slices per case reduced the effectiveness of CIV segmentation.

Lavanya Vemuri

Discipline: Biology

Authors:

#1 Michael Miles

Abstract Name: Characterization of Expression and Localization of Downstream Proteins Following Ninein Deletion in the Central Amygdala

Anxiety disorders are associated with an increased risk of developing Alcohol Use Disorder (AUD). The Miles Lab previously identified microtubule-binding protein Ninein (Nin) as a candidate gene for the anxiolytic response to an acute dose of ethanol. Here, we hypothesize that deletion of Nin in neurons in the central amygdala (CeA) will alter the localization of downstream proteins involved in inhibitory synapses. Male and female Nin Flox mice were injected with a control virus (AAV8-hSyn-eGFP) or deletion virus (AAV8-hSyn-cre-eGFP) to delete Ninein in the CeA. Prior PCR results validated Cre deletion of the floxed Ninein exon. Animals were transcardially perfused, and brains were collected and processed for immunofluorescence. We stained for Ninein to validate our knockout model and downstream proteins, including Beta-III Tubulin, Gephyrin, and Dynein, to see if the deletion of Ninein affected downstream protein localization/expression. Surprisingly, we observed no overall decrease in Ninein staining in Cre mice, but did see changes in Ninein localization from a speckled staining to a more diffuse, cytoplasmic staining. Changes were also identified in Beta-III Tubulin, Gephyrin, and Dynein expression as a result of Ninein deletion. In normal cells, Beta-III tubulin had a different localization pattern: more circular and organized staining. In the deletion cells, Gephyrin had a more diffuse and less clustered staining when compared to normal cells. Dynein showed brighter overall staining and no localization differences. While we were not able to validate that our knockout model worked based on our immunofluorescence results, Ninein staining showcased differential localization, indicating we are disrupting an aspect of Ninein function. This was also seen with the localization of other proteins known to interact with Ninein. Future studies will conduct electrophysiology experiments to measure GABAergic signaling and focus on RNA sequencing data to analyze differential expressions, alternative splicing, and further validate our knockout model.

Navyaa Vemuri

Discipline: Computer Science

Authors:

#1 Navyaa Vemuri

Abstract Name: Designing for Bi-directional Trust in Agentic AI Systems: Design Patterns for Safe Human-Agent Teaming

As agentic AI systems gain popularity by operating with autonomy to execute decisions, the trust paradigm is dynamically changing from the unidirectional trust from human to machine into a model of bidirectional trust for successful collaboration. While existing work in Explainable AI (XAI) emphasizes transparency and user control, it largely fails to address the reciprocal dynamic in understanding how the agent can evaluate the reliability of human input and adapt its behavior to achieve mutual understanding. This paper addresses this gap by defining the functional interface design patterns necessary to calibrate bidirectional trust Through a qualitative study involving semi-structured interviews with 8 design professionals and students, four key findings emerged, highlighting that users currently view the agent as a productivity amplifier requiring constant supervision. Participants indicate that auditability and the ability to intervene are critical for delegation, and that iterative prompting serves as a signal of low human confidence that agents currently fail

to interpret. Based on these insights, we propose a Bidirectional Trust Design Framework as a set of design patterns. Based on these findings, we propose a Bidirectional Trust Design Framework built upon three core patterns: Audit & Trace (enabling logic scrutiny), Control & Override (establishing functional recovery), and Agent Confidence Check (empowering the agent to interpret human reliability). This research is significant to the HCI community as it shifts the discourse from static transparency to dynamic, mutual reliance. The proposed framework offers concrete, actionable design patterns to achieve necessary trust calibration, providing a framework for an agent to interpret the reliability of its human partner and enabling safe human-agent teaming.

Radhika Venkatesan

Discipline: Health and Human Development

Authors:

#1 Karina Villalba

#2 Aditya Chakraborty

Abstract Name: From Risk to Opportunity: The Paradoxical Link Between Alcohol Use and Colorectal Cancer Screening Among Older U.S. Adults

Alcohol consumption, particularly high-risk drinking behaviors, is assumed to impede engagement with preventive health services, like colorectal cancer screening (CRC). However, the relationship between alcohol use patterns (current and binge drinking) and CRC screening remains unclear, especially within diverse population subgroups. Thus, the objective of this study is to investigate the association between current and binge drinking and adherence to CRC screening guidelines among U.S. adults, and to examine how these relationships are influenced by sociodemographic, behavioral, and healthcare access factors. A cross-sectional analysis of 7,871 adults aged 45 and older using the 2023 Behavioral Risk Factor Surveillance System dataset was conducted. Multivariable logistic regression models assessed the associations between alcohol consumption patterns and CRC screening, adjusting for various factors. Effect modification by age and race/ethnicity was explored. Essentially, 6.4% of participants who underwent CRC screening were binge drinkers, while approximately 41% of the total population had undergone CRC screening. Multivariable analysis showed that binge drinking, physical activity, health insurance coverage, and depressive disorder were significantly associated with higher odds of CRC screening. In the stratified analysis across age groups, binge drinking and current drinking were positively associated with increased odds of undergoing CRC screening across all racial groups. Both binge and current alcohol use were independently associated with modestly increased odds of CRC screening, particularly pronounced among Hispanic adults (55–64) and White adults (65 and older). These results show that colorectal cancer screening is more common among those with higher education, income, insurance, and regular healthcare access. Leveraging these encounters with targeted outreach could help address ongoing gaps in CRC screening for underserved groups. Unexpectedly, current and binge drinking were modestly associated with increased screening rates among older Hispanic and White adults. This suggests that higher-risk individuals may have more opportunities for preventive care through increased system contact.

Radhika Venkatesan

Discipline: Sociology

Authors:

#1 Amy Donley

#2 Karina Villalba

Abstract Name: Barriers to Postpartum Depression Treatment: Availability and Accessibility of Maternal Behavioral Health-Inclusive Support Groups for Low-Income Populations

The maternal health crisis is a prevalent and concerning issue in the United States. Along with socioeconomic status (SES), racial injustices, inadequate coverage, the lack of efficient availability and accessibility to health care services plays a significant role in augmenting this problem. One health care service that is often undernoted is maternal mental health care services, for prevalent issues like Postpartum Depression. Considering the socioeconomic burdens of low-income mothers, this paper analyzed the accessibility and availability of maternal health support groups across counties in Florida, with varying amounts of individuals below the federal poverty level (%BPL). Essentially, Florida counties were divided into one of four categories depending on their %BPL. A Fisher's Exact Test was performed to see if there was an association between the category type and the number of counties in it that provided support groups. The study then conducted a thematic analysis on the highest-%BPL and lowest-%BPL counties' support programs to study their accessibility to mothers, in terms of cost and transportation. A significant association ($P=0.0124$) was found between the category type and the availability of support groups in that region, with the proportion of support groups decreasing from counties with low %BPL (categories 1 and 2) to counties with high %BPL (categories 3 and 4). Additionally, transportation and cost options were limited or made unavailable, adding on to the burden for low SES mothers. This paper essentially found that apart from the mother's individual SES, the community she lives in can contribute to the burden of finding proper health care resources. Additionally, limited accessibility of certain programs can take away from the positive value added by its availability.

Kaitlyn Ventre

Discipline: Psychology

Authors:

- #1 Adam Calderon
- #2 Jannah Moussaoui
- #3 William Chan
- #4 Arielle Smith
- #5 Lauren Fowler
- #6 Denise Wilfley
- #7 Nicholas Jacobson
- #8 Michelle Newman
- #9 Ellen Fitzsimmons-Craft

Abstract Name: Linguistic Indicators of Positive Emotion Predict Long-Term Eating Disorder Symptom Change

Disordered eating behaviors impact an estimated 10–20% of young women, yet access to care remains limited. Digital interventions, including chatbot-delivered programs, have gained popularity due to their accessibility and scalability, but further research is needed to clarify which user–chatbot interaction mechanisms predict treatment response. Because all interactions occur in text and language may reflect users' emotional states, this secondary analysis of a randomized controlled trial of a two-month, rule-based chatbot prevention program examined whether positive emotional language predicted longer-term changes in eating disorder symptoms. Accordingly, 199 young women ($M_{age} = 21.08$, $SD = 3.09$) at risk for eating disorders who were randomized to a chatbot intervention, completed at least one follow-up assessment, and had at least one interaction with the chatbot assessed. Participants self-reported eating disorder symptoms at baseline, three-month, and six-month follow-ups using the Eating Disorder Examination Questionnaire. User-authored messages were quantified using the National Research Council Emotion Lexicon to assess the degree to which participants expressed four positive emotions, joy, trust, anticipation, and surprise, during user–chatbot interactions and were combined into a composite index using principal component analysis. Linear mixed-

effects models tested whether positive emotional expression during the two-month prevention program predicted changes in eating disorder symptoms across the six-month follow-up. Participants who expressed more positive emotion language in user-chatbot interactions showed greater decreases in eating disorder symptoms from baseline to six-month follow-up ($b = -0.14$, $SE = 0.05$, $p = .007$, partial $\eta^2 = .04$). This association did not emerge at the 3-month follow-up. This pattern suggested that positive emotion language, and the emotional states it reflects, may signal later symptom improvement following chatbot-delivered prevention programs. Consequently, fostering such expression could potentially support longer-term symptom reduction. Future work should test whether positive language uniquely predicts improvement beyond other established predictors.

Cindy Ventura

Discipline: Biology

Authors:

#1 Araba Abaidoo-Myles

#2 Carmen Camarena

#3 Anuj Tharakan

#4 Daniel Conrad

#5 Rebecca Martin

Abstract Name: Inhibition of Glutamine Metabolism is Essential in Decreasing the Hallmarks of Atopic Dermatitis Pathogenesis

Atopic Dermatitis (AD) remains one of the most chronic inflammatory skin diseases and is strongly associated with other atopic diseases like asthma. Although the Th2 response is known to be the primary humoral response in AD, follicular helper T (Tfh) cells have been recently identified as key mediators in AD pathogenesis. AD presents with increased serum IgE levels and associated cytokines, IL4 and IL13. Our lab has shown that upon stimulating dendritic cells with *Alternaria alternata* (a fungal allergen) in an allergic asthma model, there was an increase in the glutamine metabolic pathway. Upon inhibiting the glutamine metabolic pathway, we observed a reduction in downstream Tfh2 polarization and reduced IgE production. We therefore hypothesized that Telegnastat (CB-839), a glutaminase I inhibitor, would decrease Tfh2 responses in AD. Auricles of C57BL/6 mice were treated with MC903 and house dust mite for a period of 15 days. Ear thickness was measured throughout the model. Mice received topical treatment with CB-839 after day six. Mice were euthanized on day 15; organs were harvested and processed for flow cytometry, sectioning, and RNA isolation for gene expression analysis. Topical treatment with CB-839 inhibited AD in treated mice with a reduction in IgE+ and IgG1+ plasma cells as well as Tfh2 cells, while an increase in T follicular regulatory cells was observed. AD-associated genes such as GATA3 and CARD11 were observed to be decreased in CB-839-treated mice. Overall, topical treatment of AD with GLS-1 inhibitor, CB-839, in mice is associated with a decrease in the hallmarks of AD.

Hannah Veracka

Discipline: Engineering

Authors:

Abstract Name: A Parametric Investigation of Droplet Motion on Twisted Wires

Research was conducted on the effectiveness of bead-on-fiber systems for use in wet scrubbers, which

normally utilize liquid drops falling in air where drops fall at their terminal velocity. Prior research has shown that a drop falling down a fiber (a bead-on-fiber system) travels at a lower terminal velocity, enhancing the ability of a wet scrubber to remove particles from a gas. That prior work showed that though the liquid viscosity primarily determined the bead-on-fiber terminal velocity, the fiber geometry might also play a role. The goal of this research was to determine whether the use of twisted wires impacts the terminal velocity of a bead-on-fiber drop, demonstrating the potential for increased tuning of droplet motion by altering the fiber geometry. Silicon oils of a range of viscosities are tested flowing down vertical twisted wires with various diameters and twist densities in order to study primarily the relationship between these parameters and the drop velocity. The experimental setup allows the fluid to be pumped down a vertical wire and recorded with a high-speed camera; this, combined with a MATLAB script to identify and track the drops, allows several parameters to be measured, including the drop diameter and velocity. The results were then used to develop a more detailed picture of the bead fall velocity, which is affected by its contact with the wire and surrounding air. Ultimately, through the results of this and previous experiments, we developed an understanding of the relationship between the drop speed and the wire geometry and identify the optimal parameters for enhancing wet scrubber performance.

Aya Vera-Jimenez

Discipline: Computer Science

Authors:

#1 Aya Vera-Jimenez

#2 Calvin Ibenye

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Calvin Ibenye

Samuel Jaeger

Abstract Name: Generalization of AI Fake News Detection Across Prompting Styles

AI-generated fake news can be produced under a wide range of prompting strategies, yet most detection models are trained under a single generation setting, raising concerns about their ability to generalize across unseen prompting styles. This study investigates whether machine learning models trained on AI-generated fake news produced using one prompting strategy maintain reliable detection performance when tested on AI-generated fake news produced under different, previously unseen prompts. Using real news, human-written fake news, and AI-generated fake news, detection models are trained under a fixed training prompt and evaluated under cross-prompt testing conditions. A structured feature representation capturing document length measures, sentence structure, lexical diversity, punctuation and capitalization usage, standard readability indices, and fine-grained sentiment and emotion scores is used for model training and evaluation. Multiple classifiers, including logistic regression, random forest, support vector machines, extreme gradient boosting, and a deep neural network, are evaluated under this cross-prompt generalization setting. Model performance is assessed using accuracy, area under the receiver operating characteristic curve, and precision-recall analysis, and performance degradation between within-prompt and cross-prompt testing is used to quantify generalization failure. This study evaluates whether detection performance changes when models are applied to AI-generated fake news produced under unseen prompting strategies and examines the extent of prompt sensitivity and potential distributional shift. This analysis informs the robustness of detection systems trained under limited generation conditions and supports the development of prompt-robust misinformation detection models that can better adapt to evolving AI generation behaviors.

Anurag Verma

Discipline: Computer Science

Authors:

#1 Anurag Verma

Abstract Name: Multimodal Framework for Semantic Video Search

Traditional video search systems rely on manual tags or simple keywords, which often fail to capture the actual meaning of video content. Modern semantic search tools fix this problem but typically depend on expensive cloud services, raising issues around cost, privacy, and data control. This project presents a local, open-source video semantic search engine designed to overcome those limitations. Our system uses two key models: Whisper for accurate speech-to-text transcription and CLIP for extracting visual features from video frames. We combine these text and image representations into multimodal embeddings and store them in a local vector database. This allows users to search videos using natural language queries—for example, “a lecture about quantum mechanics” or “a car driving in the snow”—and receive precise, timestamped results. The project demonstrates that advanced semantic video retrieval can be achieved on standard hardware without relying on proprietary cloud APIs. By keeping all processing local, the system offers a cost-effective and privacy-preserving solution for universities, researchers, and organizations managing large video archives.

Andrew Veroeven

Discipline: Geography/Geology

Authors:

#1 Andrew Veroeven

#2 Gwenyth Heidinger

#3 Prajukti Bhattacharyya

Abstract Name: Comparing Olivine Geochemistry From Two Volcanoes In Iceland To Understand Magma Sources

Recent volcanic episodes in the Reykjanes Peninsula of Iceland began in 2021 in Fagradalsfjall and are continuing today in Sundhnúkur. The two neighboring eruptions are similar in style (effusive lava flows). Observing basalt lava hand samples from both eruptions show the presence of magnesium-rich and iron-rich olivines in very close proximity. Preliminary differences in whole rock chemistry analyzed using Inductively Coupled Plasma Optical Emission Spectroscopy (ICP-OES) show a higher average iron content from Sundhnúkur basalt and a higher average magnesium content in samples from Fagradalsfjall. Fagradalsfjall basalts have relatively larger olivine crystals than those from Sundhnúkur. Under a petrographic microscope, samples from Sundhnúkur basalt show large clusters of olivine, pyroxene, and plagioclase crystals. Olivine is the first mineral to form from cooling basaltic lava. The chemical and textural differences between olivine crystals in the lava from these volcanoes may indicate the location of the magma source and cooling history. Using data from Powder X-ray Diffraction (PXRD), ICP-OES, and textural analysis under a petrographic microscope, we can observe the differences between the olivine crystals in the same sample as well as differences in samples from Sundhnúkur and Fagradalsfjall. This poster will present data from hand samples, ICP-OES, and PXRD showing the differences between the basalt from the two volcanoes, along with an analysis of the olivine present in both.

Sophie Verrecchia

Discipline: Psychology

Authors:

#1 Adi Wiesel

Abstract Name: Who We Want, Why We Want Them: An Investigation of Mate Preferences Among Lesbian Women

One of the most important decisions people make is choosing a romantic partner. But how do people make these decisions, and what factors shape their preferences? Research in social psychology has provided some answers—particularly among heterosexual individuals. On average, heterosexual men tend to prefer short-term relationships with younger, physically attractive partners. In contrast, heterosexual women often seek long-term, committed relationships with partners who are older and financially stable (Kenrick & Keefe, 1992). However, less is known about whether these patterns apply across people of different sexual orientations. For example, studies suggest that gay men, like heterosexual men, are drawn to younger, attractive mates. But the preferences of lesbian women remain less clear and results are more inconsistent across studies (e.g., Bailey et al., 1994; Silverthorne & Quinsey, 2000; Conway et al., 2015). The present study aims to further explore these inconsistencies by conducting an online survey experiment investigating how different groups (heterosexual men, heterosexual women, homosexual men, and lesbian women) rate 16 excerpts of dating profiles in which targets vary in gender (man or woman), attractiveness (more attractive or less attractive), age (young or old, relative to participants), and status of their job (high or low). This work seeks to advance our understanding of people's attractiveness preferences in general, as well as contribute to our understanding of these preferences in non-heterosexual populations, who are often understudied in the research.

Jacob Verret

Discipline: History

Authors:

Abstract Name: Before Silicon: Charles Babbage and the Birth of Mechanical Computing

This study investigates how Charles Babbage's (1791–1871) designs of the Difference Engine and the Analytical Engine advanced nineteenth-century computational mathematics, while examining the social, financial, and technological barriers that prevented their completion during his lifetime. Babbage's designs have since become a focal point for historians tracing the origins of computational thought and the evolution of mechanical reasoning in the nineteenth century. Numerous scholars, including Doran Swade and Allan Bromley, have completed detailed research on Babbage's devices and have gone so far as to build one of his machines in the late 20th century to better ascertain the ingenuity of his work. Despite the technological limitations of the nineteenth century, Babbage's vision for mechanical calculators would have represented a revolutionary step toward automating mathematical calculations. Designed to automate the computation of polynomial functions, the Difference Engine would have significantly reduced human error in mathematical tables. In contrast, the Analytical Engine introduced core modern computer components such as the CPU, memory, and storage. Perhaps the most groundbreaking concept introduced by the Analytical Engine, however, was the idea of user programming, discovered by Babbage's contemporary, Ada Lovelace (1815–1852). Babbage's work serves as a window into the timeless tradeoff between the possibilities of new technologies with the constraints imposed by contemporary attitudes and costs. His work thus demonstrates that innovation is not always the sudden breakthrough of a single idea; rather, it is more often an evolutionary process dependent on inventions being both practical and affordable. Future research could examine how Ada Lovelace's early insights influenced the evolution of artificial intelligence.

David Vetter

Discipline: Nursing and Public Health

Authors:

#1 Hailey Chen

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Hailey Chen

Abstract Name: Stakeholder Interviews of Partners: Understanding the Impact of a Community Care HUB

Abstract: The Omaha Pathways HUB is an initiative of the Omaha Community Foundation. According to the Center of Excellence to Align Health and Social Care, a community care hub (CCH) “serves as a community-focused regional, statewide or multi-state umbrella organization that coordinates, centralizes and scales administrative functions and operational infrastructure on behalf of a network of community support providers”. The Omaha Pathways HUB focuses on maternal child health connecting pregnant women with a community health worker to help them navigate pregnancy and the post-partum experience. This initiative helps connect pregnant and postpartum people at elevated risk with coordinated health and social services. To inform ongoing evaluation and guide program growth, semi-structured interviews with participants and community health workers are being conducted. These interviews will be conducted through a process of audio recordings that were then transcribed, de-identified, and analyzed using a codebook developed by the lead evaluator with two trained student coders. The team will independently apply the codebook and come up with themes through team discussion. Themes and recommendations will be extracted for the purposes of program evaluation. The project is currently under approval by the Institutional Review Board and results will be shared at the conference.

Olivia Vickers

Discipline: Chemistry

Authors:

#1 Scott Handy

Abstract Name: Photocatalysis of Organic Reactions Using Crude St. John's Wort

Natural products, like hypericin, have attracted interest as cost-effective, safer photocatalysts in organic synthesis. They effectively absorb light and offer an alternative to metal-based catalysts like ruthenium and iridium. Hypericin and its derivatives are naturally found in the supplement St. John's Wort, but isolating pure hypericin is difficult due to the low concentration. Although bioengineering microorganisms to produce hypericin is possible, it is technically complex. Instead, we explored using St. John's Wort supplement capsules directly as the photocatalyst in arylation reactions with diazonium salts and aromatic rings. Reaction conditions were optimized by purifying the capsules, using an everyday sun lightbulb, and irradiating for 48 hours. To evaluate the efficacy of this approach, the recyclability of the St. John's Wort will be tested using eco-friendly deep eutectic solvents and room temperature ionic liquids. The results of this research should highlight the potential for natural product mixtures to serve as effective and simple photocatalysts for organic reactions.

Clara Vickery

Discipline: Biology

Authors:

#1 Clara Vickery

#2 Engda Hagos

Abstract Name: Krüppel-Like Factor 4 Downregulates Fatty Acid Synthesis Related Genes Clara Vickery and Engda Hagos Department of Biology, Colgate University, Hamilton, NY, 13346, USA

KLF4 is a zinc-finger transcription factor involved in cellular processes such as cell proliferation, cell cycle regulation, differentiation, autophagy, and genomic stability. Prior work in our lab has indicated in the absence of KLF4, mitochondrial damage may facilitate a shift towards glycolytic metabolism, indicative of the Warburg effect. However, the role of KLF4 in lipid metabolism as a method of maintaining genomic integrity remains to be elucidated. Given that cancerous cells tend to upregulate levels of lipid metabolism to benefit off of by-products to proliferate and evade chemotherapies, we wanted to investigate the connection between KLF4 and lipid metabolism. This study seeks to address the role of KLF4 in lipid metabolism in both mouse embryonic fibroblasts (MEFs) and human colorectal cancer cells (RKOs). We specifically looked at key lipid biosynthesis enzymes acetyl-CoA carboxylase (ACC), fatty acid synthase (FASN), pyruvate kinase M2 (PKM2), and ATP citrate lyase (ACLY). When treated with 2-DG, a drug that inhibits glycolysis, cells lacking KLF4 upregulated FASN and PKM2, indicating the role for KLF4 as a tumor suppressor to downregulate the enzymes involved in lipid biosynthesis. Furthermore, cells treated with TOFA, an ACC inhibitor showed upregulation of lipogenesis and fatty acid oxidation enzymes FASN, PKM2, ACC, and ACLY. Next, in order to visualize intracellular lipid storage, we employed the use of Oil Red O staining and found that cells lacking KLF4 exhibited higher levels of lipid droplet accumulation. Finally, in order to determine cell viability, we conducted a Trypan Blue cell death assay. We found that cells containing KLF4 are more sensitive to glucose starvation and dying at higher rates as compared with cells lacking KLF4. Taken together, our findings provide a rationale for the impaired metabolism in cells-null for KLF4 and how KLF4 regulates various metabolic enzymes to maintain metabolism homeostasis and genomic stability.

Victoria Vidal

Discipline: Interdisciplinary

Authors:

Abstract Name: Depicting Diversity in Dentistry: Analyzing Racial, Gendered, and Ethnic Representation in Textbooks

This project examines representation of human variation in dental education materials, specifically within textbooks published from the early twentieth century to the present. The field of dentistry continues to reflect major inequities, including the severe underrepresentation of Black dentists within the profession. These disparities coexist with persistent gaps in oral-health outcomes, which includes higher rates of edentulism and delayed diagnoses of disease in marginalized communities, making it essential in understanding how educational materials contribute to these patterns. The central research question asks: How are racial, gendered, and ethnic diversity portrayed in visual and written content within dental textbooks? To answer this, we selected textbooks from different areas of dental education (e.g. dental anatomy, general dentistry), then systematically abstracted visual and written information on features including oral health, oral pathologies, and patient/provider characteristics including skin melanation, gum melanation, hair color, gender performance, and other features. We completed a textual analysis to identify how dental textbooks portrayed racial, ethnic, and gender normativity and non-normativity among patients, providers, and oral pathology. Preliminary findings reveal a severe underrepresentation of minority patients and clinicians, with depictions primarily reflecting light-pink gingival tissue and predominantly white, male providers. This lack

of visual and textual diversity indicates that dental students are trained with a limited understanding of normal variation in oral presentation and clinical relationships. These may partially explain dentistry's slowness to diversify, especially relative to other health professions, and, may contribute to implicit biases in diagnosis and treatment. By applying these findings within the broader context of systemic inequities in healthcare and education, the project seeks to highlight the urgent need for inclusive reform. Ultimately, this research emphasizes how more representative educational materials can contribute to a dental workforce more representative of the U.S. demographic makeup, improved outcomes, and a more equitable standard of care for all patients.

Ashlyn Viereck

Discipline: Computer Science

Authors:

#1 Steven Fernandes

#2 Lindsay Iverson

Seamus Gerner

Abstract Name: AI-Powered Clinical Pharmacology: Enhancing Lifespan-Based Prescribing Through Interactive Learning

In this project on AI-Powered Clinical Pharmacology: Enhancing Lifespan-Based Prescribing Through Interactive Learning, I intend to develop and implement three 24/7 retrieval-augmented generation (RAG)-based conversational chatbots to support nurse practitioner students in mastering antimicrobial pharmacology, one of the most challenging and high-stakes areas of their advanced pharmacology course. This innovative approach aligns with national priorities in nursing education and antimicrobial stewardship and has the potential to scale across other complex content areas in healthcare education. My RAG model will take the text, chunk it into parts, convert it into embeddings, create a vector database, and perform cosine similarity matching.

Raksha Vikram Aditya

Discipline: Biology

Authors:

#1 Paulo Pires

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Abstract Name: Aging and Alzheimer's Disease Impair Vascular BKCa Channel Function

Large-conductance calcium-activated potassium (BKCa) channels help regulate the cerebral vascular tone by responding to localized calcium signals in vascular smooth muscle cells (VSMCs). These channels are activated by calcium sparks that originate from lysosome-dependent calcium release and sarcoplasmic reticulum stores. BKCa function can also be altered by oxidative post-translational modifications that change channel gating. Aging and Alzheimer's disease (AD) have both been associated with reduced BKCa activity, but it is unclear whether similar upstream mechanisms contribute to this dysfunction in each condition. This project examines lysosomal acidity and BKCa channel function in VSMCs from aged wild-type mice, 5x-FAD mice, and adult healthy controls using lysosomal imaging and patch clamp electrophysiology. Cerebral VSMCs were freshly-isolated and all experiments were performed on these isolated cells. Lysosomal acidity

imaging was performed using a pH-sensitive dye that accumulates in the lumen of lysosomes. VSMCs from aged and 5x-FAD mice showed decreased lysosomal acidity relative to healthy adults, which was recovered with EN6, a lysosome acidifier. Reduced acidity can decrease calcium release from lysosomes and alter calcium signaling dynamics in VSMCs. Thus, we used perforated patch clamp to address this possibility, a technique that maintains intracellular signaling. We observed reduced BKCa currents in both aged and 5x-FAD mice compared to healthy adult controls; both were recovered with EN6. Single-channel inside-out recordings measured BKCa open probability in response to calcium alone and calcium plus dithiothreitol (DTT), a reducing agent that can reverse certain oxidative modifications. In aged mice, DTT partially restored BKCa activity, suggesting the presence of reversible oxidative modifications. Together, these findings suggest that impaired lysosomal acidity and oxidative modifications may both contribute to reduced BKCa function in aging and AD. Ongoing work will further compare BKCa impairment in 5x-FAD mice to clarify whether aging and AD involve similar upstream mechanisms influencing cerebrovascular dysregulation.

Lucia Villalobos

Discipline: Biochemistry

Authors:

#1 Jemma Booth

#2 Emmanuel Adusah

#3 Michael Beck

Abstract Name: Optimizing Specificity of Fluorogenic Carbonates for Human Carboxylesterase 1

Carboxylesterase 1 (CES1) is a serine hydrolase that plays a vital role in metabolism of many drugs. Despite this established role, CES1 remains understudied compared to other drug metabolic enzymes. To address this, we are interested in making fluorogenic chemical tools that can report on the activity of CES1 in living cells. Recently, our group developed a fluorescein-based carbonate as a CES1-specific fluorogenic chemical tool. This project focuses on optimizing the carbonate substrate for enhanced CES1-specificity. Following synthesis of 11 fluorescein-based carbonates, we evaluated their stability in solution and determined their specificity for CES1 and CES2 in vitro. Our results indicate that a few carbonates may be more specific for CES1 over CES2 than our existing substrate. After determining that these carbonates are suitable for use in live cells, we are now evaluating their specificity. The more specific fluorogenic chemical tools we develop in this study will aid in creating a better understanding of CES1's role in drug metabolism enhancing human health.

Alexis Villalpando

Discipline: Art History

Authors:

#1 Alexis Villalpando

Abstract Name: Jamie Reid: Anarchist of the British people

During the 1970s, Britain was facing deep economic struggles, inflation was high, the unemployment rate was rising and the people were doubting the monarchy. Out of everything going on during these times, a specific theme stuck out, Punk. It was a raw cultural response to society that was in utter chaos. Punk wasn't just about sound or style; it was a way of rebellion. At the center of punk's identity stood Jamie Reid, a

designer who turned that rebellion into art. Reid was not only creating graphic design for the Sex Pistols, He was using his visual styling of punk to create a weapon to attack the monarchs in Britain. From his use in ransom - note typography, and provocative imagery gave the people who were voiceless a way of protest. Reid's background in political art and his connections to Situationist ideals shaped his belief that design could challenge authority rather than be a serving tool. Throughout his work one of the most influential was his work with the Sex Pistols, he transformed graphic design into a form of protest that was able to attack the monarchy, capitalism and fake promises made by the mainstream media. His work wasn't made to define punk - it was to prove that design could be more than just logos and branding. He wanted to express a communication that wasn't just for the Man but for the peoples voices who were left unheard.

Gabino Villanueva

Discipline: Philosophy, Ethics, and Religious Studies

Authors:

#1 Gabino Villanueva

Abstract Name: A Personal Reason for Theistic Belief: Epistemic Trust, Proper Functionalism, and An Awareness of Persons

In philosophy, a belief is either rational or irrational. Since the end of the medieval period, the view that belief in God is irrational has grown to be ubiquitous. In my research, I have focused on whether it is or isn't. I argue that for belief in God, especially the kind where God is a person of some sort, it is rational to believe based on the testimony of others that God exists. This is so because we're more than ready and would never think twice to believe that (1) we have met at least one other person and/or (2) that others have also met at least one other person. If this is the case, then we should not doubt when others tell us that they have met or encountered God in their lives. I also exploit the popular, implicit assumption that if all the people we have encountered are human, all people must be human. Though it is similar in many respects to other views in philosophy, it is a novel view which combines several elements of philosophical inquiry: trust, testimony, personhood, and properly working faculties. Throughout the research and writing process, I have studied formal logic and have read many works of epistemology and the philosophy of religion. This project is quite important to me, as it has been my conviction, even before my belief that there is a God, that all should strive to be rational people. I believe that this research promotes rationality amongst believers and non-believers of God alike; but I also hope that it unites scholars and intellectuals of these kinds in the academy.

Kira Villarreal

Discipline: Biology

Authors:

#1 Yuyan Han

#2 Fariha Tasnim

Abstract Name: Investigating the Therapeutic Potential of Dose-Dependent Cannabinoids in Repairing β -Oxidation in MASLD

Metabolic dysfunction associated steatotic liver disease (MASLD) is the leading chronic liver disease globally with incidence rates on the rise. MASLD is diagnosed when there is a $\geq 5\%$ build up of lipids in the hepatocytes and is not associated with high alcohol consumption. MASLD is closely linked to insulin resistance (IR). IR can impair β -oxidation resulting in MASLD due to the insufficient conversion of FA to

acetyl-CoA to generate ATP, thus leading to decreased lipid droplet breakdown. Moreover, the body upregulates β -oxidation in order to compensate for excess FA, though this can result in reactive oxygen species, highlighting the need for metabolic balance. Currently, there are no pharmacological treatments for MASLD. Cannabinoids come from *Cannabis sativa* and have increasing popularity from a pharmaceutical lens. Two major cannabinoids are cannabigerol (CBG) and cannabidiol (CBD). CBG has shown anti-inflammatory and agonist properties. CBD has also shown anti-inflammatory properties and is used to treat neurological disorders. However, the effects of these cannabinoids on β -oxidation is still unclear, therefore, the purpose of this research is to determine if CBG and/or CBD can restore normal β -oxidation in relation to alleviating MASLD. 8 week old male and female mice (n=32) were randomly assigned to control (CTRL) (n= 8) or high-fat, high-fructose diet group (HFD) (n= 24) for 16 weeks. At week 8, HFD mice were subdivided into HFD, HFD+CBG, and HFD+CBD groups, supplemented with 1.23 μ g/day of CBG or CBD via gummy. In week 17, mice were sacrificed and livers were harvested. Mitochondrial function was assessed using the Seahorse XF Cell Mito Stress Test. Lipid accumulation was evaluated via Oil Red O staining in MASH liver tissue. Detection of β -oxidation via western blot was observed using CPT-1 and PPAR α antibodies and densitometry using ImageJ and statistical analysis via GraphPad Prism.

Lluvia M Villarreal

Discipline: Gender, Ethnicity, Diversity, or Cultural Studies

Authors:

#1 Aleana Aburto
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#14 Veronica Williams
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Abstract Name: Breaking the Ice: Assessing Films as an Introduction to Asian Culture at Southwest Texas College

Southwest Texas College (SWTX) in Uvalde, TX is an institution with predominantly high numbers of Hispanic students. With three main campuses in the southwest region of Texas, the Hispanic enrollment rate reached 91% in 2025, with a recorded student population of 1% of Asian descent. At a social level, lack of cultural differentiation correlates with low cultural knowledge, low multicultural competence, and poor educational experiences. At a personal level, a lack of cultural heterogeneity correlates with low self-awareness, low cognitive skills, and decreased scholarship. A survey conducted at SWTX showed that only 25% of students were able to locate China, The Republic of Korea, and Japan correctly on a world map, whereas 35% were incapable of locating any. In an attempt to recognize a means of introducing Asian culture, a small student group completed film analyses of films that crossed over cultural borders. The films were selected for a variety of reasons: critical acclaim, commercial performance, and award-winning status. Each of these films stemmed from the countries listed above were assessed for their ability to introduce Asian customary knowledge to an otherwise deficient student community. Additionally, interviews were conducted

with natives and descendants of the respective countries and presented with data compiled from the film analyses to determine the quality of the cultural knowledge attained. Preliminary analysis of the data compiled and assessed for accuracy between cultural presentation in film and the experiences of the interviewees suggest the usefulness of film as an introductory means to cultural knowledge attainment.

William Villasi

Discipline: Biochemistry

Authors:

#1 Rania Frederic

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Abstract Name: Environmental exposures in neurodegenerative disease: Effects of copper on post-translational histone modification levels in *S. cerevisiae* ALS/FTD models

Amyotrophic Lateral Sclerosis (ALS) is a neurodegenerative disease associated with motor neuron deterioration and loss of voluntary muscle movement. ALS forms a disease continuum with frontotemporal dementia (FTD), which is connected to the death of neuronal cells in the frontal lobe of the brain. Interestingly, exposure to environmental toxins - including heavy metals like copper - has been linked to an increased risk of ALS. In fact, an elevated level of copper has been observed in neuronal matter of ALS patients, potentially causing copper toxicity connecting to the protein aggregation present in ALS. We and others have revealed that ALS/FTD is associated with certain epigenetic changes, including changes on the post-translational modification profile of the DNA-packaging histone proteins. The addition of chemical groups on histone tails, like methylation and phosphorylation, can impact gene expression. However, the exact post-translational histone modifications affecting ALS/FTD is still not certain. We hypothesized that copper exposure may impact the post-translational histone modification landscape in yeast. We treated *S. cerevisiae* with different concentrations of copper chloride and measured the changes of post-translational histone modifications through Western Blotting. Upon treatment with copper, we found an increase in the levels of H3S10ph and H3K14ac with decreases in H3K36me3. Meanwhile, the levels of H3K79me3 and H3K27ac remained unchanged. Some of these changes mirror those observed in overexpression models for neurodegenerative disease proteinopathies, such as TDP43 and PR50. For instance, decreases in H3K36me3 are connected to TDP43 toxicity while increases in H3S10ph are linked to the PR50 proteinopathy. These changes in the levels of histone modifications can potentially reveal connections between environmental exposures, protein aggregation and cell death associated with ALS/FTD and neurodegeneration. Such connections can be used to find treatments for these neurodegenerative diseases that target their mechanistic pathologies.

Kristen Vincent

Discipline: English and Literature

Authors:

Abstract Name: Ways of Rhetoric, Ways of Life: Persuasion and Performance in the Language of Poets and Lawyers

This project explores the central question: how does rhetoric function as a shared mechanism of persuasion between poetry and law? Both poets and lawyers rely on language to shape perception, evoke emotion, and argue for truth, whether in the courtroom or on the page. Through a comparative rhetorical analysis, this research seeks to uncover how these disciplines converge in their use of argumentation, performance, and audience engagement. Drawing on primary texts such as Layli Long Soldier's *Whereas*, Amanda Gorman's "The Hill We Climb," and Johnnie Cochran's closing argument in the O.J. Simpson trial, the study will analyze rhetorical devices including repetition, syntax, humor, rhyme, and metaphor—the latter serving as a critical bridge between poetic and legal persuasion. The theoretical foundation will incorporate Aristotle's Five Canons of Rhetoric and scholarly works by Kenneth Burke, S.W. DeLong, Louise Rosenblatt, and James Boyd White. Methodologically, the project employs close reading and viewing, with rhetorical analysis to compare legal and poetic texts, both written and bodily performed forms of discourse. This interdisciplinary approach aims to reveal how each practice uses language as a performance of ethos (character), pathos (emotion), and logos (reason). The expected outcome is a demonstration that rhetorical awareness not only binds poets and lawyers in their persuasive endeavors but also deepens our understanding of language as an instrument of justice, art, and human connection.

Hannah Vincent

Discipline: Computer Science

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Abstract Name: Developing In Silico Models of Breast Tumor Tissue to Assess Biomechanics of Tumor Microenvironment

The differences and interactions between cancerous and noncancerous tissues within breast tumor microenvironments present numerous obstacles to research, varying case by case and dependent on location. The current study aimed to develop in-silico models of patient-specific breast tumor tissue which will then be applied to assess the tumor's malignancy through quantifying the forces within the breast tumor tissues. We used the standard and high-definition Fourier Transform Infrared (FTIR) imaging to image and classify forty tissues to four distinct breast tissue pathology types: "Normal Breast Tissue," "Hyperplasia," "Invasive Carcinoma of No Special Type," and "Invasive Lobular Carcinoma." Using an FTIR imaging microscope, we will first record high-definition data and apply numerical noise reduction methods to provide high spectral signal-to-noise ratio. Standard definition data then will be recorded on the same breast tissue samples. The FTIR images were received in MATLAB file format and processed to extract six individual tissue components present in each sample: malignant epithelium, noncancerous epithelium, dense stroma, loose stroma, reactive stroma, and other (e.g., blood vessels, inflammatory cells). In total, 101 FTIR files were processed. The extracted tissues were segmented in MIMICS to generate two-dimensional STL representations of each tissue type. To obtain the quantity of each tissue type present in each sample, MATLAB was used to calculate the surface area of STLs exported from MIMICS. Ongoing study focuses on developing three-dimensional, particle based, in-silico models of breast tumor tissue by leveraging patient-specific data using the segmented image files exported from MIMICS into LAMMPS (Large-scale Molecular Dynamics Massively Parallel Simulator). Because mechanical properties of breast tissue are hallmarks for cancer initiation and progression, our models aim to quantify the von Mises stress distribution within the tissues. This study plays a critical role in developing targeted interventions and advancing our understanding of the biomechanical factors influencing cancer progression.

Rohith Vinnakota

Discipline: Engineering

Authors:

Lena Hoang

Abstract Name: Yarkovsky Effect for Particles in Circumlunar Space

The concept of Kessler Syndrome concerns the eventuality that increasing amounts of “space junk” in orbit around Earth will inhibit our ability to safely launch spacecraft from the surface of the planet into orbit and/or deep space. While countermeasures are slowly being taken for Earth, this is still an issue that persists for other celestial bodies. One solution that shows promise for solving this problem is utilization of the Yarkovsky Effect, which theorizes that objects in orbit are perturbed by photons as a result of illumination from sunlight. Our goal in this study is to review the feasibility of applying this in conditions that are void of atmospheric drag and perturbed by solar activity such as The Moon. From our review of the available literature on this hypothesis, we show that the default effect on space debris orbiting Earth is miniscule, but a shift in the semi-major axis of any given piece of debris can be altered by changing the spin axis with respect to the Sun. Another caveat of this theory is that timescales for such perturbations must be large due to the slow rate at which orbits may shift when this technique is utilized. However, in the absence of atmospheric drag, we theorize that Yarkovsky effect is more predominant among possible sinking and decaying mechanisms. Through our investigation, we aim to explain why spherical bodies may be less impacted by the Yarkovsky Effect compared to uneven surfaces. The data referenced from studies are all Earth based data. In the future, we plan to investigate how the impact of the Yarkovsky Effect varies for different materials (in addition to different shapes and roughness); with this research, we hope to provide insights into finding a solution for Kessler Syndrome via the intersection of orbital dynamics and materials science.

Arielle Vinnikov

Discipline: Chemistry

Authors:

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Abstract Name: Adsorptive Cathodic Stripping Analysis of Xylazine Within Fouling-Resistant and Nanomaterial-Enhanced Modified Electrode Sensors

Xylazine (XYL), an FDA-approved veterinary tranquilizer, is being abused both as an opioid adulterant in a street drug known as “Tranq-dope” and as a date rape drug. Given its now nearly ubiquitous use with fentanyl and fentanyl derivatives across the globe, XYL has become a primary target for researchers seeking to develop portable and cost-effective sensors for its detection. Electrochemical sensors based on the oxidation of XYL, while useful, have limitations due to certain interferents and inherent electrode fouling that render the approach less reliable, especially in certain sample matrices. In this work, modified electrode platforms incorporating layers of multi-walled carbon nanotubes for sensitivity, along with semi-permeable polyurethane (PU) layers and host–guest chemistry using β -cyclodextrin for selectivity, are deployed for XYL

detection using complementary adsorptive cathodic stripping analysis. The modified electrode sensors are optimized to minimize high potentials and maintain fouling-resistant capabilities, and investigated to better understand the function of the PU layer. The use of adsorptive cathodic stripping differential pulse voltammetry indirectly indicates the presence and concentration of XYL within complex sample media (beverages and synthetic urine). When used in this manner, the modified electrodes exhibited an overall average sensitivity of $\sim 35 (\pm 9)$ nA/ μ M toward XYL with a limit of quantification of < 10 ppm, while also offering adaptability for the analysis of XYL in different types of samples. By expanding the capability of these XYL sensors, this study represents another facet of tool development for use by medical professionals, first-responders, forensic investigators, and drug users to limit exposure and help stem the dangerous and illegal use of XYL.

Damon Virgo

Discipline: Chemistry

Authors:

#1 Jeffrey Pruet

Stephen Jenny

Abstract Name: Design and Synthesis of Potential Antimicrobial Drugs

Microbial infections are some of the leading causes of death in the population at large, and antimicrobial-resistant “superbugs” have become a growing issue, so there is a great need to explore new and alternative pathways for fighting these diseases. One method for doing this is by exploring Methionine synthase (MetSyn), which plays a critical role in cellular one-carbon metabolism, catalyzing the methylation of homocysteine to form methionine, an essential amino acid required for protein synthesis and methyl group transfer reactions. Key differences between the B12-independent fungal MetSyn enzyme and the B12-dependant mammalian form can allow for selective targeting of the fungal enzyme. Inhibition of MetSyn disrupts central metabolic pathways and offers a promising strategy for therapeutic and antimicrobial development. One focus of this research is the design, synthesis, and evaluation of a novel inhibitor selective for cobalamin-independent MetSyn. Computational modeling and molecular docking were used to guide structural optimization of lead compounds. This interdisciplinary approach, integrating computational chemistry, organic synthesis, and quantitative chemistry, aims to elucidate the structure-activity relationships governing MetSyn inhibition. Another avenue for developing new antimicrobial drugs relies on plant-derived phytochemicals for plants with ties to traditional medicine. We have been exploring berberine, which we initially isolated from the *Argemone mexicana* plant. Numerous structural derivatives of berberine have been prepared in our lab, with many showing significantly improved antimicrobial effects, and greater microbial selectivity. Ultimately, the findings of this project will contribute to the broader understanding of drug design and may support the development of new antimicrobial agents.

Om Vishanagra

Discipline: Engineering

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Abstract Name: Integrating AI-Based Photogrammetry to aid Custom Pediatric Prosthetic Socket

Development

Rejection rates for upper limb myoelectric prostheses remain high at upwards of 35%. The prosthetic socket, serving as the primary interface between the patient's residual limb and their prosthesis, is a key contributor to device abandonment due to uncomfortable fittings. Conventional socket designs often fail to account for the complex geometry of residual limbs. Utilizing photogrammetry may provide an alternative method to generate accurate 3D limb models to serve as the basis for personalized sockets. Photogrammetry determines an object's dimensions and shape by analyzing images taken from multiple viewpoints, using geometry to calculate camera orientation and object coordinates. Previous research has demonstrated photogrammetry's feasibility in socket design workflows to digitize socket interiors and to model patient residual limbs via smartphone scanning. Compared to other modeling techniques, photogrammetry offers a cost-effective and accessible alternative for generating high-resolution 3D models. This research introduces the design of a low-cost, automated photogrammetric enclosure that enables 360-degree capture of a patient's residual limb instantaneously. The setup includes 28 Raspberry Pi Camera Modules, arranged in seven clusters of four cameras each, managed by seven Raspberry Pi 3B+ microcontrollers. A central Raspberry Pi 5 coordinates all image capture. A Python script executed on the Pi 5 signals each Pi 3B+ to capture and return images from its cameras. The resulting 28-image set is then processed using Apple's RealityKit API, which integrates artificial intelligence (computer vision algorithms) to construct a high-fidelity 3D model of the limb. This automated workflow shows promise to substantially automate the modeling procedures while reducing errors during image acquisition. Once the model is complete, a custom socket interface is generated procedurally; this offers a faster, reproducible, and more comfortable alternative to traditional manual methods.

Avaion Viverette

Discipline: Psychology

Authors:

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Abstract Name: Predicting Applicant Acceptance of AI in Hiring

Organizations are increasingly using artificial intelligence (AI) in hiring processes, such as sourcing candidates, screening résumés, and analyzing interviews. We anticipated that applicants might feel concerned about this trend, so the present study examined what people know and believe about AI and how these views shape their reactions to AI-assisted hiring decisions. Sixty-three adults completed a survey measuring their familiarity with AI, perceived effectiveness of AI, and perceptions of AI's usefulness and ease of use in hiring. We also assessed their views of the procedural and interactional fairness of AI. Afterward, participants read a scenario in which an AI system contributed to a hiring decision that resulted in their rejection. All responses were rated on a 1 (strongly disagree) to 7 (strongly agree) scale. Correlational analyses showed that several factors predicted more acceptance of the negative hiring decision. Participants who were more familiar with AI ($r = .40$), who viewed AI as more effective ($r = .78$), more useful or easy to use ($r = .82$), or as procedurally ($r = .78$) and interactionally fair ($r = .68$) were more likely to accept the decision ($ps < .05$). The study is limited by its small sample size and potential measurement issues, particularly item wording. Future research should replicate these findings with stronger measures and consider experimental designs to clarify causal relationships. The results suggest that organizations may foster more positive applicant reactions by using AI tools that are fair, user-friendly, and clearly improve hiring quality. Educational institutions may also help by increasing familiarity with ethical and effective AI practices. Understanding these predictors can assist organizations in addressing applicant concerns about AI-driven hiring.

Athena Vizuete

Discipline: History

Authors:

#1 Athena Vizuete

Abstract Name: Reconstruction in the North Carolina Piedmont

Reconstruction (1865-mid to late 1870s) was a time of great change and violence for the former Confederacy. Into this chaos, millions of formerly enslaved people tried to create freedom and new lives out of emancipation. They enjoyed newly won political, social, and economic freedoms across the South, but were met with hate and violence by many in the white community who sought to reestablish white supremacist rule across the South. White violence was extreme in North Carolina, where many historians have studied the Kirk-Holden War of 1870, when the state government repressed the Klan in Alamance and Caswell Counties. My research, instead, emphasizes the effects of the Kirk-Holden War on Black laborers on the North Carolina Railroad. In North Carolina, the Klan intimidated, attacked, and murdered Black freed people and white Republican allies as a means of suppressing Black organizing, social life, and enjoyment of civil and political rights across the Piedmont. After Governor William Holden called out the militia to suppress the Klan, white Conservatives took control of the State Government and impeached him, reestablishing white supremacist rule across the state. Even though they no longer had formal state protection, Black people, in particular Black railroad workers, carved out bits of freedom from this hostile system during the 1870s. Unlike sharecroppers, railroad workers had cash wages in a cash-poor South that enabled their families to send their children to school and for wives to choose to work for themselves and their families instead of for white people. This self-determination highlights the economic independence and security that these railroad workers gained from their labor, which enabled them to survive in a hostile white supremacist environment.

Morea Vlahos

Discipline: Chemistry

Authors:

#1 Shubhankar Kundu

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Abstract Name: Understanding Interactions of PFAS with DNA: A Potential Tool for Sustainable Degradation

Per- and Polyfluoroalkyl substances (PFAS) are known for their persistence and bioaccumulation within humans, wildlife, and the environment, earning the title “forever chemicals”. Previous research on PFAS removal includes graphene, active charcoal, and numerous other techniques, whereas degradation of such chemicals is still underexplored. The UV/sulfite system has been considered one of the best working models of PFAS degradation via aqueous electron generation, but this process involves 254 nm UV light, which is toxic as well as not scalable. Our research broadly focuses on a sustainable degradation method of PFAS at UV 365 nm which is available in sunlight. We hypothesize such degradation can potentially be facilitated by DNA, which allows us to study the interaction of DNA with PFAS chemicals. DNA has previously been reported as a biosensor (aptasensor) for PFAS, showing successful binding of DNA to perfluorooctanoic acid (PFOA). We have studied interactions of small strand DNAs with PFAS materials at both 365 nm and 254 nm to better understand the effect on degradation of PFAS using the UV/sulfite system in water.

Jessica Vo

Discipline: Nursing and Public Health

Authors:

#1 Sarah McLarnan

Abstract Name: Investigating the neurodevelopmental effects of PFAS mixtures in a chicken embryo model

Per- and polyfluoroalkyl substances (PFAS) are a diverse group of synthetic compounds widely used in industrial and consumer products. Their strong carbon-fluorine bonds make them extremely resistant to breaking down, leading to environmental persistence, bioaccumulation, and both human and environmental health risks. Research has shown that early life exposure to PFAS compounds in humans can affect growth and development. While this is compelling, these studies have primarily been done in individual compounds, rather than PFAS mixtures, even though organisms are almost always exposed to these toxicants in combination. This study investigates the developmental effects of PFAS mixtures on chicken embryos, a model system with early developmental processes that are comparable to those of humans. Mixtures of five compounds (PFOA, PFOS, PFBA, PFBS, or PFHxS) were injected into fertilized eggs at an environmentally relevant range of concentrations, ranging from 100nM to 100µM. After 48 hours, embryos were then dissected and neural tube sections explanted. Neural crest cells were analyzed the following day using fluorescence microscopy to quantify cell death and mitochondrial quantity. Cell health was evaluated using Sytox Green live/dead staining, MitoTracker fluorescent dye was used for labeling for mitochondrial density, and NucBlue for visualizing the nuclei. Early results indicate that higher PFAS doses result in changes in development, reduced cell survival, and changes in mitochondrial abundance and quantity, with these effects increasing with the dose. These findings suggest that even relatively low PFAS mixture exposures can negatively affect development. Understanding how PFAS mixtures impact development is important for protecting environmental and human health. This research adds to the growing evidence that realistic, everyday levels of PFAS exposure may be harmful, highlighting the need for stronger policies that address PFAS mixtures rather than individual compounds.

Adam Vo

Discipline: Education

Authors:

Siddharth Rajakumar

Diya Menon

Abstract Name: PECS: A Sustainable Model for Near-Peer Mentorship in Bolstering Postsecondary Education Enrollment

Around 67% of Virginia high school graduates enroll in institutions of postsecondary education. The Richmond Public School System, however, is reduced, at a rate of just around 54%. These disparities are indicative of larger trends in educational inequity: lower-income, minority students have higher dropout rates and attend schools that receive lower state funding, altogether leaving students inadequately prepared for higher education. While previous models have called for mentorship programs as a solution to these inequities, these programs often struggle to maintain participation and engagement. Personalized Exploration for College Success (PECS), a student-led 501(c)(3) nonprofit sponsored by the Virginia Commonwealth University Honors College, was created to address these disparities and to help students approach the college and scholarship application process with high-quality guidance, comprehensive resources, and a peer-driven support network. PECS employs a near-peer model, pairing high school students with mentors close in age. This model facilitates more effective engagement from high school students and draws on mentors' recent firsthand experiences navigating the college process. Through partnerships with two local school districts

(spanning eight high schools), the organization works to close opportunity gaps by providing individualized support, skill-building workshops, and accessible college application resources tailored to students' needs. Since its inception, PECS has engaged over 200 undergraduate students to volunteer in impactful ways, form close connections with younger students, and collaborate at a high level with University and high school district administrators. Participating high school students improve not only the quality of their college essays but also their motivation and autonomy, increasing student confidence and enthusiasm surrounding the college application process. The success of our program shows that, by connecting mentorship to real-world challenges, programs following the PECS model can empower every student – regardless of background – to engage and thrive in higher education.

Adam Vo

Discipline: Nursing and Public Health

Authors:

#1 Kimberly Battle

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Abstract Name: Exploring Participant Experiences in a Community-Based Prescription Produce Program: A Qualitative Analysis

Since 2016, the Virginia Commonwealth University School of Nursing and its community partners have collaborated to address persistent food and nutrition insecurity among older adults and individuals with disabilities living in federally subsidized housing across Richmond's urban food deserts. Over time, this collaboration has grown into the Mobile Health and Wellness Program (MHWP) and its signature Prescription Produce Program (PPP), a community-driven Food-is-Medicine model designed to expand access to fresh foods, strengthen social connectedness, and improve health outcomes. Previous scholarship focused on (1) early screening efforts that identified high rates of food insecurity and facilitated referrals to CSFP, SNAP, and local food assistance programs; (2) grassroots organizing with food justice partners to launch a community-led Healthy Meal Program; and (3) implementation of an innovative PPP that trains the next generation of health professionals. Despite these programmatic successes, a critical gap remains: little is known about the lived experience of individuals who participate in the PPP. Understanding how participants interpret program components, navigate social and structural barriers, and integrate PPP guidance into their daily lives is essential for strengthening program delivery and informing future interventions targeted toward marginalized older adult populations. The purpose of this project is to conduct a qualitative thematic analysis of 2023 PPP participant data to understand their experience of participating in a Food-Is-Medicine program. Findings will inform ongoing refinement of the PPP and contribute to the broader evidence base in interdisciplinary aging research.

Brandon Voelker

Discipline: Nursing and Public Health

Authors:

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#4 Aaron Shue

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Abstract Name: Empowering Future Nurses: The Importance of Advance Care Planning Education Through a Facilitation Event

Background: During Health Care Decisions Day, we held an Advance Care Planning (ACP) facilitation event. Event topics and instructional strategies reflected a literature review that highlighted the benefits that these events can have in increasing confidence in leading end of life discussions among nursing students (NSs), registered nurses (RNs), and nurse practitioners (NPs). Methods: The event included a keynote presentation on ACP, informational handouts on how to conduct ACP discussions, and a simulated end-of-life conversation using varied scenarios. To evaluate the effectiveness of the event, we used a pre- and post-survey to measure differences in knowledge and confidence between the two measurement times using the Mann-Whitney U test ($p < .05$). The pre-/post-survey was developed to measure educational content. Results: Significant differences were found in answers to seven survey questions. Participants reported increased familiarity with advance care planning ($p < .05$), greater confidence in facilitating ACP discussions ($p < .001$), and enhanced comfort with effective communication skills ($p < .001$). Additional gains were seen in confidence and ability to assist individuals in selecting and preparing a healthcare agent ($p < .001$), understanding of cultural and spiritual influences on decision-making ($p < .05$), perceived importance of ACP facilitation skills ($p < .05$), and preparedness for engaging in end-of-life conversations with patients ($p < .05$). Conclusions: This event highlighted the effectiveness of this educational method. Future researchers could replicate this event to support learning among health care students about ACP. ACP continues to be an underutilized resource for community members in clarifying goals of care. Enhancing healthcare students' familiarity, confidence, and communication skills can lead to improved patient and family experiences surrounding end-of-life conversations.

Sara Von Hoene

Discipline: Nursing and Public Health

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Abstract Name: Characteristics of Human, Pet and Deer Contact Captured on Social Media and Implications for Zoonotic Disease Transmission, 2015-2025

Increasing urbanization has led to more frequent interactions among humans, deer, and pets, raising concerns about the risk and emergence of zoonotic diseases. This highlights a need to monitor behaviors associated with disease transmission. Social media platforms offer an opportunity to collect data and identify emerging trends in human-wildlife contact. However, their potential remains underutilized, as few systematic approaches exist to effectively collect and analyze this data. Using an adapted systematic literature review protocol, videos posted on Facebook, TikTok, and Instagram from 2015-2025 that met the inclusion criteria ($n=1182$) were collected and reviewed. Extracted data included contact type, demographics, personal protective equipment (PPE) use, presence of pets, and metadata (season, number of likes, and location). Results show that the TikTok videos collected have the most likes and shortest duration. Most of the videos

were recorded in the spring and summer during the daytime. The highest rates of geotagged videos per 100k population were in Montana, Alaska, and Wyoming. The demographic distributions of the video's recorders were 90.3% white, 55.4% female, and 96.2% middle-aged (18-64 years old). 25.0% (n=295) of videos included a pet where 84.1% (n=248) of these included an interaction between the pet and deer. The most common contact types of deer/human were observing only (55.8%, n=660), touching/scratching/petting (37.5%, n=443), hand-feeding (13.3%, n=158), and rescuing (9.1%, n=108). Only 3.24% (n=38) of videos included PPE use. This protocol provides a valuable framework for researchers seeking to systematically use social media data to study human-animal interactions. The behaviors identified through this approach underscore significant public health concerns regarding zoonotic disease transmission, animal welfare, and injury risks. Furthermore, the role of domestic animals as potential intermediaries in disease transmission is an avenue for further examination. Overall, targeted interventions are needed to mitigate health risks associated with increased interactions.

Emma Vonder Haar

Discipline: History

Authors:

Abstract Name: (Dis)enchanted Islands: Dubious Commemoration and Questions of Culture in the Jewel of Ecuador

My research focuses on the human history of Isla Isabela, Galápagos, Ecuador, specifically the public and social memory of the penal colony. After the Americans left their World War II military base on the Island, the Ecuadorian government created a penal colony. This colony, which lasted from 1946 to 1959, treated its prisoners very inhumanely, like by forcing them to construct El Muro de las Lágrimas (Wall of Tears): a stone wall that they were forced to build, deconstruct, and rebuild. After the 1958 prisoner escape, the Ecuadorian government closed the penal colony and formed the Parque Nacional Galápagos (Galápagos National Park). The legacy of the penal colony has only lasted in the social memory: the memories of witnesses, their descendants, and others who have heard the stories. My research explores four relevant themes to public and social memory theories. First, I explain the contradictions in information regarding the history and memory from my sources, including: 16 interviews, experiences, and texts. Second, I investigate how tourism is central to Galapagueñan life and how the role of the Muro (Wall) as a tourist site has created tension in this dark history. Third, I describe how after a history of conflict and stereotypes, there is still an everyday impact of the penal colony on the people. Finally, I explore the lack of commemoration or official history due to the official focus in natural sciences. This impacts the people, as they lack a commemorated history with which to construct a culture Isabeleña. Without a culture, the society risks a collapse of connection or integration. Above all, my research addresses the memory and effects of the penal colony in Isabeleña society today – a unique contribution to the field as my work is the first to explore the memory of the penal colony.

Camelia Vonica

Discipline: Biology

Authors:

#1 Ryan Loker

Abstract Name: Investigating the function of alternative 3' UTRs of the Drosophila translation elongation factor eEF1a1 in developing neurons using in-vivo reporters

After mRNA is transcribed from DNA, it must be modified in order to be translated into protein. One part of this processing is called polyadenylation, in which numerous adenosine nucleotides are added after the 3' end of the mRNA. For some genes, there are multiple possible cleavage sites, some closer (proximal) and others further (distal) from the end of the coding sequence. Distal cleavage results in a longer 3' untranslated region (UTR). These 3'UTRs directly determine RNA fate, as they contain binding sites involved in regulation of stability, localization, and translation. Selection of one cleavage site over the other is known as alternative polyadenylation (APA). Genes expressed in neurons tend to utilize the distal cleavage site more often. The consequences of APA are not fully understood, but its effect on RNA localization within the neuron (e.g Axon/Dendrite vs Soma) is thought to be important. By analyzing neuronal gene expression over development in the *Drosophila* visual system, we found a subset of genes which deviate from this trend. These genes utilize the distal cleavage site early in neuronal maturation, but undergo a switch to the proximal site later. We are focusing on the gene encoding eukaryotic translation factor eEF1a1, which participates in mRNA translation. Preliminary investigations found that the long UTR is only in the cell body and is prominent in the first 24 hours of neuronal development, while the short UTR localizes to the distal processes and is almost exclusively expressed later. We hypothesize that each UTRs has unique contributions to differential localization. Because eEF1a1 is essential for protein synthesis, we predict that changes in APA may reflect changes in where proteins are being made during development. We intend to investigate localization using GFP reporter plasmids for each UTR, and investigate regulation using microRNAs specific to one UTR.

Nicholas Voyagis

Discipline: Mathematics

Authors:

#1 Nicholas Voyagis

#2 Dana Paquin

Abstract Name: A Method for Portfolio Creation Utilizing Triangulated Maximally Filtered Graphs and Duality

This research project introduces a novel graph-theoretic method for creating stock portfolios utilizing Triangulated Maximally Filtered Graphs (TMFGs) and their dual graphs. TMFGs are created by using the highest values of a covariance matrix made from the daily percent changes of several stocks to identify pairs of stocks that rise in price together. In this framework, stocks are represented by nodes and trends shared by two stocks are indicated by edges. Utilizing the maximal planar property of TMFGs, dual graphs are made, in which every node represents a face from a TMFG and nodes are connected if they represent adjacent faces. Because every face in a TMFG is a triangle—which is also a clique of three stocks—each face is associated with a unique set of three stocks that have experienced similar trends. Thus, a unique portfolio of three stocks can be made for each node in a dual TMFG. After using Lagrange multipliers to create portfolios of minimal variance, statistical and machine learning methods are utilized to analyze centrality measures of dual TMFGs and the dynamic structure of TMFGs. Statistically significant patterns have been detected in the structure of both TMFGs and dual TMFGs that can be used to create subsets of the portfolios created by dual TMFGs that have an increased likelihood of outperforming the S&P 500.

Michael Vu

Discipline: Business

Authors:

#1 Jamie Kurash

Abstract Name: Can We Exploit Abnormal Stock Returns from Effective Date Delays?

This study examines the effect of governmental policy shock and stock market reactions due to delayed effective dates. The Efficient Market Hypothesis (EMH) has dominated modern financial literature since the 1970s. This paper seeks to determine whether abnormal returns can be exploited in the energy sector through governmental policy delays in announcement dates and effective dates. The daily stock prices of two energy sector market leaders were extracted from the beginning of the year when the announcement was made and through the second half of the year of when the policy took effect. Energy market leaders were determined by the criteria of market capitalization (Stock Price x Number of Shares Outstanding). By testing the Efficient Market Hypothesis (EMH) through an analysis of variance (ANOVA) and t-testing, the expected finding is that the semi-strong form of the theory holds, as the information delay is only short-term, but not long-term. Additionally, this study will also test the theory of Behavioral Finance, as this area of the Finance literature seeks to explain market behavior through investor sentiment. It is inferred that this is due to abnormal returns findings only occurring after the announcement date, but not after the effective date. The overall implication that this study seeks to accomplish is to determine whether certain sectors are efficient, the degree to which they are more efficient, or if the overall market is efficient. As a result, this study paves the way for further research through sector analysis in different industries to examine market efficiency.

Tam Vuong

Discipline: Political Science

Authors:

#1 Tam Vuong

Abstract Name: Beyond Dobbs: Public Opinion and State-Level Shifts in Abortion Law in Colorado, Nevada, and New York

This research evaluates shifts in the American public opinion and state policy on abortion rights by examining legislative changes and expert perspectives in Colorado, Nevada, and New York, comparing the period before the establishment of *Roe v. Wade* in 1973 with the period following its overturning in 2022 after the Supreme Court ruling on *Dobbs v. Jackson Women's Health Organization*. Existing research often emphasizes the federal and national implications of the overturning of *Roe v. Wade*, and few studies examine how individual states have distinct approaches to abortion and how these legal shifts intersect with changing public opinion, narratives, and lived experiences. Thus, this study examines the implementation of abortion legislation in Colorado, Nevada, and New York pre-*Roe v. Wade* and after its overturning, along with how these policies have been shaped and supported by public opinion by utilizing expert narratives and legal analysis, such as the story of abortion provider Ruth Barnett and the perspective of Dr. Mary Ziegler at UC Davis School of Law. This research concludes that there is a pattern of increasing abortion liberalization in parts of the United States, as proven by the legislative responses and changes within Colorado, Nevada, and New York, combined with the broader shifts in public opinion. This contrasts with the belief that the ruling of *Dobbs v. Jackson Women's Health Organization* greatly restricted abortion nationally. This study is limited to developments up to December 2023 and to the states of Colorado, Nevada, and New York. Therefore, future research should examine more recent legislative changes and other states' legislation to assess how abortion rights are evolving in the United States. Keywords: Abortion Rights, Pro-Life, Pro-Choice, *Roe v. Wade*, *Dobbs v. Jackson Women's Health Organization*, Colorado, Nevada, New York

Carissa Wagner

Discipline: Exercise Science and Nutrition

Authors:

#1 Carissa Wagner

#2 Aakankshya Dhakal

#3 Achyut Adhikari

Abstract Name: Fermentation Trends and Microbial behavior in Herbal Tea-Based Kombucha

Kombucha is a fermented tea beverage produced by a symbiotic culture of bacteria and yeast (SCOBY). Kombucha has been investigated for its functional properties and potential food safety applications. Natural additives, including honey and raspberry juice, may further modulate its microbial composition and antimicrobial activity; however, comparative evidence across tea substrates remains limited. This study aims to identify the fermentation dynamics, microbial profiles, and antimicrobial activities of green and chamomile kombucha and evaluate their antioxidant capacities and chemical compositions. Green and chamomile teas were fermented under controlled conditions for up to 14 days, with optional secondary fermentation using honey and/or raspberry juice. The fermentation progression was monitored through pH and °Brix measurements. The microbial population, including yeast, mold, and lactic acid bacteria (LAB), was quantified using 3M Rapid Yeast and Mold petrifilm plates and MRS agar. Antimicrobial activity of unfermented teas and kombucha samples was assessed against *Staphylococcus aureus* and *Escherichia coli* using a disc diffusion assay. Fermentation followed expected biochemical trends, with the pH decreasing from 7.28 on day 1 to 2.82 on day 14, and °Brix decreasing from ~9% to 5.8%, confirming active sugar metabolism and organic acid production. Yeast and mold growth peaked on day 7, decreased on day 10, and day 14. LAB colonies were observed on MRS agar plates by day 14, indicating the development of probiotic-associated microbiota. Preliminary antimicrobial data indicate a measurable zone of inhibition of 17 cm against *S. aureus* with green tea kombucha, while no inhibitory activity was detected against *E. coli*. These findings provide an insight into early fermentation behavior and microbial dynamics in green and chamomile kombucha systems. Ongoing analysis will determine how natural additives influence antioxidant properties, organic acid formation, and microbial interactions, supporting future development of functional kombucha beverages with enhanced health and food safety relevance.

Mackenzie Wagner

PA - Westminster College

Discipline: Psychology

Authors:

Abstract Name: Sucrose vs. Nicotine Consumption in Male and Female Rodents

Nicotine usage persists among younger generations and continues to be a global health concern. Nicotine is a primary reinforcer that enhances the reinforcing effects of other rewarding stimuli, yet research on how sex differences influence nicotine and sucrose as a reinforcer in rats is limited. This experiment seeks to determine the way in which nicotine affects sucrose consumption and if it modulates sucrose drinking behavior in male and female subjects. In this experiment, both male and female rats were tested across a range of nicotine dosages. Current results show that across doses of nicotine there was a decreased consumption in both males and females. Females may show a greater decrease in consumption rates than males at a higher dose. This confirms that nicotine's impact on sucrose consumption appears to vary by sex, suggesting potential differences in how male and female rats respond to the combined reinforcing effects of nicotine and sucrose. This study continues to add information on how sex differences affect nicotine consumption with expectations of increased female sucrose-nicotine intake. It is also expected that females will show greater effects of nicotine with increased dosages across longer exposure.

Elaha Wahidi

Discipline: Chemistry

Authors:

#1 Antoinette Corbin

#2 Linda Bustos

#3 Amy Eaton

Valeria Martinez-Yela

Abstract Name: Effectiveness of Dried and Fresh Marigold (*Tagetes erecta*) in Adsorbing Methylene Blue from Aqueous Solutions

Dyes such as methylene blue pose significant risks to both human health and ecosystems, yet many existing removal methods are costly, generate secondary pollutants, and remain inaccessible in many regions. Marigold petals pose a promising alternative, as their porous, high-surface-area structure enables effective removal of methylene blue while remaining biodegradable, cost-effective, and readily accessible. This study investigates the effectiveness of *Tagetes erecta* (marigold) as a bio-adsorbent for the removal of methylene blue (MB) dye from aqueous solutions. The experiment specifically examines whether the physical state of marigold petals, fresh or dried, and the use of sulfuric acid activation impacts their effectiveness as a bio-adsorbent, an area not well-explored in existing research. Each preparation method followed a distinct sequence of activation and drying. Fresh petals were tested both with and without sulfuric acid activation, while dried petals were prepared using either sun-drying or oven-drying methods. These variations allowed for a direct comparison of preparation techniques and their influence on overall adsorption performance and efficiency. Overall, it was determined that dried marigold petals outperformed fresh marigold petals regarding MB removal from aqueous solutions. Kinetic studies were performed using first order and pseudo-second order models to understand the adsorption process. Comparisons of the adsorption performance of dried versus fresh marigold petals provide insights into the efficiency and process of bio-adsorbents. The findings suggest that marigold petals show potential as a cost-effective and environmentally sustainable bio-adsorbent for the removal of MB from aqueous solutions.

PANYEE WAIZIN

Discipline: Biochemistry

Authors:

#1 Panyee Waizin

#2 Sidy Bah

#3 Mason Micou

#4 Kehinde Banjo

#5 Shukurat Adeola

#6 Victoria Vu

Abstract Name: Determination of K_m and V_{max} for Turnip Peroxidase and Catalase via Lineweaver-Burk Plots

This study investigates the enzyme kinetics of two distinct peroxidases: turnip peroxidase and catalase, utilising spectrophotometric assays at 470 nm and 240 nm, respectively. Substrate concentrations and reaction velocities were systematically varied to generate Lineweaver-Burk plots, enabling the determination of

kinetic parameters such as K_m and V_{max} for each enzyme. For turnip peroxidase, absorbance measurements at 470 nm were used to calculate product formation rates across a range of substrate concentrations. The resulting data yielded a V_{max} of approximately $-1.80 \mu\text{mol/min}$ and a K_m of 0.35 mM , indicating the enzyme's affinity and catalytic efficiency under the tested conditions. The negative V_{max} suggests possible experimental error or substrate inhibition, as noted in the dataset. Catalase kinetics were assessed using absorbance at 240 nm, with substrate concentrations spanning from 1 mM to 880 mM . The Lineweaver-Burk analysis produced a V_{max} of $1.97 \times 10^{-5} \mu\text{mol/min}$ and a K_m of -0.48 mM , again suggesting substrate inhibition or experimental anomalies. The instructions provided in the dataset emphasise the use of reciprocal plots and trendline analysis for accurate kinetic parameter estimation. Overall, the comparative analysis highlights the importance of precise experimental design and data interpretation in enzyme kinetics studies. Both datasets underscore potential challenges such as substrate inhibition and experimental error, which must be carefully considered when evaluating enzyme activity and efficiency.

Kai Wakeman

Discipline: Psychology

Authors:

#1 Kai Wakeman

#2 Chloe Waterman

Abstract Name: An Adult Attachment Style Approach to Understanding Musical Genre Preferences

Background: A newer area of adult attachment research addresses potential links between attachment styles and musical preferences; data suggest that people favor songs that reflect their attachment style. However, limited research has explored the connection between attachment security (vs. insecurity) and musical preferences. A key objective of this study was to investigate differences in attachment styles and their relationship to musical genre preferences. Method: The sample consisted of 505 undergraduate students at a mid-Atlantic liberal arts university ($n = 353$ females and $n = 152$ males; mean age = 19.13 years [$SD = 1.31$]). The survey was administered through an online research portal. Measures included: Demographic items and the Short Test of Music Preferences (STOMP; comprised of four musical factors: Reflective/Complex; Intense/Rebellious; Upbeat/Conventional; and Energetic/Rhythmic); and a four-category (Secure, Dismissing, Preoccupied, and Fearful) forced-choice measure of adult attachment styles. Results: A 2 (biological sex) $\times$ 2 (attachment security/insecurity) factorial ANOVA was performed for each of the four STOMP factors. For the Intense/Rebellious factor, there was a significant main effect for attachment style, $F(1, 501) = 8.90$, $p = .003$, with insecurely attached participants scoring significantly higher than securely attached participants. For the Upbeat/Conventional factor, there was a significant main effect for biological sex, $F(1, 501) = 9.18$, $p = .003$, with females scoring significantly higher than males. For the Energetic/Rhythmic factor, there was a significant main effect for biological sex, $F(1, 501) = 4.16$, $p = .042$, with males scoring significantly higher than females. Discussion: Obvious biological sex differences were to be expected with regard to musical genre preferences. However, the fact that attachment security (vs. insecurity) exerted an effect only for the Intense/Rebellious factor of the STOMP merits further consideration and exploration.

Kai Wakeman

Discipline: Psychology

Authors:

#1 Kai Wakeman

#2 Isabella Ventimiglia

Abstract Name: An Attachment Styles Approach to Understanding the Burden of Somatic Symptom Disorder in a College-Age Sample

Background: Somatic symptom disorder (SSD), characterized by excessive thoughts, feelings, and behaviors surrounding physical sensations that cause distress or impairment, is increasingly understood to be influenced not only by physical factors but also by relational and psychological processes that shape how bodily sensations are experienced and interpreted. Research indicates that insecure adult attachment is linked to greater somatic symptom burden, including severity (e.g., reporting of higher somatic distress) and impaired emotional processing. The purpose of this ongoing study is to examine associations between adult attachment styles (secure vs. insecure) and somatic symptom severity among undergraduate students. Method: The current sample comprised 89 undergraduate psychology students with mean age = 19.57, SD = 2.13), who completed an online survey comprised of: Demographic items; the Somatic Symptom Scale-8 (SSS- 8; developed to assess severity of burden associated with SSD) and a four-category forced-choice measure of adult attachment styles (Secure, Preoccupied, Dismissing, & Fearful). Results: Preliminary analysis with a 2 (biological sex) x 2 (attachment Security vs. Insecurity) factorial ANOVA on SSS-8 total scores was significant, $F(1,88) = 4.80$, $p = .03$. Participants endorsing an Insecure attachment style had a significantly higher SSS- 8 total score ($M = 19.13$ [very high symptom burden], $SD = 5.88$) compared to participants who endorsed the Secure attachment style ($M = 15.72$ [high symptom burden], $SD = 5.86$). There were no other significant effects. Discussion: Preliminary results from this ongoing study trended in the expected direction, with an Insecure attachment style being associated with a greater somatic symptom burden. Interestingly, however, is that these preliminary data indicate a high symptom burden even for those participants who endorsed a Secure attachment style. Further data collection will be important to more fully assess this phenomenon and determine the existence of a possible cohort effect.

Madison Walker

Discipline: Chemistry

Authors:

#1 Daniel Willems

Abstract Name: Proteomic and Metabolomic Characterization of *Paruroctonus boreus* Venom

Very little is known about *Paruroctonus boreus*, (*P. boreus*), the Northern Scorpion. Venom proteomic and metabolic components will be identified and evaluated for potential anticancer properties. Interest is relevant in this potential anticancer property as other potential anticancer uses from scorpion venom arise. *P. boreus* specimens were collected at field sites outside of Warren, Montana. Venom was collected via manual milking, frozen, reconstituted into high purity samples and clarified before analysis via high-contrast UHPLC Q-TOF mass spectrometry. Identified molecules from raw venom will be searched against relevant databases for potential function. Bulk venom and specific proteins and/or small molecules of interest found in the venom will be used to assay biological effects on cancerous melanoma cells.

Mackenzie Walker

Discipline: History

Authors:

#1 Mackenzie Walker

Abstract Name: How Witches Got Woke

This paper discusses how the word “witch” went from a term which denoted participation in criminal magical activity which was mostly forced onto people by their accusers to a label with which over one million Americans identify. It primarily focuses on analyzing how and why the modern witchcraft movement became disproportionately queer, female, and politically left-wing. In summary, those prosecuted for the crime of witchcraft did not all participate in any specific spiritual practice or share any specific demographic characteristic, but certain groups are overrepresented among them, namely gender nonconformity. The creator of the modern witchcraft movement posited that witches had been a secret group of pagans who secretly practiced pre-Christian rituals with fabricated evidence. While he took largely conservative positions on gender and sexuality, conflicts within the movement quickly led to rival factions which advocated for agitation against patriarchal gender norms and eventually eclipsed the influence of the conservative faction. The Internet era has seen the number of witches grow remarkably quickly, but also seen the movement more fragmented and less organized. While there is a fair amount of scholarship about specific events which contributed to the outsized presence of queer people, women, and leftists in the modern witchcraft movement, there is significantly less scholarship in which researchers make hypotheses for its cause. This paper argues that the causes for their outsized presence in the witchcraft movement is that their demographic characteristics are similar to those of people charged with the crime of witchcraft and an identification with a group which faced arbitrary violence for non-conformity. This paper is far from a definitive statement on this matter and instead intended to inspire future research.

Andrew Walker

Discipline: Chemistry

Authors:

#1 Jason Bennett

Abstract Name: Hemin-Adsorbed Carbon Nanotube-PEDOT Coatings on Flexible Wires for Selective H₂S Detection

The detection of low concentrations of gaseous compounds, collectively known as gasotransmitters, such as NO, CO, and H₂S, is critical for understanding physiological mechanisms and pathways. Unfortunately, detection techniques encounter unique challenges when exposed to biological environments. Electrochemical methods offer multiple advantages for these investigations, including quick response, high sensitivity, and the potential for miniaturization. Carbon fiber microelectrodes are often used in these studies; however, they are limited due to both their high cost and fragility. The long-term goal of this project is to fabricate a flexible microelectrode with carbon-like surface properties and the dexterity of a metal wire, then modify this surface with an electrocatalyst to selectively detect the gasotransmitter of interest. Previous work focused on coating flexible PtIr wires with electrochemically reduced graphene oxide (ERGO) with and without polymerized 3,4-ethylenedioxythiophene (PEDOT). These efforts did not yield a carbon surface suitable for practical applications. This presentation will involve two phases towards the long-term goal of this project. The first phase involves polymerizing EDOT with polystyrene sulfonate (PSS) and acid-washed carbon nanotubes (CNTs) to function as a conductive layer on the electrode. These surfaces were probed using cyclic

voltammetry and scanning electron microscopy with energy dispersive X-ray (EDX) spectroscopy to ensure good coverage and electrochemical response. The second phase of this project applied these results towards fabricating a flexible microelectrode that can selectively sense H₂S against CO and NO. Here, hemin was initially adsorbed to the CNTs before entrapping them in PEDOT. Following polymerization, the electrode surface was treated with KCN in a pH 9.6 carbonate buffer to coordinate cyanide ligands to the Fe center of hemin. Amperometry was used to analyze and compare the microelectrode's response toward H₂S, CO, and NO.

Kiaizah Walker

Discipline: Interdisciplinary

Authors:

Abstract Name: Visual Storytelling: Philadelphia's Resistance Against Gentrification

Philadelphia, PA is the city of black visual storytelling. Philadelphia preserves black spaces and its rich black history through movements such as the 'Mural Arts Philadelphia', the nation's largest public art program, and installation art dedicated to black people. Murals and installation art that captures blackness have become intertwined with Philadelphia's spatial design. Scattered across the city, there are creative public displays that empower black joy, black growth, black unity, and black history. When admiring 'Threads of Joy: Celebrating the Golden Years' by artist Kelley Prevard exhibited on 2000 S 58th St Philadelphia, 19143, she encourages viewers to gracefully embrace ageing while paying homage to Philadelphia's historical block parties and the residents of Ann Thomas, a senior housing facility. As gentrification stretches through neighborhoods, Black Philadelphia residents sustain its posture as a refuge for the Black community through visual storytelling. This presentation strives to magnify Philadelphia's black history and culture and cultivate appreciation for the efforts of its residents to preserve it through murals and installation art. By surveying murals and installations of art representative of black history and culture, there is evidence and inspiration on how to resist, preserve, and empower communities. I reason that visual storytelling is not simply ornamentation or an attempt to ignite change, but is an act of defense against gentrification. The murals and installations of black history and culture are barriers that Philadelphia residents use to protect themselves from the threat of unwanted reconstruction in their neighborhoods. This presentation will dissect the effects of visual storytelling in Philadelphia through the examination of murals and installations and bring understanding to how these artistic displays resist gentrification.

Olivia Walker

Discipline: Art History

Authors:

#1 Olivia Walker

Abstract Name: A Comparative Study of Yoruba and Yakama Beadwork of the 20th Century: The Unseen Consequences of European Trade

This research investigates the 20th century similarities between the beadwork done by the African group based in Nigeria, the Yorùbá, and the Native American group based in Washington State, the Yakama. Of the many native cultural expressions beadworking itself is one of the most well known practices of colonized groups around the North American and African continents. Contemporarily, the Yakama use of glass beads is common though the practice has no basis in their ancestral roots. At the same time, the Yorùbá, known to

develop their own glass beads from around the 11th - 15th centuries, would suddenly lose the knowledge of their practices during colonial glass bead trade. Consequently, over time, components of the Yakama and Yorùbá beading arts have become more similar to each other while using the same materials and processes under colonial rule. Other historians have explored the topic of beadworking through the analysis of French documents and describe the trade agreements as a closed loop between “sellers”, French colonists, and the “buyers”, the Yakama and Yorùbá native peoples. This research will instead explore the reasons behind the Yorùbá and Yakama’s artistic similarities through analysis of their trade relationships to France and through a comparison of each group’s beadwork, formally, as well as historically. Research in this area brings to light the cultural loss of native groups during the bead trade and highlights the ways that native cultures in America and Africa have lost their original cultural practices due to trade agreements made during the 1500’s.

E. Aaron Walker

GA - Morehouse College

Discipline: Environmental Science and Sustainability

Authors:

#1 Aaron Walker

#2 Ethell Vereen

Abstract Name: Exploring The Links Between Water Quality and Social Equity In An Urban Stream Watershed

Reducing disparities in stream water quality is a key state-level priority in Georgia, USA. However, efforts to target communities for assistance are often hindered by the limited availability of empirical evidence identifying populations disproportionately impacted. This study seeks to address that gap by examining the relationship between stream water quality and social equity, with a focus on identifying the types of communities most burdened by water contaminants. We hypothesized that watersheds predominantly composed of low-income residents and minority groups (Hispanic and non-White populations) are more likely to experience degraded water quality. Our analysis focused on an urban stream network encompassing two creeks—Proctor Creek at Burbank Drive (AW-BB) and Proctor Creek at Grove Park (AW-GP)—as well as the Chattahoochee River (AW-CHR), which collectively represent communities with diverse socioeconomic characteristics. Water quality was assessed through physicochemical parameters measured with a Horiba U-50 portable meter, alongside microbial indicator testing conducted using IDEXX standard methods. In addition, windshield surveys provided observations of visible pollution differences, with affluent areas displaying cleaner environments compared to economically disadvantaged neighborhoods. Laboratory microbial analysis revealed significant variability in contamination levels, with higher microbial counts particularly evident at AW-GP, a predominantly low-income site. These findings highlight the complex interplay between socioeconomic disparities and contemporary water quality challenges. Results underscore the urgent need for targeted interventions that address environmental justice concerns and ensure equitable access to safe, clean water across Georgia. This research contributes to a broader understanding of how socio-environmental dynamics shape water quality disparities. By clarifying the connection between sociodemographic inequities and environmental conditions, the study emphasizes the importance of inclusive and equitable water management strategies that both advance environmental justice and safeguard public health.

Liza Walker

Discipline: Biology

Authors:

#1 Emily Durkin

Abstract Name: Identification and Exploration of a Parasitic Trematode (*Saccularina magnacetabula*) in Tampa Bay Ladyfish

Within Florida waters, the species richness of parasitic worms, specifically trematodes, has not been cataloged since the early 20th century. There have been few updates in recent years, leaving space for the question of existing host-parasite relations for the Gulf of Mexico and the Atlantic. In a 2022 study, a new genus and species of parasitic trematode in the family Didymozoidae was discovered in the fins of ladyfish, *Elops hawaiiensis*, and named *Saccularina magnacetabula*. A genetic and anatomical analysis was performed, laying the groundwork for new comparisons to this established species. In the fall of 2024, yellow parasitic worms were discovered within the fins of *Elops saurus*, a species of ladyfish in the Tampa Bay area. Since this initial discovery, we have performed thorough data collection, anatomy comparison, and genetic analysis of our unidentified worm and compared it to *S. magnacetabula*. This project explores the ecological, genetic, and anatomical aspects of this parasitic trematode. Here, we have performed DNA analysis on two specific genes and used an image analysis software for anatomical measurements. With this knowledge, we contribute to the newly developing list of parasite species inhabiting Florida and the geographical distribution of possible *S. magnacetabula*, which opens the floor for further study on host specificity for this trematode.

Carly Walker

Discipline: Psychology

Authors:

Abstract Name: Thematic Analysis of Queer Aesthetic and Identity in Rural Georgia

This study utilized Photovoice, a qualitative community-based participatory action research (CbPAR) technique, to explore how queer GCSU students define their own aesthetic and identity. Queer students may feel uncomfortable when directly asked about their identity; therefore, Photovoice can help participants share about their identity through a more conversational anchor point. Participants responded to the prompt “How do you present yourself to others?” by selecting photos that reflect their identity and aesthetic as queer individuals. Each participant then completed a semi-structured individual interview via Zoom and participated in an in-person focus group. During the focus groups, participants discussed how they hoped their data could be used to foster positive change at Georgia College & State University. I analyzed individual interview transcripts with Dedoose and used a phenomenological approach to uncover themes related to queer aesthetic and identity. After both transcript cleaning and coding, each participant read their transcript and codes to confirm that the results reflected their story. Emergent themes included: Stereotypes are unfortunately normal, People have multiple layers to their identity, Look good, feel good, play good, Strong and positive sense of self, and I’ve felt safe to express myself at GCSU. CbPAR and Photovoice help foster trust between researchers and historically exploited and excluded groups in science (HEEGS), as well as amplify marginalized voices in a research setting. They help to facilitate more ethical, empowering research with queer individuals. As a final showcase, I plan to create encouraging, bite-sized flyers, videos, digital galleries, and resource guides tailored to the needs of various campus groups, including athletic teams, academic departments, and diverse student and faculty demographics.

Nivea Walker

Discipline: Biology

Authors:
#1 Efrain Rivera-Serrano

Abstract Name: Prevalence and effectiveness of visual abstracts in peer-reviewed scientific articles

Science communication has evolved drastically over the decades transitioning from solely peer-reviewed journals intending to communicate exclusively to peer scientists, to the usage of news outlets and social media venues to span diverse audience spanning both the scientific community and the general public. Paradoxically, the language complexity used in peer-reviewed journal articles has concomitantly increased. Filled with jargon and convoluted statements, science communicators and journalists—who frequently lack specific high-level training in the sciences—are left with minimal understanding of the articles they frequently report on. This communication gap opens new doors for misinterpretation of scientific findings, which in turn influences the way the public learn about and perceive science, oftentimes leading to misinformation and negative views towards science. In more recent years, some scientific articles have introduced visual abstracts to increase engagement and comprehension. Research shows that graphical and video abstracts have the ability to reach a wider audience when properly designed, regardless of their reading ability and knowledge of science. Despite their effectiveness, to date only a limited number of journals require or encourage the use of visual abstracts—and those that do range greatly in quality and effectiveness. My research seeks to examine the prevalence of visual abstracts in STEM and discuss existent research on their effectiveness, addressing their benefits and limitations. This work offers evidence-based suggestions on improvements regarding the implementation of more visual abstracts, and what this would mean for the future perception of science in the eyes of the public.

Samantha Walkiewicz

Discipline: Biology

Authors:
#1 Samantha Walkiewicz
#2 Peter Etnoyer
#3 Steve Morton

Abstract Name: Using Visual Data to Identify Deep-Sea Corals: Taxonomy, Abundance, and Distribution

Tropical and subtropical zones in the Atlantic Ocean harbor extensive mesophotic coral reef communities at depths from 30 meters to greater than 150 meters. Similar to shallow-water reefs, mesophotic reefs contain anthozoans of two classes: hexacorallia and octocorallia. Despite these reefs being more widely distributed than shallow-water Atlantic reefs, the identity, abundance, and distribution of community members remains cryptic when compared to shallow-water reefs. In part, this is due to the challenges that come with studying mesophotic communities - increased depth comes with increased difficulty in surveying and sampling. Furthermore, members of Octocorallia specifically are complicated to identify, with genetic sequencing or scanning electron microscopy (SEM) of sclerites (calcium carbonate pieces localized to soft tissue) being the main methods. Genetic barcoding of octocorals is tricky and limited, plus the number of taxonomists trained on sclerite identification is small. This project sought to: 1. Identify the abundance and distribution of both a mesophotic reef-building hexacoral genus, *Oculina* and additionally, an octocoral genus by the name of *Bebryce* in the Gulf of America. 2. Use SEM to confirm the identity of members of the mesophotic octocoral genus *Bebryce*, also sampled from the Gulf of America. For data regarding distribution and abundance, ROV footage was annotated using the platform TATOR, then verified and processed using Excel, RStudio and ArcGIS. *Bebryce* samples were prepared and then imaged using light microscopy and SEM. The results of this work showed distribution and abundance of both genera consistent with previous literature as well as support for the ability of *B. parastellata* and *B. cinerea* to hybridize.

Jacob Wallin

Discipline: Biology

Authors:

#1 Brock Sheehan

#2 Ruhul Kuddus

#3 Sicely Bybee

#4 Kiara Whitley

Jeremy Wilson

William Acero

Abstract Name: Characterization of the phage PaL41501, a potential therapeutic agent for treating multidrug-resistant *Pseudomonas aeruginosa* strains

Background: *Pseudomonas aeruginosa* is a primary pathogen that infects diverse tissues, including the ear, nose, urethra, soft tissues, lungs, and burn wounds. Some strains of *P. aeruginosa* are multidrug-resistant (MDR). We previously isolated and partially characterized a strain of Litonavirus named L41501 using the *P. aeruginosa* strain Boston 41501 as the host. Here, we present further virological findings for this bacteriophage strain regarding its potential as a phage therapy agent. Methods: Bacterial strains, including some MDR strains, were obtained from ATCC/BEI (Manassas, VA). The host range of the phage, its minimum inhibitory multiplicity of infection (MOI), phage-antibiotic synergy, and its ability to inhibit the host cell's biofilm formation were assessed using standard virological methods. Results: L41501 infected five MDR strains and two non-MDR strains, but was unable to infect eight other strains. L41501 remained biologically active after incubation of the phage for 75 minutes at pH 3-11 and temperatures from 37°C to 67°C, but was inactivated at 77°C. It causes lysogenic infections in the strain Boston 41501, and the resulting lysogens are resistant to reinfection by L41501. L41501 was unable to completely inhibit the growth of the host strain at an MOI of 1-1000. However, the phage reduced the minimum bactericidal concentration (MBC) of neomycin for the host strain by 4-fold at an MOI of 1. L41501 also decreased the host bacterial strain's biofilm formation by 6-fold at an MOI of 10. Conclusions: L41501 is stable across a broad pH and temperature range. It inhibits biofilm formation by *P. aeruginosa* strain Boston 41501. A pure preparation of L41501 cannot be used for phage therapy because of lysogenic infection, but it can be combined with antibiotics for similar applications. We are currently studying the mechanisms of lysogenic infection to develop a mutant L41501 that lacks the ability of lysogenic infection.

Owen Walter

Discipline: Music

Authors:

#1 Owen Walter

Abstract Name: Documenting a Regional Legacy: Tracing the Collaboration of Hank Marr and Rusty Bryant, 1954–1968

From the beginnings of jazz during the early twentieth century, the state of Ohio played an important role in the development and mobility of the genre. Predating the prevalence of air travel, Ohio served as a frequent stop for touring acts due to its location in the United States.. Although the idea of Ohio as a musical crossroads is what the state is most remembered for today in the context of jazz, it created and was home to

many local jazz musicians who never moved to a larger city, such as New York, Chicago, or Los Angeles. In an effort to preserve the local jazz history of the state of Ohio, this paper investigates the rich history of the relationship between two of the state's most revered local jazz musicians: Hank Marr (1927-2004) and Rusty Bryant (1927-1991). Although there is existing literature about these two musicians as separate performers, they had a lifelong musical relationship that has gone largely unnoticed since Bryant died in 1991 and Marr's death in 2004. By referring to existing literature in addition to thorough research of newspaper and music periodical archives, this study aims to provide a new, fuller, and comprehensive history of the complex and exciting relationship between Marr and Bryant. The overview begins with the release of "All Nite Long," the first major recording success on which the two collaborated, and ends with the musical separation of the two artists due to Bryant being signed to Prestige Records in 1968. Ultimately, through reconstructing the musical biographies of these two important musicians, the paper sheds light on a largely forgotten era in Ohio jazz history and aims to inform those who otherwise would remain in the dark about these two Ohio Jazz Musicians.

Norrah Walters

Discipline: History

Authors:

Abstract Name: Seeing into the Past: FSA Photographers Addressing the Medical Neglect of Rural Black Communities in the South

This project is an analysis of why and how the Farm Security Administration documented and portrayed Black people with visual impairments, particularly from rural areas of the southeastern United States, during the late 1930s and early 1940s. This project will emphasize the photographs and works of one of the FSA's key players, Marion Post Wolcott, in conversation with the general treatment of these individuals. The primary audience for my project is historians along with those interested in themes of race, class, and medicine. My research began with the Library of Congress, in which I noticed how often Wolcott took photos of African Americans with visual impairments (with most of them being blind or in clinics having their eyes checked). Since then, health records from 1944 have been located regarding eye health statistics across FSA borrower families, and they left a lot to be desired in discussion with possible racial bias and medical neglect of Black communities as few Black people were included in the physical examinations among said families. This discussion cannot take place without the consideration of location and redlining, thus making medical bias all the more possible. The goals of my project are to break down these photos so I can identify the purpose of why they were taken, what they say about rural Black communities across the southeastern United States, and explain exactly how these photos aided the greater Farm Security Administration in conversation with social and medical programs for those in need. As a result, the audience can thus understand the importance and meanings behind Wolcott's captured imagery.

Whitney Walters

Discipline: Psychology

Authors:

#1 Dr. Cara Palmer

Abstract Name: The Effect of Childhood Trauma on Associations Between Sleep and Emotions in Young Adults

Sleep plays a key role within socioemotional functioning, however the ways in which sleep interacts with experiences early on in life that can further moderate this relationship of emotional regulation are still misunderstood. This study aims to examine whether early exposure to childhood trauma moderates associations between sleep and everyday socioemotional outcomes in young adults. This work draws on data on a project led by Dr. Cara Palmer from the Sleep and Positive Socioemotional Dynamics Study (SAPS). This is a two week sleep assessment that is designed to better understand objective behaviors of sleep related to positive and negative socioemotional experiences in young adults. Participants ages 18-25 wore actigraphy sleep watches continuously for 14 days to assess sleep duration, sleep efficiency, and overall sleep quality. Each morning and evening participants completed surveys that further assessed their moods, social emotions, and depicted interactions they had each day before bed that are later assessed and coded on the Levels of Emotional Awareness Scale assessing levels of emotions. There were baseline assessments that included the Childhood Trauma Questionnaire (CTQ) and the Positive Childhood Experiences (PCE) measures to evaluate early adversity and protective relational factors . We expect that adequate sleep will be connected with more socioemotional functioning processes functioning, including greater positive affect and reduced emotional reactivity. Individuals with poorer sleep are anticipated to report greater emotional dysregulation and more negative emotional responses. Trauma exposure is hypothesized to strengthen these associations as participants with higher CTQ scores are expected to experience amplified negative effects of insufficient sleep. Findings from this study aim to clarify how sleep, trauma, and positive childhood experiences interact to shape emotional awareness. This work may inform prevention and intervention efforts by identifying trauma as a moderating factor that can impact socioemotional challenges among young adults.

Malikhai Walton

Discipline: Music

Authors:

Abstract Name: BORDER CORRIDOS: THEMES OF US-MEXICO RELATIONS AND HOW THE CORRIDO MAY HELP INFORM OUR PERSPECTIVE ON THE POLITICAL STATE OF THE BORDER AND IMMIGRATION POLICY TODAY.

The Mexican corrido has been a popular musical form of storytelling throughout the country's history. The corrido offers unique insight into historical events and figures that represent changing popular sentiment, cultural values and traditions. While corridos have certainly existed in Mexico prior to musical recordings, a corrido genre became very popular in the 1990's and early 2000's with acts such as Los Tigres Del Norte, Los Tucanes De Tijuana and Chalino Sanchez to name a few. Today, the corrido has evolved into many sub-genres, gaining huge audiences of younger fans, still maintaining the traditions connection to popular sentiment among the newer generations, as well. Broadly speaking, some topics discussed in the corrido include colonialism, regional and national politics, narco-culture and the US-Mexico border among many others. Interaction and relations between Americans and Mexicans have been widely expressed throughout the history of the corrido. This presentation will be an investigation into how the ever-changing relations between the United States and Mexico can be understood through the corrido, and how this history may help inform our perspective on relations between the two countries today.

Peyton Walz

Discipline: Environmental Science and Sustainability

Authors:

#1 John Frye

#2 Brian Schanen

Abstract Name: Storm Chasing Documentary: The Making of a Film on Severe Great Plains Storms

The Storm Chasing Documentary explores the University of Wisconsin–Whitewater’s field-based course GEOGRPY 492: Forecasting and Verification of Severe Weather, a program that provides hands-on training for future meteorologists and storm chasers. This project aims to document how the course enhances weather literacy, fosters collaboration between students and mentors, and deepens understanding of severe weather forecasting through experiential learning. The film captures students as they apply classroom knowledge to real-world storm environments, using forecasting tools, safety protocols, and data collection techniques. Through a combination of interviews, field footage, and reflective commentary, the documentary showcases how students analyze storm systems, navigate unpredictable weather conditions, and develop a scientific appreciation for atmospheric phenomena. The purpose of this project is not only to highlight the educational value of storm chasing but also to illustrate the ethical considerations and personal growth associated with participating in such high-risk, high-reward experiences. The documentary emphasizes mentorship, showing how experienced meteorologists guide students through both technical and emotional aspects of storm observation. By integrating storytelling and science communication, this project demonstrates how media can serve as a bridge between academic research and public understanding of weather. Ultimately, the Storm Chasing Documentary aims to inspire future students to engage with environmental sciences and to promote awareness of the power and beauty of severe weather while underscoring the importance of safety, ethics, and preparation in the field. I edited the Storm Chasing Documentary, organizing and refining field footage, interviews, and sound to craft a clear and engaging story. My goal was to balance the scientific aspects of storm chasing with the emotional and educational experiences of the students in the field.

Holly Jiayi Wang

PA - Carnegie Mellon University

Discipline: English and Literature

Authors:

Abstract Name: The Hinge of Collapse: Bodily Micromanagement in the “Unhinged Woman” Genre

This chapter argues that contemporary "unhinged woman" narratives reveal capitalism's gendered promises of success as structurally unattainable through what I term "bodily micromanagement" — the repetitive regulation that operates between conscious control and unconscious compulsion. These practices function as paradoxical bridges between the illusion of agency and its systematic negation, promising coherence while accelerating the very collapse they seek to prevent. The argument proceeds in three stages. First, I trace how concepts of gendered success shift across historical periods while remaining fundamentally unattainable for women. Second, through close readings of Sylvia Plath's *The Bell Jar*, Margaret Atwood's *The Edible Woman*, and Ottessa Moshfegh's *My Year of Rest and Relaxation*, I analyze how protagonists retreat to intensive bodily self-regulation when external promises of fulfillment fail. Esther's contraceptive obsession, Marian's systematic food refusal, and the unnamed narrator's pharmaceutical scheduling represent sophisticated attempts to control corporeal experience that ultimately intensify estrangement. Third, I develop a framework that reconceives these practices as active processes occupying the liminal space between social alignment and complete detachment. Rather than static symptoms, micromanagement unfolds temporally, allowing us to trace how tension between conscious intention and unconscious compulsion develops over time, revealing the gradual estrangement between mind and body that precipitates collapse. This analysis intervenes in both literary and feminist criticism by repositioning the "unhinged woman" genre as cultural diagnosis of how capitalism exploits and intensifies the fundamental tension between mind and body in women's experience. By theorizing micromanagement as process, the chapter reveals how capitalist ideologies intervene in the psychosomatic split, promising that rational self-control can master bodily experience while systematically generating the very mind/body estrangement that renders such control impossible. The conscious/unconscious split characterizing micromanagement becomes emblematic of how

gendered subjects navigate impossible positions through corporeal practices that contain the seeds of their own destruction.

Katherine Wang

Discipline: Physical/Occupational Therapy and Speech Language Pathology

Authors:
#1 Virginia Chu

Abstract Name: Analysis of early childhood sensorimotor control: A computer vision approach to motion analysis

Currently, there are limited standardized sensorimotor tests for young children under 5 years of age. This leaves out a significant period of growth where children with delayed motor development could be helped before entering schools. Atypical somatosensory processing may impact motor development, but children often do not receive a formal diagnosis until they are older where symptoms of dyspraxia or developmental coordination disorder (DCD) become more apparent in a structured environment. The Sensorimotor Performance and Rehabilitation Engineering Lab (SPRE), led by Dr. Chu, has developed the Somatosensory Test of Reaching (STOR). STOR is an assessment tool meant to evaluate a young child's somatosensory processing by using stickers in and out of a child's field of vision. A pilot study was conducted and determined that STOR would most likely present accurate results for children aged 10 months or older. Early detection plays a critical role in motor development, yet the current STOR assessments rely on labor-intensive manual analysis of video data. The purpose of this project is to determine the feasibility and accuracy of using computer vision algorithms to analyze children movement data. First, simplified videos will be used to test the computer algorithm. Then, through secondary data analysis, videos from actual data collections will be sampled to represent a range of participants. Feasibility of using computer vision algorithms will be determined by evaluating circumstances that the algorithm can function appropriately. Accuracy will be determined by comparing the computer vision analysis with original manual analysis. If this process can accurately code data, this would reduce the amount of time needed to code each video and streamline the process of simplifying analysis for STOR. This methodology can also be expanded to other motion analysis in children and potentially adapted into clinical use with mobile applications.

Hanzhi Wang

Discipline: Communications

Authors:
#1 Hanzhi Wang
#2 Benjamin Johnson

Abstract Name: Older Adults' Trust in Extreme Weather Information

With the increasing frequency of extreme weather events, older adults face higher risks in disaster situations due to health vulnerabilities and limited access to risk information. In this context, existing research has examined disaster risk communication, yet there remains a lack of research on how older adults evaluate the trustworthiness of different channels in a multi-channel media environment and on how trust functions within the information-seeking process. Drawing on the risk information seeking and processing (RISP) model, this study focuses on multiple stages that can lead to seeking and accepting relevant information and ultimately taking protective behavior. Key early stages in this process include risk perception and information

insufficiency. We aim to also place special focus on trust as a key psychological mechanism that can lead to positive outcomes for older adults. Specifically, this study investigates how older adults evaluate trust across four categories of channels: traditional media, professional meteorological platforms, social media, and interpersonal communication. Furthermore, it analyzes the role of channel-level trust in the relationships among information insufficiency, information-seeking, and decision-making, for several extreme weather scenarios: hurricanes, floods, tornados, and heatwaves. The research consists of a cross-sectional online survey to be conducted with older adults in Florida, and the data will be analyzed with multiple regression models. The findings are expected to provide more in-depth information about how older adults navigate the complex information environment about weather-related risks, and can guide improvements to emergency management, public policy, and media alerts.

Winnie Wang

Discipline: Political Science

Authors:

#1 Winnie Wang

Abstract Name: Wealth, Power, and Reform: A Global and Historical Approach to America's Pathways to Equity

Since 1989, the United States has remained trapped in a persistent cycle of wealth inequality that only continues to increase today. Whether driven by market failures or deliberate public policy decisions, this disparity is not accidental- it is systemic. This paper seeks to uncover the reasons behind the lack of meaningful progress over the past three decades and to explore potential pathways toward a more equitable society. It begins by acknowledging the importance of understanding how these disparities persist, particularly through the division of the population along both material and inherent lines as a necessary first step in recognizing the core issues at hand. Furthermore, by examining historical precedents and comparable global cases such as Vietnam, Iraq, and the recent Nepali Revolution, the analysis identifies strategies that may be adapted to contemporary conditions. The central argument emphasizes the necessity of gradual yet revolutionary policy reform grounded in socialist principles, aiming to curb excessive wealth accumulation and promote sustained redistribution. Furthermore, the paper highlights the importance of ensuring that economic justice extends beyond the middle class to include society's most vulnerable populations through continuous redistributions of wealth downwards through increased welfare programs. In an era defined by political polarization and rising living costs, this study contends that the United States must move away from systems rooted in exploitation and toward policies that foster collective well-being and economic fairness despite the continued propaganda against such.

Liz Wang

Discipline: Chemistry

Authors:

#1 Hyunjung Kim

#2 Pengfei Wang

Abstract Name: Structural Optimization of Saponin Adjuvant to Boost Immune Response

Many vaccines contain adjuvants, compounds that boost the immune response to a vaccine and allow for smaller dosages and fewer immunizations. Saponin-based adjuvants have gained more attention due to the

clinical success of the saponin QS-21, which is the current industry gold standard. However, though it is effective, QS-21 has inherent drawbacks that make it increasingly important to develop alternative adjuvants. One such alternative is VSA-2, a semisynthetic saponin adjuvant consisting of a synthetic side chain attached to the natural product Momordica saponin II (MS II). Its immunological effects are comparable to that of QS-21, with the added benefits of also being more sustainable to isolate and chemically stable. To investigate the effects of the side chain on the immunological function of MS II, structure-activity relationship (SAR) studies were conducted to evaluate the impact of the side chain's length and internal functionality. Taken together with previous SAR studies, the results indicate that both the terminal functional group and internal structure of the side chain greatly influence the adjuvant activity of semisynthetic saponins.

Ronak Wani

Discipline: Computer Science

Authors:

#1 Roe Shraga

#2 Matthew Ahrens

Hemankit Vallurupalli

Abstract Name: Earthovia: Full Stack System For Interdisciplinary Education

This study examines how Interdisciplinary learning objectives, such as the United Nations Sustainable Development Goals (SDGs) and UNESCO AI competency framework can be effectively integrated into higher education curricula. These interdisciplinary objectives are often neglected as their integration requires educators to work with domains beyond their primary areas of specialization. Large language models (LLMs) have demonstrated immense potential to generate content across numerous domains. Nevertheless, existing literature shows that LLMs remain susceptible to hallucination and struggle with domain-specific questions requiring factual precision. To address this gap, we introduce Earthovia, a full-stack interactive web application, that employs a Hybrid Dense-and-Sparse Retrieval Augmented Generation (RAG) approach grounded in vector embeddings generated from United Nations Education for Sustainable Development (ESD) and UNESCO AI Competency educational frameworks. Earthovia supports educators in backward-design curriculum development starting from curating the course structure to module learning objectives to assessments, homeworks, and the last step being reading materials to ensure tight integration of interdisciplinary learning objectives at each step. Earthovia's interface provides clear Create, Read, Update, and Delete (CRUD) operations for every AI generated material to ensure final materials reflect educator's informed judgment. Earthovia is evaluated through a workshop with faculty participants using a within subjects, mixed methods approach where the participants engage in a manual and an Earthovia assisted integration round (IRB-26-0011). The changes are recorded as modifications in learning objectives, class structure, assessments, and curriculum materials on a worksheet. After each round, the participants complete a survey where we collect both quantitative data and qualitative reflections. The workshop concludes with a focus group semi-structured interview to collect user stories. All data collected is analyzed using the grounded theory approach to create en-vivo, procedural, and descriptive axial codings from which broader thematic categories are derived.

Daisy Wanjala

Discipline: Exercise Science and Nutrition

Authors:

#1 Daisy Wanjala

#2 Donna Wolf

Abstract Name: Preconception and Prenatal Lifestyle Behaviors as Predictors of Labor and Delivery Outcomes

Preconception health reflects the physical and behavioral well-being of individuals of reproductive age, and unhealthy habits during this period may increase the risk of pregnancy complications. This study examined whether lifestyle behaviors before and during pregnancy were associated with adverse outcomes, including labor induction and cesarean delivery. A descriptive cross-sectional survey was conducted in April among 15 postnatal women aged 18–50 living in the Hampton Roads area. Participants were recruited using snowball sampling and completed an anonymous online questionnaire with approximately 76 items assessing sociodemographic characteristics, physical activity, nutrition, sleep, stress, physician guidance, and delivery outcomes. Women who were currently pregnant or had pre-existing chronic conditions were excluded. Results indicated that participants had a mean age of 26.67 ± 5.07 years. The average pre-pregnancy weight was 145.93 ± 19.93 lbs., which increased to 168.93 ± 15.82 lbs., representing an average weight gain of 23 lbs. Overall, 20% of women experienced medically induced labor due to preeclampsia, and 33.3% underwent emergency cesarean sections, most often because of difficult labor. Unhealthy lifestyle behaviors were also prevalent: 40% reported being “not very active,” 73.3% consumed processed or fast foods multiple times per week, and 60% slept fewer than six hours per night. Additionally, 93.3% stated they received no preconception physical activity counseling from healthcare providers. Findings suggest that lower physical activity levels, poorer diet, inadequate sleep, and elevated stress may contribute to increased pregnancy complications. While the results support the study’s hypothesis, the small sample size and demographic similarity of participants limit generalizability. Larger, more diverse studies are needed to further examine these associations and to support improved preconception counseling that encourages healthier behavioral practices.

Chloe Warble

Discipline: Psychology

Authors:

#1 Jelynn Horsey

#2 Meghan Farrar

#3 Sophia Rankin

#4 Erin Worgan

Abstract Name: Effects on Mental Illness in Individuals with Familial History of Alcohol Use Disorder

This study aims to explore the differences in rates of depression, anxiety, stress, and alexithymia (a diminished capacity to both identify and describe emotions and appropriately manage problematic emotional states) in those with and without a family history of alcohol use disorder (AUD). Previous research has found that there's an increased risk of an individual developing AUD if it is present in their family history due to a combination of genetic and environmental factors. Approximately 50–70% of individuals with an AUD will be diagnosed with comorbid psychiatric disorder, including depression and anxiety. Although previous research has focused on how having a family history of AUD is associated with an individual's risk of other mental health issues the goal of this study is to bridge a gap in research by examining how those with and without a family history with AUD will score on multiple mental health related measures. This study also focuses on college aged students who are in environments more susceptible to experiencing these negative mental health challenges. Data was collected via SurveyMonkey from a college sample using the following questionnaires: Toronto Alexithymia Scale TAS-20: A 20-item self-report questionnaire that assesses questions related to alexithymia. Alcohol Use Disorder Identification Test: A 10-item screening questionnaire regarding alcohol use disorder. Depression Anxiety & Stress Scale: A 21-item scale self-rated questionnaire consisting of questions related to depression, anxiety, and stress. Demographic information such as age, sex, gender identity, a history of mental illness for both for the participant and their family

members. We expect individuals with a family history of AUD to score higher on all mental health and alcohol use measures than participants who do not have a family history of AUD.

Brogan Ward

Discipline: Dance

Authors:

Abstract Name: Fragments of One

This dance explores themes of overcoming internal barriers and the mental "fronts" people put up when in different situations. The choreography blends hip hop with contemporary movement in a way that captures constant shifts and waves of emotion representing the pullbacks of fear and false comfort, contrasted by the pushes of optimism and self-growth. The nine dancers represent the various internal "masks" that an individual might rely on as they navigate these competing forces. The aim of the work is to show that hope is rarely linear in its progression; instead, it appears in powerful surges that mirror the same speed at which insecurities can return. Through this interplay, the piece highlights how difficult finding clarity and strength within one's own mind may be to some. This choreographic research builds on the idea of using movement to make internal experiences visible to its audience, as well as exploring how to portray emotional tension by patterns of expansion and contraction. The work also experiments with how the body can reflect vulnerability, resistance, and growth through shifts in dynamics and intention in spacing. The central purpose of this project is to investigate storytelling through movement, translating emotion into a physical vocabulary. That purpose continued to guide my creative process in structure and phrasing. The expected outcome of this research is a deeper understanding of how physicality can make emotions legible, both for the performers and audience members. Through creating and rehearsing this work, the project has expanded my creative process by refining my use of dynamics, timing, and dancer interactions to explore more abstract concepts.

Artemis Ward

Discipline: Linguistics and World Languages

Authors:

#1 Richard Armstrong

Abstract Name: Anti-Augustan or Pro-Augustan: The ending of the Aeneid-An inquiry into the language

"Imperium sine fine"- "empire without end"- are the words of Vergil, Rome's greatest poet. His monumental epic, The Aeneid, was written to evoke the mythic foundations of Rome and to trace a divine lineage from Aeneas to Augustus. The poem's climatic finale in book XII concludes with the death of Turnus. The Aeneid's final scene has been greatly debated amongst scholars. Two views have come from this debate: anti-Augustan and pro-Augustan. The focal point is the anger of Aeneas. Furthermore, the violence of Aeneas has been viewed as a critique on Augustus. This paper argues that the anger of Aeneas is justified. Moreover, that it is not a critique on Augustus but recognition on his rule. Vergil indicates that Turnus' was destined to die for his killing of Pallas and his taking a spoil of war, the belt of Pallas. By applying a philological analysis of key passages in the Aeneid combined with a look at the historical background in which the Aeneid was produced helps in understanding these passages. This also includes ancient commentators and evaluating the work in relation to the moral values of the ancient Romans. As stated by Karl Galinsky: "The Roman reader would not have been concerned about his capital punishment in the final scene of the epic."Throughout the Aeneid,

Vergil sharply contrasts Aeneas and Turnus. Vergil makes it clear that it was destined that Aeneas would establish Rome, and Turnus was destined to die.

Elizabeth Warford

Discipline: Chemistry

Authors:

#1 Sara Zerangnasrabad

#2 Alexei Kisselev

#3 Rashad Karimov

Abstract Name: Conjugation of the Proteasome Inhibitor Bortezomib to the TROP2 Antibody to Directly Target TNBC Cells

Triple-negative breast cancer (TNBC) is an aggressive form of breast cancer with low survival rates after metastasis. Bortezomib (BTZ) and other proteasome inhibitors (PIs) have been shown to kill TNBC cells in vitro at similar rates to Multiple Myeloma (MM), a blood cancer for which PIs are FDA-approved treatments. However, TNBC is a solid tumor, making it difficult to target with PIs, as the body clears them out before they reach the tumor site. BTZ also has off-target effects, leading to cardiovascular, gastrointestinal, and neurotoxicity. Identifying a way to directly target the TNBC cells provides a solution to reduce the toxic effects of BTZ while also ensuring the cancer receives the drug prior to systemic clearance. One way to target TNBC is by synthesizing an antibody drug conjugate (ADC) attached to BTZ. TROP2 is overexpressed in TNBCs, making it an ideal target for ADC therapy using TROP2 antibodies. My goal in this project is to synthesize an antibody drug conjugate with BTZ linked to a TROP2 antibody, sacituzumab, leading to direct targeting of BTZ to TNBC cells. This requires a novel multiple-step synthesis to create a linker in which the drug is attached to the antibody, so that it can be cleaved within the cell to release the drug. During the synthesis phase, many steps will be taken to ensure the linker is following the desired formation, including using analytical devices like NMR. After the linker is successfully made, it will be added to the TROP2 antibody using previously optimized conjugation conditions. After successful conjugation, the ADC will be tested in vitro alongside free BTZ to see if the ADC gets cleaved and releases BTZ in biological conditions, and if it kills TNBC at similar rates to free BTZ, ensuring its structure and function were not affected.

Serena Warner

Discipline: Psychology

Authors:

#1 Serena Warner

Abstract Name: Carl Jung's Cognitive Function Theory: Beyond the MBTI

In this work, we apply computational methods and machine learning to evaluate Carl Jung's original personality theories using quantifiable data. We derive mathematical proxy equations for Jung's eight cognitive functions and calculate them using a publicly available dataset of approximately one million responses to the statistically supported Big Five Inventory (BFI). While contemporary personality psychology relies on trait-based models such as the Big Five, Jung's cognitive-function framework remains influential despite its limited empirical validation and its popular association with the Myers-Briggs Type Indicator (MBTI). This study returns to Jung's Psychological Types to isolate the conceptual definitions of each function and map them onto measurable Big Five traits through theoretically informed weighting schemes.

These proxy functions are then evaluated using a permutation-based null model to assess whether their interrelationships align with Jung's predicted function pairings. Finally, we apply Principal Component Analysis (PCA) to visualize the latent structure of the computed functions and examine whether they form distinct dimensions or collapse into broader trait components. This approach provides a large-scale empirical test of Jung's typological claims, assessing whether these constructs meaningfully align with measurable trait dimensions or whether their structure diverges from current scientific models.

Ezekiel Warren

Discipline: Biology

Authors:

#1 Ezekiel Warren

#2 Joseph McCormick

Abstract Name: Nucleoid Compaction and Chromosome Segregation in a Filamentous Sporulating Soil Bacterium

The increased frequency of antibiotic-resistant organisms is a major medical, agricultural, and ecological concern. *Streptomyces* are Gram-positive, filamentous, sporulating soil bacteria that produce a majority of medically relevant antibiotics. *S. coelicolor* is the typical model species used to study the genus, and is an excellent model organism to study cell division due to its complex life cycle. To increase understanding of the *Streptomyces* life cycle, strains that express deletions of conserved cell division genes *ftsK* and *ftsQ* have been constructed. Previous lab members have identified additional genes that may act in a compensatory manner for each gene deletion. *ftsK* is a DNA translocase that encodes an ATPase, which uses energy from ATP hydrolysis to ensure each spore receives a complete chromosome. Despite this gene being conserved, its deletion in *Streptomyces* does not result in a significant aberrant phenotype. A conserved gene encoding a Type VII Secretion System (T7SS) encodes an ATPase that exhibits high sequence similarity to the ATPase encoded by *ftsK*. To determine whether this T7SS compensates for a deletion of *ftsK*, strains expressing deletions of *ftsK* and the T7SS-encoding gene have been constructed. If a significant aberrant chromosome segregation and compaction phenotype is observed, it indicates that this gene product likely impacts cell division. *ftsQ* encodes a protein that acts as a scaffold to recruit the master cell division protein, *ftsZ*, and other essential cell-division machinery. *ftsQ*-null mutants can accumulate mutations that restore sporulation. One set of these mutations is in the *lsr2* gene (*lsr2**), which encodes a transcriptional repressor of biosynthetic gene clusters. To determine how this set of mutations in *lsr2* suppresses the deletion of *ftsQ*, various genetic fusions to the reporter gene, EGFP, have been constructed to assay activity under mutant conditions, which will likely reveal a mechanism of suppression.

Gabrielle Warriner

Discipline: Art History

Authors:

#1 Gabrielle Warriner

Abstract Name: The Hobo Code: A Language Unspoken

This research delves into the inner workings of Hobo culture and the vast visual language shared by immigrant workers, okies, bohemians and famous blues artists in America - the Hobo Code. With a broad system of pictograms, Hobos were able to covertly communicate with an entire subculture of workers across

the American West. Whether it was to signal that water and food was available in an area, or to alert Hobos of police enforcement, this shared language strengthened a marginalized community. By examining the extensive history of U.S migration and unravelling the social hierarchies in the 1900s West, this topic questions how Hobos are commonly generalized today, and analyzes what their true nature and intentions were. This research on the Hobo code uses the history of a form of visual communication to look inside the minds of both men and women who dedicated their lives to travelling on the rails, seeking work, and creating adventure along the ride.

Chloe Waterman

Discipline: Psychology

Authors:

#1 Lindsay Smith

#2 Isabella Ventimiglia

Abstract Name: A Regional Differences Approach to Understanding Ageist Views and Behaviors among University Students

Introduction: Ageism remains prevalent in the U.S., manifesting in discriminatory behaviors typically displayed by younger populations. However, there may be regional variations in ageism, particularly in regions of the U.S. where there is a high percentage of older adults (65+). The purpose of the present study was to determine if regional differences in ageist views and behaviors exist among university-age students. Method: The sample consisted of 521 undergraduate students (mean age = 19.56 years) enrolled in psychology courses at liberal arts universities in Virginia (n = 288) and Florida (n = 233). In addition to the collection of demographic information, measures included the 29-item Fraboni Scale of Ageism (FSA), which measures cognitive and affective qualities of ageism, and the 20-item Relating to Old People Evaluation (ROPE), which measures positive and negative ageist behaviors exhibited by individuals throughout their everyday activities. Results: Independent samples t-tests were performed to compare data from students at the Virginia and Florida universities on the ageism and ageist behaviors measures. Results of the t-test for FSA scores were statistically significant [$t(519) = -2.30, p < .05$]. The subsample of Florida university students had significantly greater ageist views ($M = 57.41, SD = 9.95$) compared to the subsample of Virginia university students ($M = 55.51, SD = 8.88$). Results of the t-test for the ROPE were not statistically significant [$t(519) = .84, p > .05$]. Discussion: Where one lives may play a pivotal role in their experience of growing old in America. Age friendliness may vary by state, depending on age demographics and population aging rates. These findings aligned with a study of all 50 states, where ageism was found to be more prevalent in northeastern and southeastern states (including Florida). Further research in this area is required to elucidate the impacts of this societal phenomenon.

Jaeden Watkins

NC - North Carolina A&T State University

Discipline: Communications

Authors:

Abstract Name: From the Feed to the Bleachers: Student Perspectives on Social Media Production and Game Attendance

This study examines the extent to which institutional social media production influences student attendance at

college basketball games, an increasingly relevant but understudied aspect of sports communication. As athletic departments enhance their digital presence through cinematic edits, motion graphics, trailers, and promotional storytelling, questions remain about whether these production efforts actually motivate students to attend games in person. Existing research often focuses on digital engagement metrics such as likes, views, and comments, yet provides limited insight into how production quality shapes physical attendance decisions. To address this gap, the project centers on qualitative insight grounded in student experiences. By interviewing one student from an HBCU (North Carolina A&T State University) and one student from a PWI (University of North Carolina at Chapel Hill), this research explores how fans interpret, respond to, and engage with their school's official men's basketball Instagram content. These conversations, supported only by past attendance numbers for contextual background, highlight how production style, financial considerations, and perceptions of authenticity influence whether students choose to attend games. Prioritizing lived experience over numerical correlation, this approach highlights motivations, expectations, and barriers that traditional quantitative research methods can often overlook. Comparing responses across an HBCU and PWI setting further illustrates how differences in resources, media strategy, and school culture shape the effectiveness of digital promotion. Ultimately, this study aims to expand the broader conversation about sports marketing in higher education by providing insight into how students perceive institutional social media and how those perceptions relate to in-person attendance. By prioritizing lived experience, the project emphasizes the value of student voices in understanding contemporary fan behavior.

Colin Watkins

Discipline: Chemistry

Authors:

#1 Aseem Visal

#2 Carson Bruns

Abstract Name: Mechanical Properties of Tough & Stretchable Slide-Ring Hydrogels

Two polymer chains, joined by a fixed crosslink have limits to their stretchability, however, Slide-ring materials which resemble molecular necklaces have greater stretchable properties. Slide ring hydrogels are a hydrogel composed of a polymer string which is threaded through lamp shade shaped rings, capped on the ends with larger molecules keeping the rings trapped in the structure, and having its rings crosslinked with other rings on different strands. The Hydrogel formed now gets its stretchable properties not from chemical bonds but from the mechanical sliding of the rings on the polymer strands. The benefit of this slide ring hydrogel is that there is very little wear and tear after repeated usage compared to other gels and rubbers as there are no chemical bonds being stretched only mechanical sliding. The research of these hydrogels included overall synthesis, tensile testing, and figuring out applications. For the main chemistry portion of the presentation it will include things like Polyethylene glycol bis(amine)(PEGNH₂) synthesis from polyethylene glycol(PEG), getting the inclusion of the rings in the structure using hydroxypropylated α -cyclodextrin (HP α CD) as the rings, the end capping, and the cross linking using Divinyl Sulphone (DVS). For the other portions of the presentation, it will include applications of the hydrogel like flexible electronics, tissue engineering, membrane technology, and sustainable soft materials.

Hanora Watson

Discipline: Engineering

Authors:

Abstract Name: Mitigating Climate Change Through the Application of Thermoelectric Effects in Waste Heat Recovery

My project addresses society's need of growing demand for renewable energy. My research developed a novel apparatus that will generate electricity from extreme temperature differences. The temperature difference will come from harvested waste heat in order to further cool down the atmosphere. Since there is a high societal demand for a diversification of energy that does not depend on fossil fuels, or have loud moving machinery that disrupts neighborhoods, I anticipate this generation technology will contribute to the future of renewable energy. The technical methodology of my generator only requires an electrical current and temperature difference between two surfaces. I will analyze how thermoelectric effects heat convert to electricity through using a thermoelectric effect apparatus as a thermoelectric effect generator (TEG). The TEG developed in this experiment performs the Seebeck effect in which the temperature difference between the hot junction and the cold junction produces a voltage that sends a current to flow in this open circuit. My hypothesis is that if the temperature gradient is higher, in the range of 100°C-120°C, the voltage output will increase, in the range of 1mV-5mV, therefore producing more electricity. The results of this research show that the relationship between voltage generated and temperature difference is a linear increasing relationship. I have also analyzed the direct relationship between platinum resistors and temperature and inverted relationship between thermistor output data and temperature. I plan to expand my research to increase the scale of the generator. I anticipate that the larger scale will produce more electricity. I also plan to modulate the parameters set for platinum resistance and thermistors in order to maximize the amount of electricity generated.

Gracia Watson

Discipline: Engineering

Authors:

#1 Venumadhav Korampally

#2 Selina Cervantes

Abstract Name: Microfluidic Diode Valves for Point of Care Diagnostics

This study looks at how microfluidic diode valves can be used to create point of care testing devices with similar efficacy to PCR tests. The goal is to develop portable, timely, and accurate point of care testing devices capable of performing more complex detection methods. The microfluidic diode valves are constructed of an inlet and drain made of conjugate pad with a channel in between, which are then covered by mylar on the top and bottom. A solution is added to the inlet, which flows through the channel and to the drain. By manipulating the surface of the mylar in the channel with hydrophobic materials, the flow speed of the solution can be controlled. Ultimately a scalable time delay will be created that can manipulate the timing of reactions to improve the clarity of the results. Data was collected to see how well these time delays work. Preliminary results show that while it is possible to create them, keeping them consistent is challenging. Further analysis will be presented, including steps being taken to help improve the reliability of these time delays, as well as what it could mean for the future of point of care testing in a resource limited setting.

Tobiah Watts

Discipline: Computer Science

Authors:

Miles Wirht

Abstract Name: Ultrasonic Information Broadcasting for Multi-Device Communication in High-Noise Environments

This project will introduce a new encoding format utilizing ultrasonic signals for wireless data transmission between several devices in noisy, chaotic environments. Unlike optical methods, like QR codes, that require line-of-sight or visual clarity, ultrasonic communication (ranging between 18-22 kHz) uses inaudible sound to carry encoded data to nearby receivers omnidirectionally. This will allow continuous communication between a large number of devices without needing paired connections or a WiFi network. The encoding scheme will be based on the frequency-shift keying (FSK) method and will use error-correcting algorithms to ensure data can still be obtained in the presence of noise, reverberations, and signal loss. The encoding will allow a variable data transmission rate from 100-1000 bps and a data range from 1-15 meters, depending on the various environmental conditions. Use cases for this transmission method can include, but are not limited to, contactless check-ins, proximity authentication, IoT device configuration, information for museums/exhibitions, and cellular-like emergency broadcast systems in areas without internet access. This research will assess the packet delivery rates and reliability in different noise conditions (as high as 85 dB) and in different architectural environments. Because the communication method relies on low-cost hardware (i.e., standard speakers/microphones) and has no internet capabilities, this method may prove advantageous for resource-limited situations. The approach will yield proof-of-concept results and performance evaluations suggesting its potential for real-world settings.

Katie Waukau

Discipline: Political Science

Authors:

#1 Jeremy Arney

Abstract Name: The Colonial Mindset Behind Blood Quantum: A Tool of Indigenous Erasure

This research examines the colonial origins and ongoing impacts of blood quantum laws on Indigenous tribes in the United States. Introduced by colonial and federal authorities in the late nineteenth and early twentieth centuries, blood quantum policies served as tools of settler colonialism designed to diminish Indigenous populations over time. The purpose of this research is to demonstrate how these policies function as instruments of erasure and statistical genocide. This project examines how the colonial mindset behind blood quantum has been internalized and adopted by some Indigenous communities. As blood quantum requirements grow more restrictive with each generation, many tribes continue to experience population decline. Some have already moved away from using blood quantum for enrollment, while others are considering similar changes. To complete this project, I used a combination of qualitative methods, including analysis of historical government records, tribal enrollment policies, and key scholarly works such as *Beyond Blood Quantum* and *The Great Vanishing Act*. I conducted interviews with Norbert Hill, a contributor to both volumes, along with Megan Minoka Hill. Both are Indigenous scholars and leaders who discussed the implications of blood quantum and potential alternatives. The goal of this project was to better understand how blood quantum laws, originally imposed by colonial and federal authorities, continue to affect how Indigenous people define identity, claim tribal membership, and uphold sovereignty. This research also examines how current enrollment policies might be reformed through a decolonizing approach that moves away from colonial frameworks. By exploring alternatives such as lineage-based or reduced-fraction criteria, the project aims to halt the decline of sovereign Native nations and support their continued survival.

Andre Weaver

Discipline: Chemistry

Authors:

#1 Andre Weaver

#2 Gregory O'Neil

Abstract Name: Redefining Alkenone Synthesis for Accurate and Precise Quantification

We developed a simple, reliable NMR method that removes the need for added chemical standards by calibrating an electronic reference signal (ERETIC 2) against a common compound in CDCl₃, allowing any lab to obtain accurate, comparable concentration measurements quickly; in parallel, We advanced a stepwise synthesis of the methyl alkenone 37:2 using ring-opening cross-metathesis followed by a Grignard addition and confirmed the product by ¹H NMR, and together these efforts improve the identification, quantification, and separation of closely related alkenones while laying the groundwork for the targeted synthesis of a related di-ketone.

Peyton Weaver

Discipline: Economics

Authors:

Abstract Name: The Effect of Suburbanization on Biodiversity

Since the introduction of Levittown in the 1940s after World War II, suburban communities have been the fastest growing developments for families. (Nelson, Williams, L.J., 1999). The introduction of the first G.I. bills after the second world war subsidized the construction and purchase of single-family homes, and there have been additional government subsidies to encourage the sprawl of suburban life since the initial introduction to facilitate this rapid growth. There is a correlative relationship between the growing suburban and single-family living and the damage to local ecosystems and diminishing populations of native species due to the negative externalities of the added pollution and depletion of resources. The research intends to solidify the connection between horizontal building expansion to the declining population of pollinating species by examining the behavior and externalities of growing suburban communities and their ability to support natural ecosystems.

Miranda Weaver

Discipline: Biology

Authors:

#1 Miranda Weaver

#2 John B. Echols

#3 Victoria Ordonez

#4 Authur W. Meehan

#5 Blake E. Hildreth

Abstract Name: The Evaluation of the role of the transcription factor PU.1 in breast cancer cancer-associated fibroblasts

Macrophages are normal immune cells. In tumors, they are convinced by tumor cells to promote tumor

progression. Here, tumor-associated macrophages (TAMs) provide tumor growth, survival, and metastasis signals. We found that the protein PU.1 is essential for normal macrophages to become TAMs. Here, PU.1 deletion in TAMs in mice reduces BrCa growth. Another key cell type in tumors are fibroblasts. Like TAMs, cancer-associated fibroblasts (CAFs) 1) are present in great number; 2) drive tumor progression; 3) suppress the immune system; and 4) promote treatment resistance. Therefore, like TAMs, CAF density is linked to a poor prognosis. Interestingly, PU.1 has been shown to have functional relevance in fibroblasts, with inhibiting PU.1 reducing their function in non-cancer models. From our background in studying PU.1 in BrCa and its discovered function in fibroblasts, our objective is to evaluate the role of PU.1 in BrCa CAF function. Our hypothesis is that like in non-cancer models, PU.1 will have functional relevance in CAFs. First, using cell proliferation assays and gene expression analysis, we found that inhibiting PU.1 reduces mammary fibroblast proliferation and fibroblast marker and function gene expression. We then exposed fibroblasts to triple negative breast cancer (TNBC) and luminal B BrCa cells. Interestingly, TNBC, but not luminal B BrCa, cells promoted increased PU.1 levels in fibroblasts. Last, we used genetically engineered mice to delete PU.1 specifically in fibroblasts. Like our cell assays, PU.1 deletion in fibroblasts reduced TNBC, but not luminal B BrCa, growth. Total findings indicate that PU.1 in CAFs promotes tumor progression in TNBC, but not luminal B BrCa. From this, therapeutic targeting of PU.1 in CAFs could be a viable strategy to treat TNBC, which has a high degree of treatment resistance and limited effective treatment options.

Kacey Webb

Discipline: Psychology

Authors:

#1 Kacey Webb

Abstract Name: Prominence of Antisocial Personality Disorder in Violent Crime

Violence has become a widespread and growing phenomenon, with rates of violent crime increasing despite professional efforts to reduce it. The cause of violent crime across the world is something that these professionals have wondered about for generations. While many researchers have investigated external influences, one influence that should be considered is mental health. Antisocial personality disorder (ASPD) has been shown to be associated with behaviors that result in criminality. To research this relationship, a collective meta-analysis was conducted. While much of the research done on this topic was qualitative, seven studies provided sufficient data for a quantitative analysis. From these sources, five commonalities were discovered: (1) aggression, (2) impulsivity, (3) psychopathy, (4) recidivism, and (5) substance use disorder. Preliminary analysis identifies a significant relationship between antisocial personality disorder and these five characteristics. These prominent characteristics have been established with violent behavior, resulting in violent crime. The prominence of this disorder within the criminal justice system could provide insight into how to reduce the rising number of violent crimes across various societies. With this information, professionals can take a step back and reassess their approach to reducing violent crime.

Alex Webb

Discipline: Biology

Authors:

#1 Christopher Goodchild

#2 Richard Dolman

#3 Michelle Haynie

Abstract Name: IgM hantavirus (Sin Nombre virus) ELISA for free-living deer Mice from northwest Oklahoma

Hantaviruses are an emerging zoonotic disease and are the etiologic agents of severe acute respiratory diseases: hantavirus pulmonary syndrome (HPS) or hantavirus cardiopulmonary syndrome (HCPS). Human hantavirus infection occurs through inhalation of excreta from reservoir hosts, which include rodents, shrews, moles, and bats. We are conducting a hantavirus (Sin Nombre virus [SNV]) surveillance in a free-living deer mice population located in northwest Oklahoma. To do so, we optimized an ELISA method for the detection of SNV IgM and IgG antibodies. The development of an SNV IgM ELISA complements another project that characterizes horizontal SNV transmission of wild-caught deer mice in a semi-natural enclosure.

Joshua Weber

Discipline: Biology

Authors:

#1 Joshua Weber

#2 Molly Ludwick

Molly Ludwick

Abstract Name: Oral administration of fluoxetine with L-Dopa further disrupts behavioral self-control in male *Betta splendens*

Recent research examined whether *Betta splendens* can exhibit behavioral self-control in a discrete-choice instrumental task for food reward. Male, but not female, bettas spontaneously preferred a larger-later (LL) reward over a smaller-sooner (SS) reward across repeated trials, demonstrating self-control without specialized training such as fading-delays procedures. Follow-up work showed that oral administration of the dopamine precursor L-DOPA disrupted this self-control, shifting preference strongly toward the impulsive SS option. Because selective serotonin reuptake inhibitors (SSRIs) like fluoxetine reduce impulsivity and aggression across species, the present study tested whether fluoxetine could restore self-control impaired by L-DOPA. Male bettas were randomly assigned to either a fluoxetine-only group (F) or a fluoxetine-plus-L-DOPA group (FD). Starting one week before testing and continuing throughout the study, all subjects received a daily oral dose of fluoxetine (2 mg/kg) at 9 a.m. Before each behavioral trial, FD subjects received an additional L-DOPA dose (60 mg/kg). During testing, fish completed three daily trials in a submerged T-maze, choosing between an immediate SS reward (1 pellet) and a delayed LL reward (3 pellets after 15 seconds). More than half of all subjects were removed due to abnormal swimming or atypical task performance, with attrition nearly twice as high in the FD group as in the F group. Among the remaining subjects, outcomes in the F group were variable: twice as many stabilized on the impulsive SS option as on the LL option. In contrast, all surviving FD subjects responded exclusively for the SS reward. These results indicate that this fluoxetine dosage does not rescue L-DOPA-induced reductions in self-control. Moreover, fluoxetine alone may further impair self-control in this paradigm. Future work could test alternative fluoxetine dosages, other SSRIs (e.g., sertraline), or co-administering carbidopa to isolate peripheral effects of L-DOPA on behavioral regulation.

Kirsten Webster

Discipline: Biology

Authors:

#1 Kirsten Webster

#2 Regina Hilfiker

Abstract Name: Rescue of cell viability in an optimized in vitro model of radiation induced anemia

Erythropoiesis is the generation of red blood cells (RBCs) through progenitor expansion during development. When exposed to radiation during cancer treatment progenitor cells may undergo programmed cell death due to DNA damage from radiation. This often leads to secondary anemia. Anemia is a condition where the body is unable to circulate enough oxygen to the cells due to a loss of RBCs or decreased oxygen carrying capacity of RBCs. Erythropoietin (Epo) Receptor (EpoR) is a crucial regulator of RBC progenitors. Epo binding causes a cascade of events in the cell, driving expansion of RBCs. EpoR knockout in mice is embryonic lethal, showcasing the importance of EpoR in erythropoiesis (Lee et al., 2001). Bcl-xL is an antiapoptotic protein that leads to increased cell division and pro-survival signaling downstream of EpoR. In the absence of Bcl-xL, red blood cell progenitors are pushed towards apoptosis (Güler, 2025). In our lab, when exposed to UV radiation, K562 cells have significantly reduced cellular growth and cellular viability. However, overexpression of the anti-apoptotic protein, Bcl-xL, rescued cellular viability post UV radiation in K562 cells, suggesting that Bcl-xL overexpression may recover cellular growth quicker than cells without the overexpressed protein. Since K562 cells are not an accurate model for erythroid maturation and development, we further used KITCAT cells, a cell line that has the ability to mature similarly to RBCs. KITCAT cells when exposed to radiation also exhibit significantly reduced cellular growth and cellular viability. We will present data on the ability of Bcl-xL to rescue from radiation induced death in KITCAT cells. Morphology data will show what KITCAT cells look like pre and post radiation. Therefore, our data supports that we have an efficient model for radiation induced anemia and have demonstrated that Bcl-xL overexpression is a potential approach to protecting erythroid cells from radiation-induced apoptosis.

Linduli Weerasinghe Hettiarachchige

Discipline: Health and Human Development

Authors:

#1 Linduli Weerasinghe H

#2 Kacie Blackman

Abstract Name: Maternity and the aging brain : Understanding the link between reproductive trauma and dementia risk in women

The prevalence of dementia and its associated costs are on the rise, as the total number of people with dementia is projected to reach 82 million in 2030 and 152 million in 2050. As research continues to explore the biological and ecological factors that may aid in its manifestation, it is important to understand sex-based biopsychological experiences that may affect an individual's long-term brain health. This project aims to examine the biological factors surrounding pregnancy, specifically traumatic birthing experiences, and how they correlate with the increased risk for women that gave birth developing dementia in later life. This project focuses on three major forms of reproductive and birthing trauma that are statistically linked with the increased risk of cognitive decline in older women who gave birth during their reproductive period. Additionally, it synthesizes information from cohort research studies examining physical indicators of traumatic birthing experiences (e.g., pre-eclampsia, stillbirths, and recurrent miscarriages) and their association with dementia diagnosis. The conditions explored in this paper are commonly related to dementia through shared pathways such as vascular abnormalities (specifically in relation to hypertensive disorders and dysregulation) and impaired endothelial function. By identifying these overlapping pathways, this project aims to clarify which traumatic birthing physical indicators may serve as early indications of cognitive decline as well as understand how both biological and psychological mechanisms work simultaneously. Determining these risks will contribute to improved risk assessment for women and aid in building efficient dementia preventive methods, as well as to develop ways to enhance the birthing experience.

Annalie Wehmuller

Discipline: Art History

Authors:

Abstract Name: Comparative Analysis of the Cultural Values of 20th Century Nigeria and the United States Through the Depiction of Christ in Art

In the early 1900s, both the United States and Nigeria experienced significant Christian movements that reshaped cultural values and practices in the respective societies. In the United States, the American Liturgical Movement, stemming from the Roman Catholic Church, promoted active participation in Christian practices, countering the observational participation of the time. In Nigeria, Episcopalian prophets such as William Wadé Harris revitalized Christianity in West Africa, opening doors of personal relation and reflection through Christianity following the Age of Prophets in sub-Saharan Africa. This study examines these Christian movements through artistic interpretation, focusing on the depiction of Christ in art, and interpretation of common stories focusing on Christ in order to compare values of Nigeria to the United States due to the similar timing of Christian movements in the 20th century. In order to compare and contrast the aesthetics of art, artworks such as "Head of Christ," created by Waller Sallman in 1940 in the United States will be compared to "Veronica Wipes the Face of Jesus," created by Bruce Onobrakpeya in 1969 in Nigeria. In the United States, interpretation includes relaying the cultural values of individual connection through the active personal reflection deriving from the American Liturgical Movement, comparing it to the aftermath of the Age of Prophets in Nigeria, promoting allegory of societal hardships and individual reflection through the historical context of each Christian transformation going on at the time. Using the aesthetics of art to relay interpretation and importance of each culture displayed through the figure of Christ, the cultural values of the United States and Nigeria will be compared through each respective scope of Christianity.

Nicholas Wehrman

Discipline: Engineering

Authors:

#1 Hui Wang

#2 Alexander Chattos

Abstract Name: Creating 3D Digital Twins of Civil Infrastructure Using Visual Sensors

The goal of this project is to use an array of visible light cameras to generate a 3D surface model (digital twin) of roadways while driving over them. Currently, there are other methods of generating these models, the closest one being LIDAR, which uses pulses of light to measure the distance from the sensor to an object. The methods the project uses are Structure from motion, which is well established as a computer vision system for robotics to detect objects in 3D space. This method uses multiple images of the same scene to triangulate the relative location of points in the image to the camera sensors. Doing reconstructions this way requires that the cameras be calibrated to find their intrinsics and extrinsics (internal properties like focal length, central point, and distortion, and their external position and orientation). This is done using OpenCV, a Python package designed for photogrammetry, which has functions to calculate the properties based on a known checkerboard pattern captured in several images varying in position and orientation. Then, using the intrinsics and extrinsics of the cameras, the structure-from-motion program OpenMVG can accurately triangulate the

feature points in any set of images with enough overlap (roughly 70%). This creates an unscaled collection of points related to their relative location (this is called a point cloud). A GPS module that runs simultaneously gives accurate extrinsic location information at 10Hz, which is then interpolated with an IMU (inertial measurement unit) using a method called dead reckoning. The combination of the GPS and IMU gives accurate location information at 400Hz, while the cameras run at 200Hz. This can result in a point cloud model that is then scaled to the real world with an accuracy of around 5-15mm.

Zora Weir-Gertzog

Discipline: Interdisciplinary

Authors:

#1 Gastón Jofre-Rodriguez

Temmm Phan

Abstract Name: Visualizing Vertebrate Anatomy: The Educational Impact of Scientific Illustration

Clear diagrams are essential for understanding complex anatomical relationships in comparative vertebrate anatomy, an intensive course focused on the evolutionary relationships of vertebrate forms. In BIOL 402 at Virginia Commonwealth University, repeated student feedback has indicated that photo-based dissection manuals are more difficult to interpret than illustrated guides. To address this limitation and evaluate the educational impact of customized materials, a new set of anatomical illustrations was developed to support laboratory instruction. Laboratory practical exam scores from previous cohorts of BIOL 402 were analyzed to identify the lowest performing anatomical subjects for each specimen. Based on these findings, dissections of the dogfish shark and domestic cat were conducted to obtain accurate visual references. Live observational drawings and photographic documentation were used to construct the initial illustrations, which were refined through comparison with existing anatomical diagrams. All information labels and anatomical structures were reviewed and approved by the course instructor to ensure accuracy. These illustrations will be implemented in upcoming sections of Comparative Vertebrate Anatomy during the spring semester. Student feedback and future exam data will be collected to evaluate whether custom illustrations improve anatomical comprehension, laboratory performance, and overall educational outcomes.

Quinn Weisenfeld

Discipline: Linguistics and World Languages

Authors:

#1 Quinn Weisenfeld

Abstract Name: Stativity and Intransitive Forms in Chuj

The purpose of this study is to describe the forms and functions of stative predicates in Chuj, a Mayan language of Guatemala and Mexico. Statives in Chuj are typically marked with a specific stativizer morpheme, -an, which attaches to positional and verbal roots. Previous work (Henderson et al., 2018) proposes a two-way distinction between temporary, spatial Davidsonian states expressed by a stativized positional followed by a directional (POS-DIR), and characteristic, individual-level Kimian states expressed by reduplication of the stativized positional (POS-REDUP). This paper uses data comprising of over 600 sentences elicited from a native Chuj speaker also fluent in English. While the data does support treating -an as a general stativizer and confirms that directionals are independent verbs that can follow stative predicates, no productive reduplication of stative predicates was found, and directionals do not consistently mark stage-

versus individual-level readings. Instead, directionals appear to be only necessary on elements where orientation or path alter the meaning of the verb root, and the permanence of a state is encoded elsewhere as an additional predicate. The data also shows that the intransitive suffix -il can attach to transitive roots in contexts where -an might be expected, suggesting potential overlap of pathways for deriving intransitive and stative predicates in Chuj. These findings challenge a simple mapping between stative morphology and level of state, and contribute to broader theories of how languages encode temporary versus characteristic properties.

Kayla Welker

Discipline: Business

Authors:

#1 Gaia Rancati

Sonya Morales-Olivares

Abstract Name: Exploring Generation Z's Interaction With Voice Assistants in Online Shopping: A Multi-Method Approach

The present study explores how Generation Z interacts with voice assistants and reacts to their product recommendations when shopping online. This research combines the Zaltman Metaphor Elicitation Technique and an eye-tracked product choice experiment, guided by the Technology Acceptance Model, the Media Richness Theory, and the Visual Attention Theory. This design captures the cognitive, emotional, and attentional processes influencing the intention of using voice assistants and the likelihood of following their product recommendations. The Zaltman Metaphor Elicitation Technique reveals that while cognitive load for low-enjoyability products was reduced, skepticism persists in product categories where personal preferences and emotional connections are stronger. The product choice experiment further demonstrates that when voice assistants recommend products, those products attract greater visual attention (e.g., a higher number of fixations), especially for low-enjoyability items like detergent and drills. However, participants tend to rely on their own preferences for high-enjoyability products, such as bicycles and couches, despite engaging with the recommendations, as shown by the average fixation duration. These results suggest that voice assistants are most effective in assisting Generation Z's decision-making for products they have limited experience with or interest in. In contrast, recommendations have less impact when Generation Z has emotional or aesthetic preferences. The findings highlight that marketers should tailor voice assistants' recommendations by product category to increase Generation Z's engagement.

Alexa Wenger

Discipline: Interdisciplinary

Authors:

Abstract Name: Leveraging Machine Learning and Natural Language Processing to Analyze Sentiment Variation in Biblical Translations of John 6

This study investigates how modern natural language processing (NLP) techniques can illuminate differences in sentiment and meaning across Biblical translations, focusing specifically on John 6. While Biblical translation has long been influenced by linguistic, cultural, and theological decisions, recent computational methods provide new ways to quantify these translational choices. Building on emerging scholarship that applies sentiment analysis and semantic modeling to sacred texts, this project aims to determine whether

measurable patterns of emotional tone and lexical variation can be detected across translations representing distinct philosophies from word-for-word to paraphrastic renderings. To explore this question, five English translations of John 6 were collected and processed using a combination of lexicon-based sentiment scoring (AFINN), BERT-based contextual sentiment classification, word-frequency visualizations, and cosine similarity comparisons. These methods allow for both numerical and qualitative insight into how sentiment and semantics shift from one translation to another. The findings show that while the overall emotional structure of the chapter remains stable, subtle differences emerge in polarity scores, contextual sentiment categories, and lexical patterns, especially between translations with contrasting linguistic styles. Semantic similarity analysis further highlights clear clusters among translations with shared philosophies and greater divergence between literal and paraphrastic versions. Together, these results suggest that machine learning can meaningfully complement traditional textual scholarship by quantifying how translation decisions shape tone and interpretation. The discussion situates these findings within broader conversations about translation reliability, the limitations of NLP models, and the appropriate role of technology in studying sacred texts.

Avery Werneburg

Discipline: Biology

Authors:

#1 Scott Cooper

#2 Lydia Mack

#3 Halle Derleth

#4 Lakeyshi Xiong

Abstract Name: Prevention of Cold-Induced Apoptosis using Mitochondrial and Plasma Contributions of Human and 13-Lined Ground Squirrel Platelets

Platelets are small cell fragments found in the bloodstream that play a critical role in blood clotting. Donated platelets, crucial in medical emergencies across the globe, can only be stored for 3-5 days at room temperature before they must be discarded due to microbial contamination and degradation. Additionally, when human platelets are stored at refrigeration temperatures for prolonged periods of time, they lose functionality and undergo apoptosis, or programmed cell death. The 13-lined ground squirrel (*Ictidomys tridecemlineatus*) has adapted such that their platelets are able to withstand prolonged exposure to “refrigeration” temperatures of 4°C, an adaptation utilized during long periods of winter torpor. As these organisms regain body temperature post-hibernation, their platelets remain intact and retain functionality, making them an ideal model organism for studying mechanisms applicable to the cold preservation of human platelets. To evaluate these possible mechanisms, human and squirrel platelets have been stored in both human and squirrel plasma at refrigeration temperatures to determine platelet viability. Platelet apoptosis has been measured through Annexin binding and flow cytometry. Cell viability has also been assessed using a TMRE assay to determine mitochondrial contributions to the cold-induced apoptotic tendencies of platelets. Results obtained from the use of these methods have allowed further isolation of apoptosis prevention mechanisms and specification of assays to narrow possible contributing factors. Identifying this protective factor to prevent apoptosis could dramatically extend the shelf life of human platelets, reduce waste, and increase the distance in which platelets can be transported for use in the medical field.

Winifred Wesley

Discipline: Interdisciplinary

Authors:

#1 Samantha Giordano-Mooga

#2 Naira Rehman

#3 Dhanashree Rane

Abstract Name: Exploring the Relationship Between Resilience, Grit, and Stress Levels in Undergraduate Pre-Health Students

Burnout rates are high among healthcare professionals, driven by both professional and personal factors. Literature shows that burnout can be reduced by building coping mechanisms, such as grit and resilience, to help individuals manage stress. Cultivating these traits early in a health professional’s career, such as during undergraduate studies, may better prepare them for future challenges. However, baseline measurements of physiological and psychological stress, resilience, and grit in pre-health undergraduates are lacking. We hypothesize a strong positive correlation between physiological and psychological stress levels, and a strong negative correlation between both grit and resilience with these stress levels. To test this, we extracted cortisol from saliva and nail samples for physiological data and used the Perceived Stress Scale, Adult

Resilience Scale, and Short Grit Scale for psychological measures. Among 72 diverse participants, we found a moderate positive correlation between grit and resilience ($r = 0.430$, $p < 0.01$), a weak positive correlation between perceived stress and salivary cortisol ($r = 0.242$, $p < 0.098$), and a weak negative correlation between perceived stress and nail cortisol ($r = -0.183$). These results highlight the value of targeted interventions to boost grit and resilience among pre-health undergraduates, supporting their capacity to manage stress during professional school and in their healthcare careers.

Mya Wesley

Discipline:

Authors:

Sopio Avsajanishvili

Abstract Name: Bridging the Gap: Strengthening the Integration of Theoretical Knowledge and Practical Application Among Social Work Students in Practicum Education

Social work education encompasses the integration of theory and practice as a fundamental aspect of professional competence. However, many students face challenges in applying theoretical frameworks during real-world client interactions in practicum education. As social work education continues to evolve, it seeks to adopt best practices and better prepare students for their professional roles. Despite concerns about the gap between theory and practical application being raised over a century ago, this gap appears to be as pronounced as ever. This "theory-practice gap" can lead to uncertainty, decreased confidence, and limit skill development among students. Social work students must successfully link theory to practice to be adequately prepared for the profession. Practicum education is fundamental to the pedagogy of social work and requires students to achieve mastery. This study aims to explore strategies for strengthening the connection between classroom learning and field-based practice, thereby enhancing students' ability to critically apply theory in real-life social work situations. Given the significance of field-based learning in social work education, it is essential to empirically examine students' experiences to inform the ongoing evolution of this vital educational practice. Social work is one of the fastest-growing professions of the 20th century, and the demand for skilled professionals continues to rise due to the increasing mental health crises in our socio-political climate. This study aims to use its findings to help institutions effectively train social work students at both undergraduate and graduate levels. Moreover, this study aims to enhance the knowledge and skills that students acquire at practicum agencies, better preparing them for the professional world.

Talisa Wessels

Discipline: Biology

Authors:

#1 Jackson Perez

#2 Ella Burch

#3 Luke King

#4 Darlene Mitrano

#5 James Bogenpohl

#6 Jessica Burket

Abstract Name: Investigation of Potential Effects of D-cycloserine on Behaviors of Anxiety and Parvalbumin Expression in Taconic's 22q11.2DS (Df(h22q11)/+) Mouse Model

Human 22q11.2 deletion syndrome (22q11.2DS) is characterized by a 3.0 Mb deletion on the 22nd chromosome. Prior research has confirmed its pathogenic role in neurodevelopmental disorders, including autism spectrum disorder (ASD) and schizophrenia. Dysfunction in prefrontal GABAergic interneurons, essential for information processing and social-cognitive functioning, has been observed in both preclinical models and clinical populations. A subset of these GABAergic interneurons express parvalbumin (PV+) protein and are surrounded by perineuronal nets (PNNs), which may help regulate firing, influence plasticity, and support executive functioning. Additional research indicates that 22q11.2DS mice display behavioral differences when administered an NMDA receptor antagonist, suggesting NMDA receptor hypofunction that may influence PV + GABAergic interneuron function. Moreover, elevated anxiety has also been observed in children with 22q11.2DS. Therefore, the present study assessed anxiogenic and stereotypic behavior in male and female 4-6-week-old Df(h22q11)/+ (n = 55) and their wildtype controls (n = 55) following a 7-day sub-chronic administration of NMDA receptor partial agonist, D-cycloserine (30mg/kg, i.p.) or saline using the light/dark box. Preliminary results show significant genotypic differences in total distance traveled, immobility, and ambulation, but no differences in stereotypic behavior or after treatment. Additionally, quantification of PV+ and PNN expression, as well as colocalization, is being performed using WFA staining within several areas of the prefrontal cortex. All stained slides were imaged using a confocal microscope at 60x magnification and were counted using NIH ImageJ software. Preliminary analysis shows a reduction of the number of PV + interneurons ($p < 0.05$) that may be restored in some PFC areas with D-cycloserine treatment ($p = 0.05$). By integrating these behavioral findings with alterations in PV+ and PNN expression, these data provide valuable insight into the underlying neurobiological mechanisms and potential therapeutic effects of NMDA receptor activation in 22q11.2DS.

Michael Westbrook

Discipline: Business

Authors:

#1 Jill Weber

Abstract Name: Which Wisconsin universities do Wisconsin CPA Firms prefer to hire from and why?

Do accounting firms value students for entry-level accounting positions the same way despite coming from different universities, specifically in Wisconsin? The purpose of this study is to examine the hiring preferences of Wisconsin CPA firms in terms of which Wisconsin-based universities they prefer to hire from. We will use data from a survey that my faculty mentor and I created and run an analysis based on the responses to the survey questions. The questions that we are asking range from the professionals' ranking the universities based on their preferences for those schools to how they picked their top choice from the collective rankings. My mentor and I believe that the research will suggest that Big 4 CPA firms will prefer students from larger schools near urban centers such as Marquette and UW-Madison while smaller CPA firms, such as KMA or Hawkins Ash will prefer students from regional state universities such as UW-Parkside or UW-Whitewater. Prior research has not examined the hiring market for accounting graduates in Wisconsin, and the information this project will provide will be beneficial to accounting employers, professors and students.

William Westbrook

Discipline: Psychology

Authors:

#1 William Westbrook

#2 Kai Wakeman

Abstract Name: A Mother's Love? A Biological Sex Comparison of Machiavellianism and Parental Bonding Types

Background: Machiavellianism, or the tendency to employ calculated and opportunistic behaviors for personal gain, is linked to early environmental/interpersonal factors, particularly parental bonding styles. Sex differences have been noted in both of these factors. This study aims to investigate how parental bonding styles affect Machiavellianism, utilizing the combined-scale parental bonding instrument, with a comparison of these effects across sexes. Method: Undergraduate psychology students (N = 239) completed measures: Machiavellianism Personality Scale (MPS), consisting of one total score (MPS) and five subscales; Parental Bonding Inventory (PBI), consisting of two scales, Mother and Father, each containing two dimensions. The PBI dictates five types of parental bonding—Affectionless Control, Affectionate Constraint, Optimal Bonding, Absent/Weak Binding, and Average. Results: Factorial ANOVAs, 5 (PBI; mother or father figure) x 2 (biological sex), were conducted to determine effects of parental bonding and biological sex on overall MPS scores. There was a significant interaction between biological sex and parental bonding type on overall mother figure (MF) MPS score. Mean MF MPS score was significantly greater for male participants than for female participants with the Affectionate Constraint PBI type and the Average PBI type; there was no significant difference for the Optimal Bonding, Affectionless Control, or Absent/Weak Bonding PBI types. Post-hocs indicated that the Absent/Weak Bonding PBI type scored significantly higher on the overall MF MPS scale than the Optimal Bonding PBI type. A significant main effect for biological sex was found on overall father figure (FF) MPS scale, indicating that male participants scored significantly higher than female participants. Conclusion: Machiavellian sex differences were replicated, as insecure (Absent/Weak) bonding resulted in higher Machiavellianism scores than 'secure' (Optimal Bonding). Further research into the Affectionless Control PBI type's individual effects on Machiavellianism is merited, due to the close relation between control and Machiavellianism.

William Westbrook

Discipline: Psychology

Authors:

#1 William Westbrook

#2 Kai Wakeman

Kai Wakeman

Abstract Name: Insecure and Entitled: The Relationship between Academic Entitlement and Attachment Styles

Background: Academic entitlement is the tendency for students to possess externalized expectations of academic success while negating the role of personal responsibility. Attachment styles are individual patterns of relating to others, which have been correlated to a wide range of issues of social functioning and stress-reduction behaviors. However, little work has been done extending adult attachment styles to the field of educational research. The present study will serve as an analysis of the connection between academic entitlement and adult attachment styles. Method: Analysis consisted of 113 undergraduate students who completed measures including the: Academic Entitlement Scale (AES), consisting of two subscales, Externalized Responsibility and Entitled Expectations; Rosenberg Self-Esteem Scale (RSES); and Adult Attachment Scale (AAS) which was clustered into three categories—Anxious, Avoidant, and Secure. Results: The Externalized Responsibility subscale revealed a significant difference between AAS levels. Secure participants scored significantly lower on the subscale than Avoidant participants. The RSES revealed a significant difference between AAS levels. Secure participants scored significantly lower on the scale than Avoidant or Anxious participants. Conclusion: Preliminary results align with those expected from research into broader narcissistic entitlement. Reflecting the view of covert narcissism as an especially relevant

predictor of Anxious attachment, the Externalized Responsibility subscale of the AES, previously associated with personal control, may be especially salient for further research. Moreover, it is suggested that covert narcissism may explain the relation between academic entitlement and insecure attachment. The similarity between the RSES and the AES on AAS suggests an underlying factor—more research is needed.

Joshua Westhora

Discipline: Biology

Authors:

#1 Claudia Nischwitz

Abstract Name: Identification of Leafhoppers In Vineyards and On Landscape Trees in Utah

Leafhoppers are small herbivorous insect pests which feed on the sap of many vascular plants. Several species of leafhopper are known to vector phytoplasmas, which are obligate intracellular bacterial parasites associated with a variety of plant diseases. Grapevines and landscape trees, both of which are important to Utah's economy and urban canopies, are susceptible to phytoplasma-caused diseases. This susceptibility warrants the identification of leafhopper vectors in vineyards and parks, which would provide insight into the development of preventative measures for growers to utilize across the state. In this study, leafhoppers were collected from vineyards and landscape trees throughout Utah and identified with DNA sequencing. Although leafhopper species may be distinguished through morphological traits, the additional use of molecular techniques allows species with similar morphologies to be differentiated. Collected leafhopper were photographed and then processed for molecular identification. The sequences were compared to other leafhopper sequences in the NCBI BLAST search for identification. Of the leafhopper species so far identified, *Fieberiella florii* was the only species found that has a known potential for vectoring phytoplasmas. *Candidatus Phytoplasma pruni*, which causes cherry buckskin disease, and *Candidatus Phytoplasma mali*, which causes apple proliferation are both known to be vectored by *Fieberiella florii*. Understanding that this leafhopper is present in Utah will allow growers to take the appropriate preventative measures against the spread of these phytoplasma-caused diseases.

Kyle Wheaton

Discipline: Computer Science

Authors:

#1 Kyle Wheaton

#2 Kamryn Hoehne

#3 Mathew Heath Van Horn

Kamryn Hoehne

Abstract Name: Mastering Enterprise Networks: A Practical Guide to Building Computer Network Systems

Mastering Enterprise Networks focuses on the development of an open educational resource (OER) textbook that is freely accessible to support student learning in computer networks. Enterprise networks are intricate large-scale systems that enable organizations to securely connect users, devices, and applications across multiple locations. They are a foundational component of modern communication, business operations, and cybersecurity. The goal of this research is to reduce financial barriers for students while working on instructional effectiveness and breaking down complex topics into teachable material. The textbook was created using open-source tools and aligns with coursework at different universities as well as high schools to

ensure accessibility and relevance. The content of the textbook was developed through the collaboration of students writing chapters on networking topics they wanted to delve deeper into and other students assuming the role of testers to ensure that the chapters written are clear and precise. According to our preliminary research, open-source materials promote access to education without compromising academic integrity. This project demonstrates the potential of OER to enhance learning experiences, encourage academic collaboration, and contribute to long-term affordability of higher education resources as the textbook has reached a wide audience from the United States, Canada, and Nicaragua as well as being peer-reviewed by the National Centers of Academic Excellence in Cybersecurity (NCAE-C) which is managed by the U.S. government's National Security Agency.

Mackenzie Wheelock

MD - Salisbury University

Discipline: Criminology/Criminal Justice

Authors:

Abstract Name: Drunk Driving: A Crisis in Need of Reform

Drunk and impaired driving is all too familiar for far too many people in society. Regardless of how one has come into contact with the system, drunk driving is a major public health issue. With thousands of lives being lost every year, it is evident that the current system for handling these offenses is not an adequate deterrent for the behavior. Consequentially, improvements need to be made to this system to not only stop the behavior, but to save lives. Drunk driving has been a longstanding issue in society, and reforming the system has importance on a number of identifiable levels and areas. As research has indicated, drunk driving needs to be addressed through a combination of legal, educational, and social reforms. By taking a multi-faceted approach to punishing drunk driving offenders, the system can work better to prevent drunk driving before it happens and when it does, prevent offenders from re-offending. This research shows the structure of the current system, the flaws, and suggests a number of reforms to increase the effectiveness of the legal system. This research demonstrates the importance of a combination approach to the sanctioning of drunk driving offenses in order to successfully address the drunk driving public health crisis and save the lives of thousands each year.

Kaeley Whitacre

Discipline: History

Authors:

Abstract Name: Revival Song: The Significance of Hymns in the First Great Awakening

This paper highlights the transition in church music during the First Great Awakening in Colonial America. It argues that hymns and new psalmody had a mutually beneficial relationship in the Awakening, as they aided one another in emphasizing personal salvation experiences. Prior to the Awakening, English-speaking churches in Colonial America sung almost exclusively literal translations of Psalms in a more formalized call-and-response format. While current scholarship on the First Great Awakening broadly analyzes the primary tensions and debates within New England churches regarding changes in music, it does not provide a comprehensive overview of the introduction of hymns in Colonial America. Despite this important shift in church music, most studies of the Great Awakening only scratch the surface of music's importance to the revival ethos. This paper analyzes primary source documentation concerning the response to and significance

of hymns and new psalmody in Colonial America. The writings of Great Awakening figures including Jonathan Edwards, George Whitefield, and Isaac Watts provide key insights into this transition and are supplemented by personal journals and newspapers from the period. Hymns were a major factor in the spread of the Great Awakening and gave individuals the means to express how the preaching impacted their lives. Instead of singing literally translated Old Testament Psalms, churches and individuals began to sing songs that reflected of their personal faith. Further, many of the hymns from this period became central to several church denominations in early America. Ultimately, this study underscores the central yet understudied role of music in the Great Awakening.

JeNiya White

Discipline: Mathematics

Authors:

Abstract Name: Improving Tour Qualities of some TSP Heuristics using Tree-Penalized Distance Matrices

The Traveling Salesman Problem (TSP) is a classic NP-hard combinatorial optimization problem that seeks the shortest route visiting each of (n) cities exactly once and returning to the origin. TSP has numerous real-world applications, including vehicle routing, logistics, DNA sequencing, circuit board manufacturing, and urban planning. While exact solvers such as Concorde can guarantee optimal solutions, they become computationally infeasible for moderately sized instances (e.g.,) due to factorial growth in complexity. Consequently, heuristic algorithms—such as Nearest Neighbor—remain widely used for large problems because they are fast, though they often produce suboptimal tours. In this work, we propose a general framework for improving the performance of classical TSP heuristics by modifying the distance matrix. Specifically, we introduce tree-penalized distance matrices which combine the original intercity distances and tree penalties derived from hierarchical clustering trees. We use tree-penalized matrices to replace the original distance matrix to guide heuristic decisions. Extensive experiments on 40 benchmark datasets compare the performance of four well-known heuristics—Nearest Neighbor, Nearest Insertion, Cheapest Insertion, and Farthest Insertion—with and without the proposed modifications. Results show that the approach can significantly improve the quality of the tours generated by the heuristics, while maintaining practical runtime efficiency.

Nicholas White

Discipline: Physics and Astronomy

Authors:

Abstract Name: Light Reflection Simulations for MAGIS-100

MAGIS-100 is a large scale atom interferometer based at Fermilab in Batavia, Illinois. Light pulses are fired within the 100-meter channel on atoms under the effect of gravity, with the intent on finding gravitational waves, and the ever elusive dark matter. Ensuring that the light pulses are properly timed and calibrated is an intricate process and requires considerable steps to mitigate any issues. Simulating the impact of diffracted beams is essential to reduce noise in the system and choose effective mitigation efforts. Using Mathematica, we worked to build reflected and diffracted beams within the tube, and also simulate which angled beams would be absorbed by different methods. These methods include baffles placed inside the tube, aquadag coatings, and oxidization coating solutions. These simulations are being used to find the most effective treatment and lower cost. Analysis of method effectiveness is also discussed.

Addie White

Discipline: Criminology/Criminal Justice

Authors:

#1 Rey Salvi

#2 Paul Atandoh

Rey Salvi

Abstract Name: An Analysis of Literacy and its Impact on Crime

This study aims to find and analyze answers to the common stereotypes and assumptions that in the United States of America, the lesser educated are more likely to commit pettier and less severe crimes, such as drug dealing, loitering, or drug possession within a controlled amount. More specifically, this project seeks to answer the questions, "Do those with lower reading scores commit lesser crimes? Do those with higher reading scores commit the more sinister, severe crimes, such as murder, or grand larceny? And how does reading, and by proxy, education, actually affect crime, and can we take steps to address it effectively?" Through robust and thorough data analysis that implements regression techniques such as Least Absolute Shrinkage and Selection Operator (LASSO regression) and stepwise regression analysis, this study seeks to provide a detailed quantitative understanding of how literacy may prove impactful on the severity of crime committed, specifically in the region of Macon, Georgia. This study will also aim to tackle the common stereotypes surrounding poor education in the United States of America, as well as the history and reasoning as to why these stereotypes can form, thus prompting many solutions to fix them, guided by the initial results of the study.

Suzanne White

Discipline: Political Science

Authors:

Abstract Name: Rising Fuel Prices and Transit Demand: A Longitudinal Study of Five U.S. Metropolitan Areas

Previous research has suggested that rising gas prices are associated with increased public transit ridership, yet there remains a lack of recent empirical evidence exploring this relationship. In recent years, both ridership levels and fuel prices in the United States have continued to climb, emphasizing the need for updated empirical analysis. Moreover, researchers found a statistically significant correlation between fuel prices and transit use, even in highly automobile-oriented cities. This study aims to investigate the relationship between the average cost of gasoline per gallon and weekly ridership across five major US cities using a longitudinal study. The five cities include Atlanta, Georgia; Dallas, Texas; Los Angeles, California; Washington, D.C.; and San Francisco, California. These cities were selected for their diverse transit infrastructures and system designs. Data will be collected from multiple sources, including the Bureau of Transportation Statistics and the American Public Transportation Association. It is anticipated that the findings will support the existing literature by demonstrating that higher fuel prices correspond with increased public transit ridership. These findings might educate transit agencies and public policy decisions in assessing the reactionary nature of riders and fuel prices.

Jesse White

Discipline: Philosophy, Ethics, and Religious Studies

Authors:

Abstract Name: Mahdism and Sudanese: History and Memory of an Islamic Movement in North America's Diasporic Sudanese Communities)

In 1881, Muhammad Ahmad, a sheikh in the Sammaniyya Sufi order, proclaimed himself to be the expected Mahdi and led a revolt that culminated in the creation of an independent state, the Mahdiyyah. At the time, British officials viewed Mahdist expectations in Sudan as a product of events and beliefs in Egypt, an idea which rested upon the Nile River uniquely connecting the communities of Sudan and Egypt. Later scholars have parted from this narrative and instead choose to focus on how Egyptian policies and attempts to end the slave trade contributed to the Mahdi's rise. Using a twofold ethnographic and historiographic approach which includes literature review, archival research, and observational fieldwork with the Sudanese community in Greensboro, North Carolina, this project seeks to demonstrate that neither of these arguments align with narratives in the Sudanese diaspora. These narratives, collected through in-depth semi-structured ethnographic interviews, place greater emphasis on Sudan's connection to West Africa than to Egypt. Moreover, they reveal a division between Eastern and Western Sudan, as well as the close association between Western Sudan and two of Sudan's most prominent political and religious organizations. The analysis of the Sudanese diaspora's memory alongside primary documentation reveals connections between Sudan and West Africa in addition to the relevance of Muhammad Ahmad's legacy to the conflict in Sudan.

Finley White

Discipline: Social Work and Human Services

Authors:

#1 Finley White

Abstract Name: Applying Faith-Based Solutions to the Complex Foster Care System in Tennessee

The state of the foster care system in Tennessee remains an urgent issue as youth entering the system face a lack of support, as retention rates of foster families decrease, transitional programs fail to support the youth, and a lack of community involvement and awareness isolates the foster care population. This study examines faith-based solutions by applying a systems lens to a complex foster care system in Tennessee. 50% of foster families in Tennessee discontinue fostering after the first year, although when properly supported, the retention rate climbs to 90%. This study focuses on faith-based solutions to the complex foster care system of Tennessee, beginning by looking at the longitudinal study performed by the Belmont Innovation Labs relating to transitional youth in foster care and the statewide Every Child Tennessee initiative that addresses the four focus areas of foster care: Preservation, Recruitment, Retention, and Transition. To understand the interworkings of faith-based partnerships and community involvement in the foster care system of Tennessee and the lack thereof, we utilized a mixed-methods approach, performing quantitative surveys, partnering with non-profit Crowded Table to pursue practical solutions addressing the retention rate in Tennessee. Considering this data, we found that retention of foster families in Tennessee remains low due to a lack of faith-based involvement of partners and organizations, limited WRAP-Around Care, and limited mentorship opportunities. Our findings indicate that providing WRAP-Around care, mentoring resources, and data-based partnerships through faith-related organizations will create a more holistic, stable, and relational environment for complex family dynamics relating to the foster care community. Ultimately, our study suggests that practical support provided by faith-based organizations will advocate for foster youth and will transform the foster-family retention rate in Tennessee.

Jaiden Whitner

Discipline: Political Science

Authors:

Abstract Name: Stateless Knowledge: Education as a Claim to Belonging

This project examines how stateless communities establish and maintain education systems in the absence of recognized nation-states. Focusing on three comparative cases, the Rohingya camps in Cox's Bazar (Bangladesh), Palestinian refugees in Lebanon, and Sahrawi camps in Algeria, it examines how schools emerge as political and cultural institutions that preserve identity, transmit civic memory, and assert belonging when citizenship rights are denied. Drawing from policy analyses, UNHCR and UNRWA reports, and NGO education frameworks, the study maps how communities adapt to restrictions on mobility, funding, and accreditation. It identifies the governance mechanisms, such as community education committees, diaspora teacher networks, and informal credentialing, that allow learning to continue even without legal recognition. These forms of "stateless schooling" challenge conventional assumptions about education as a state function, reframing it instead as a collective human right sustained through self-organization and transnational solidarity. The project employs a comparative governance framework to analyze three key dimensions: access (including gender and age inclusion), continuity (pathways to certification or external exams), and civic participation (student leadership and community decision-making). By highlighting the adaptive capacity of stateless educators and learners, this research argues that education can serve as a form of soft nation-building, preserving identity, fostering resilience, and maintaining the moral legitimacy of communities excluded from the international state system. Findings contribute to the growing literature on education in emergencies, stateless governance, and refugee self-determination, offering policy recommendations for humanitarian actors to strengthen education systems that exist beyond the nation-state.

Emile Whittle-Hage

VA - Virginia Polytechnic Institute & State U

Discipline: Engineering

Authors:

#1 Udeme Gordon

#2 Kasiviswanadha Nimmagadda

Cassie Freedlander

Kira Patel

Abstract Name: MyoWrist: Novel Designs for a Low-Cost, Intuitive Prosthetic Wrist

The wrist is a crucial part of a functioning upper limb, whether biological or prosthetic. However, wrists are quite complex, with three degrees of freedom and the ability to vary stiffness depending on the desired task. Because of this complexity, it has historically been difficult to develop functional, intuitive prosthetic wrists. Current designs lack the flexibility and dexterity present in biological wrists and can be difficult to control, resulting in muscle overcompensation and user strain or injury. Additionally, the average range in cost of a prosthetic arm is \$20,000-\$80,000, which presents a barrier to lower-income individuals. To address these shortcomings, we are currently prototyping and testing two lightweight, low-cost wrist designs that provide both flexibility and stability to the user. Our team, part of a larger myoelectric upper-limb prosthetic team, comprises four undergraduate engineering students. Our first wrist prosthetic includes a ball-and-socket joint

designed to enable all three degrees of freedom in the wrist and forearm: flexion/extension, radial/ulnar deviation, and pronation/supination. This joint also contains a spring mechanism to ensure the wrist restores back to its original neutral position. This design will interface with the larger team's prosthetic hand through carefully placed polyethylene fibers that replicate the tendon mechanisms in the body. The second design consists of two high-torque servos, one for pronation/supination and the other for flexion/extension, within a 3D-printed housing. It also features variable stiffness, allowing the user to more naturally grip and lift heavy objects. Both designs were modeled using SolidWorks and 3D printed, significantly reducing the cost of the wrist while maintaining structural stability. Next steps include design refinement, functionality testing, and client interaction. Ultimately, our prosthetic wrists will integrate with existing upper-limb prosthetics and offer a wide range of motion to users at a reduced cost.

Venna Wiandt

Discipline: Biology

Authors:

#1 Katherine Morton

#2 Andrew Wojtovich

Abstract Name: The role of the NDUF2.1 C366 residue in neuronal biology, neuronal behavior and its implications for neurodegeneration

Neurons rely on mitochondria for energy production and signaling. During energy production mitochondria also produce reactive oxygen species (ROS). While critical for signaling, ROS can cause mitochondrial dysfunction leading to neuronal dysfunction and neurodegeneration. Our lab previously identified the redox active NDUF2.1 C366 residue as critical for hypoxia/reoxygenation response in *Caenorhabditis elegans*. To investigate the role of NDUF2.1 C366 oxidation in neuronal function, we generated a cysteine to aspartate mutant, that mimics a locked oxidized state and C366S, a cysteine to serine mutant, that mimics a locked reduced state. We completed neurobehavioral assays using the model organism *C. elegans*, evaluating the function of dopaminergic, serotonergic, glutamatergic, GABAergic, and cholinergic neurons. We found that both C366D and C366S mutants' dopaminergic neurons functioned abnormally. It was also revealed that C366D mutant's GABAergic and cholinergic neurons functioned abnormally. Then, we completed genetic crossing of C366D and C366S mutants to investigate the mitochondria morphology, neuronal morphology of these mutations with microscopy. In the future, we aim to understand the role of NDUF2.1 C366 in mitochondrial function and neuronal death in neurodegenerative diseases.

Bryleigh Wickham

Discipline: Engineering

Authors:

#1 Carl Robbins

#2 Umisha Siwakoti

#3 Elisa Castagnola

Abstract Name: The Effects of Microgravity and Hypergravity Conditions on Neurotransmitters in the Brain

Space exploration has greatly expanded human knowledge, yet the physiological and neurochemical consequences of spaceflight remain incompletely understood. Reduced-gravity environments are difficult to reproduce on Earth, and available technologies offer limited capability for real-time, in vivo measurement of

neurotransmitters, hindering efforts to determine how spaceflight stressors alter brain function. Serotonin (5-hydroxytryptamine, 5-HT) and dopamine (3-hydroxytyramine, DA) are key neuromodulators that regulate mood, cognition, memory, and physiological homeostasis. Dysregulation of 5-HT and DA is associated with depression, anxiety, and impaired cognitive performance, increasing risks to astronaut well-being, crew cohesion, and mission success during prolonged isolation and stress. To address this gap, we developed a novel electrochemical sensing platform for real-time detection of 5-HT and DA in the mouse brain during simulated microgravity and hypergravity. These conditions were modeled using custom small-scale suspension chambers and centrifuges, respectively. Flexible glassy carbon microelectrode arrays (GC-MEAs) coated with a poly(3,4-ethylenedioxythiophene) (PEDOT)/COOH-functionalized CNT composite (PEDOT/CNT), coupled with optimized square-wave voltammetry (SWV), achieved enhanced electrochemical performance. SWV enabled well-resolved, linear detection of DA and 5-HT from 10 nM to 1 μ M, suitable for monitoring basal physiological levels. In vivo recordings demonstrated reliable detection of 5-HT in the hippocampus (CA2) and DA in the striatum, validated through pharmacological manipulation. PEDOT/CNT-coated GC-MEAs maintained stable electrochemical and sensing performance for up to four weeks for DA and one week for 5-HT. We are applying this technology to mice undergoing partial weight suspension (PWS) to model microgravity and complementary centrifuge-induced hypergravity paradigms, with electrodes implanted in the hippocampus and other relevant brain regions. This approach enables dynamic monitoring of neurochemical adaptations to altered-gravity environments, providing new insight into central nervous system responses to spaceflight-relevant stressors. Ultimately, these findings aim to support the development of countermeasures to protect astronaut mental health and maintain performance during long-duration missions.

Shea Wildman

Discipline: Biology

Authors:

#1 Laxmikant Deshpande

#2 Sai Kulkarni

Abstract Name: Assessment of Lamotrigine in an Organophosphate-based Rat Model of Gulf War Illness

Approximately 1/3 of veterans of the First Gulf War suffer from a chronic health condition known as Gulf War Illness (GWI). GWI affects multiple body systems, including the nervous system. Neurological symptoms include mood disorder and memory dysfunction. GWI is thought to be caused in part by deployment-related exposure to organophosphate (OP) chemicals, which include pesticides and nerve agents. These OP exposures have been determined to result in neurodegeneration, neuroinflammation, and epigenetic modifications, possibly underlying the development of GWI. Despite years of research, effective treatments for GWI veterans are lacking. Lamotrigine (LTG) is an FDA approved antiepileptic drug that has also been reported to be epigenetically active. LTG blocks histone deacetylase (HDAC) enzyme which is reportedly elevated in experimental models of GWI. We hypothesized that LTG, by virtue of its HDAC inhibition, could effectively treat neurological symptoms of GWI. Diisopropyl fluorophosphate (DFP) is an OP compound which mimics the effects of the nerve gas sarin under laboratory conditions. In this study, adult male Sprague-Dawley rats were exposed to DFP (0.5 mg/kg, s.c., 1x daily, 5 days) to mimic deployment-related nerve gas exposures. Three months post-exposure, rats were assessed for signs of mood and memory function. DFP-exposed rats exhibited significantly lower sucrose preference on Sucrose Preference Test indicative of anhedonia, spent more time in the closed arms of the Elevated Plus Maze indicative of anxiety, and demonstrated lower discrimination towards the novel object on the Object Recognition Test indicative of memory impairment. A subset of DFP-exposed rats were treated with LTG (30 mg/kg, i.p., 1x daily, 7 days). Statistically significant improvements in mood and memory function were observed in LTG-treated rats. Additional studies researching the molecular mechanisms of LTG are underway. These results indicate that LTG may be effective in treating symptoms of GWI.

Andrew Wiles

Discipline: Psychology

Authors:

#1 Andrew Wiles
#2 Roxann Roberson-Nay
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Abstract Name: Ovarian Hormones and Electronic Cigarette Use in Young Women

Electronic cigarette (“e-cigarette” or “vaping”) use is increasingly common among adolescent and young adult women, yet no studies have tested whether ovarian hormone fluctuations contribute to vaping behavior. Prior cigarette-smoking research suggests that estradiol may enhance, and progesterone may dampen, nicotine reward, craving, and withdrawal, but hormone-informed e-cigarette studies are virtually nonexistent. This study evaluates whether vaping behavior varies with ovarian hormone levels and whether associations differ between naturally cycling (NC) women and oral contraceptive (OC) users. Participants were 60 young women (ages 16–22; 30 NC, 30 OC). At baseline, approximately 45% reported lifetime e-cigarette use, and about 25% reported current use. Among current users, daily vaping frequency ranged from 1–6 uses/day, and about 10–12% reported awakening at night to vape. Craving was present in ~20% of participants, with past-week urge severity ranging from 3–9, and ~10% reporting strong urges (≥ 8). Irritability or nervousness when unable to vape was endorsed by 6 participants, consistent with early dependence-like patterns. Over the past 30 days, vaping ranged from no use among non-users to near-daily or daily use among regular users, indicating substantial variability in exposure. E-cigarette use was reassessed at follow-up visits, providing repeated measurements across the menstrual cycle and the inactive/active pill conditions. Hormone assays (estradiol, progesterone, FSH, LH) are currently in progress. We will test whether (1) higher estradiol, lower progesterone, or a higher estradiol-to-progesterone ratio predict vaping likelihood or intensity; (2) within-person hormone changes better capture vaping fluctuations than absolute hormone levels; and (3) hormone-vaping associations are attenuated in OC users. Mixed-effects models will evaluate hormonal predictors with Group (NC vs OC) included as a moderator. This study provides one of the first hormonally informed investigations of e-cigarette use in young women and will determine whether momentary endocrine states influence nicotine-related behavior.

Jordyn Wiley

Discipline: Education

Authors:

Olivia Walker
Midori Ito

Abstract Name: The Benefits of Cartoons in an Educational Setting: An Examination of Cartoons' Impact on

Students' Participation, Attention, and Comprehension

This research investigates the relationship between student comprehension and the implementation of cartoons in cross-curricular K-16 educational settings. Our research is inspired by the art education graphic novel *What's So Great About Art Anyway* by Rachel Branham (2016), which illustrates her individual experience with her art education journey. This led us to create cartoons in our own unique styles surrounding the question, "Why do we want to become an art educator?" This was a prompt for our research notebooks in our introductory art education class. Because of the positive feedback we received from our professor and peers about our cartoons, we gathered supporting materials from our institution's library and online sources regarding the use of cartoons as a method for supporting students' education inside and outside of an art curriculum. In this research, we are expanding this question to include, "How do cartoons affect students' attention, comprehension, and participation in the K-16 classroom setting?" Further supporting our hypothesis will be investigations into contemporary cartoon implementation in the classroom through curriculum as well as our own autobiographical art examinations. Other studies surrounding the impact of cartoons in the classroom are often focused on a single subject area while neglecting to reference art as a tool for thorough understanding. By reviewing documents showing the implementation of cartoons in the classroom, we expect the outcome of our research to display student engagement, understanding, and visual literacy across multiple subject areas and ages. Our research and resulting curriculum will encourage dialogue about the cross-curricular applications of cartoons into core classes to improve students attention, comprehension, and participation.

Anthony Wilkerson

Discipline: Biology

Authors:

#1 Anne Alerding

#2 Aryeh Weiss

Abstract Name: Comparative Study of Fiber Cells and Their Physiological Functions in Animals and Plants

This study explores the connection between structural support tissues in plants and animals by comparing skeletal muscle morphology in rodents to xylem tissue development in soybean stems. We aimed to understand how investment in physical support structures relates to function, such as strength and reproduction. This helps address broader questions about how organisms allocate resources to structure versus performance. For our animal model, using published literature, we collected cross-sectional data on muscle fibers. Specifically, we looked at fiber number, type, and cross-sectional area of leg muscles in mice and rats subjected to energy-consuming exercises (treadmill, ladder climbing). We then related these morphological measurements to functional strength and growth outcomes in response to different training. Results indicated consistent muscle hypertrophy across all studies with slight variation depending on type of training and fiber type tested. At the same time, we analyzed stem images from soybean plants grown in two field locations in Virginia, measuring xylem vessel size and number to assess investment in transport and support tissue as related to fruit yield potential. Trends suggest that plants with larger xylem investment show increased seed abortion due to carbon cost of building support tissue. Our comparisons of soybeans and rodent structural tissues showed that these trade-offs are visible and measurable across both systems, providing a foundation for future studies to explore how structural investment affects performance and reproduction across species.

Elizabeth Wilkinson

Discipline: Education

Authors:

Abstract Name: The Sensory Classroom: Understanding the Impact of Environment on Literacy for Students with Sensory Processing Disorders

This project investigates how sensory-friendly classroom environments influence literacy development among students with Sensory Processing Disorders (SPD). The central research question guiding this study asks: How does the physical and sensory design of the classroom impact literacy engagement and achievement for students with SPD? The purpose of this research is to synthesize findings across educational and psychological studies to identify evidence-based environmental strategies that foster inclusion, self-regulation, and academic success in literacy-rich classrooms. Existing scholarship demonstrates that traditional classroom settings – characterized by harsh lighting, inconsistent noise levels, and rigid seating – often hinder attention, motivation, and comprehension for students with sensory challenges. Conversely, classrooms intentionally designed to regulate sensory input – through flexible seating, structured routines, visual organization, and adaptive tools – create environments more conducive to literacy development and emotional well-being. This project employs a qualitative synthesis of current research, analyzing trends across empirical studies to evaluate how specific sensory modifications (lighting, noise control, flexible seating, and multisensory instructional tools) contribute to improved focus, reading comprehension, and writing fluency. The analysis also explores intersections between environmental design and multisensory literacy instruction, emphasizing the role of sensory regulation in academic engagement. Preliminary findings suggest that sensory-friendly environments not only enhance literacy outcomes but also promote confidence and positive associations with reading and writing for students with SPD. These conclusions will be discussed through visual models illustrating optimal classroom arrangements and sensory supports. Ultimately, this research contributes to a growing understanding of inclusive literacy pedagogy, demonstrating that intentional classroom design is integral to equitable literacy instruction for all learners.

Emmerson Willhoite

Discipline: Environmental Science and Sustainability

Authors:

#1 Hudson Koch

#2 Meredith Odell

Abstract Name: Analyzing Environmental and Geological Factors that Influence Bird Species Abundance and Distribution at Mundy's Landing

In Kentucky, there has been a dramatic increase in flooding over the past few years, destroying many lives, towns, and ecosystems. When considering the displacement and disruption of lives and ecosystems due to flooding, one species impacted that are often forgotten are birds. Birds play a variety of roles in ecosystems including pollinators, seed dispersers, and scavengers. The objective of this study is to determine the environmental factors, specifically geological, that drive richness, abundance, and distribution of bird species at Mundy's Landing, and determine the potential effects of flooding on those bird species and their habitat. Located on private property and bordering Woodford and Mercer Counties in Kentucky, Mundy's Landing area includes a variety of habitat types crucial for many bird species survival such as the Kentucky River, forested areas, and open pastures. A series of point count surveys consisting of visual and vocal cues of bird species were performed throughout the property's different habitats to determine which bird species were present in a habitat. Once bird species were identified, their conservation status was then analyzed through the IUCN (International Union for Conservation of Nature) Red List of Threatened Species to determine the species global extinction risk status. The categories of the IUCN's Red list utilized in this study include Critically Endangered, Endangered, Vulnerable, or Least Concern. Upon determining conservation status of species, their associated habitats were analyzed and allowed us to determine the habitats that were most

crucial for the species of conservation concern. These habitats include open forests, densely forested areas, and streamside forests, which host the most at risk species. This study highlights the importance of conserving habitats that are critical for the survival of bird species of conservation concern, many of which are threatened due to the increased frequency of flooding in Kentucky.

Zion Williams

Discipline: Biology

Authors:

#1 Linda Resar

#2 Li Lou

#3 Zanshé Thompson

Abstract Name: HMGA1 Represses Oxidative Phosphorylation to Maintain Hematopoietic Stem Cell Quiescence and Long-term Regenerative Capacity

Introduction: Hematopoietic stem cells (HSCs) have the remarkable capacity to generate blood for the entire lifespan of an organism. While precisely regulated metabolism is required for HSC quiescence and regenerative function throughout life, factors governing these processes remain unclear. The gene encoding the High Mobility Group A1 (HMGA1) chromatin binding protein is highly expressed in HSC. HMGA1 modulates chromatin structure to activate transcriptional networks that promote proliferation and plasticity. Prior studies of single-cell transcriptomes in murine gut stem cells reveal that HMGA1 regulates genes involved in metabolism (Luo et al, JCI 2025). We therefore hypothesized HMGA1 regulates metabolic gene networks required for HSC function. Methods: To test this, we analyzed single-cell transcriptomes via RNA sequencing (scRNAseq) of HSCs from mice with intact or genetic deletion of HMGA1. Chromatin immunoprecipitation sequencing (ChIPseq) then identified HMGA1 binding sites in human HSC and progenitors (HSPC). We then performed Seahorse extracellular flux assays in murine HSPCs to measure oxygen consumption rate (OCR) and extracellular acidification rate (ECAR) as indicators of mitochondrial respiration and glycolysis. Results: scRNAseq reveal Hmga1 represses gene networks involved in oxidative phosphorylation (OXPHOS), including genes associated with the electron transport chain. Similarly, ChIPseq showed that HMGA1 binds promoter and enhancer regions of OXPHOS genes, suggesting that HMGA1 directly represses their expression. By Seahorse assays, mitochondrial respiration is repressed in murine HSPCs with intact HMGA1, whereas mitochondrial respiration is activated in HSPCs lacking HMGA1. By contrast, glycolytic capacity and reserve remain unchanged. Conclusions: Together, our studies unveil HMGA1 as a novel regulator of HSC metabolism by repressing OXPHOS genetic programs to restrict mitochondrial activity. Because mitochondrial activity and OXPHOS are associated with HSC cycling and differentiation, our results suggest that HMGA1 maintains HSC quiescence. Future studies will investigate whether modulating HMGA1 could enhance HSC function for stem cell transplantation and regenerative medicine.

Kyra Williams

Discipline: Visual Arts

Authors:

Abstract Name: Translating Glassblowing Into Print: A Visual Identity for New Glass Now

This project was developed as an informational package for the Smithsonian's New Glass Now exhibition,

highlighting contemporary innovation in glass art. The guiding question behind my work was: How can a cohesive visual identity and its application help museum visitors better understand the fluidity, materiality, and creative process behind contemporary glass? To explore this, I researched the history and craft of glass blowing, studied museum publications, and experimented with materials and typography to translate the physical qualities of glass into graphic form. My methods were technical and experimental. I began by creating a custom typeface using chocolate sauce to mimic fluid motion, using its unpredictability as a metaphor for molten glass. This early experiment established the project's visual language: motion, translucency, and energy. From there, I developed gradients, layered shapes, and abstract forms inspired by how glass captures and refracts light. I also tested a variety of print materials, including holographic sticker paper, acetate, and metallic-coated paper, to understand how physical finishes could enhance luminosity and tactility on the page. The final package, which includes a museum catalog, donor card, educational booklet, and sticker pack, demonstrates how graphic design can make an unfamiliar craft, like glass blowing, feel more approachable to museum visitors. By mirroring the behavior of glass, the visual identity gives readers a tactile, intuitive sense of how the material feels. The material choices and immersive layouts work together to translate the complex, hands-on art of glassblowing into a visual experience that feels approachable.

Katie Williams

Discipline: Economics

Authors:

#1 Katie Williams

#2 Janette Goodridge

Abstract Name: Understanding the Impact of Experiential Learning Through: Evidence from a Stock Pitch Competition

This study aims to assess the outcomes of an experiential learning opportunity, specifically a stock pitch competition. The benefits of experiential learning in academic settings are well-documented (e.g., Burch et al., 2019; Mak et al., 2017) and have been explored across various disciplines, including chemistry and accounting (e.g., Hulaikah et al., 2020; Alkan, 2016). Research within finance has also examined experiential learning through simulations, investment funds, and personal finance initiatives (e.g., Marriott et al., 2015; Bakoush, 2022; Dolan & Stevens, 2010; Brau et al., 2015). Despite the extensive literature on experiential learning, limited research exists on its application in stock pitch competitions, particularly regarding how to measure and quantify these outcomes. While experiential learning is widely acknowledged as valuable, this study seeks to evaluate its true impact and understand the significance of its benefits within the context of a stock pitch competition. Data will be collected from the inaugural stock pitch competition held last fall, in which 20 teams from the Huntsman School of Business participated. The study may also include students who participated in other stock pitch competitions, such as the William & Mary Women's Stock Pitch Competition and the Rocky Mountain Investment Challenge. A student researcher will conduct interviews with willing team members to gather qualitative data, which will be analyzed using a qualitative or mixed-methods approach. Findings from this research will inform the development of a survey, which will be distributed to students participating in future stock pitch competitions to further explore and measure the effects of experiential learning in this context.

Kamryn Williams

Discipline: Philosophy, Ethics, and Religious Studies

Authors:

Abstract Name: Safe Surfing: Moral Considerations on Children and Pornography

This paper is a consideration of moral perspectives regarding age verification laws and pornography. In 2023, the regional intercollegiate ethics bowl case described the situation in which select states in America began to require more stringent age verification on pornography websites. Previously, in order to comply with the laws, most sites utilize a system simply requiring users to check a box verifying their status as eighteen years old or older. Compliance with the new laws necessitates sites requiring users to upload their ID in order to more effectively verify their age. In response, some sites like Pornhub have merely declined to allow access to their sites in states requiring the new system of ID uploading. While there are many interesting questions to analyze in a case such as this, the following question is the focus of this paper: are children harmed by viewing pornography? The goal of this paper is to develop an effective argument through specific considerations of details in order to come to a decisive, moral, and philosophical conclusion. While alternative views are considered, and subsequently thrown out, the paper comes to the final conclusion in which pornography is, in fact, harmful to children.

Lillian Williams

Discipline: Art History

Authors:

Abstract Name: Prowling Unseen: Lost and Misattributed Cat Art by Women Artists

Cats have long been beloved subjects in art, yet the contributions of women artists who depicted them have frequently been erased, marginalized, or misattributed to male peers. In this research project I seek to recover these overlooked works by examining how gender biases in art history have systematically obscured women's legacies in animal representation. By analyzing case studies of lost, anonymized, or wrongly credited cat-themed art by women, this paper will argue that such exclusions reflect broader patterns of gendered dismissal, particularly the devaluation of "decorative" or "domestic" subjects. Reclaiming these works not only corrects the historical record but also challenges traditional narratives of artistic authority and creativity. Research questions I would like to explore through my investigation would include, How and why were cat-themed works by women artists excluded from canonical art history? What role did gender stereotypes play in their erasure? And how does rediscovering these works reshape understandings of animal representation and women's artistic labor? The methodology I would follow while investigating this topic would start with archival research, such as scrutinizing exhibition records, auction catalogs, and artist correspondence to identify overlooked or misattributed works that could make up an exhibition. I will be looking at feminist art historical frameworks. I will do this by applying theories by Griselda Pollock, on gendered space, and Linda Nochlin, on institutional exclusion, to interrogate systemic biases. This project rectifies historical emissions by centering women's contributions to animal art, demonstrating how "minor" subjects reflect major institutional biases. Along with highlighting the beauty of the feminine and the feline. By merging rigorous scholarship with public engagement and simultaneously leveraging the enduring appeal of cats, it advocates for a more inclusive art historiography, one that prowls beyond the canonical to uncover what has been unseen.

Cameron Willis

Discipline: Psychology

Authors:

#1 Kiara Brown
#2 Fantasy Lozada
#3 Terri Sullivan

Abstract Name: The Protective Factor of Social Support on Exposure to Community Violence and Physical Aggression in Adolescents

Community violence (CV), defined as deliberate acts intended to cause physical harm within a community, disproportionately affects adolescents living in urban and marginalized areas (Cooley et al., 1995). African Americans are more likely to live in these environments due to historic inequities, resulting in higher rates of CV exposure. It is estimated that roughly 80% of adolescents living in urban communities have experienced or witnessed community violence (Pittman & Farrell, 2022). Victimization involves being the target of violence, while witnessing refers to the observation of violence towards others. In high-violence areas, these will likely coexist (Farrell et al., 2014). Social support from caregivers and peers has been identified as a potential moderator between CV and physical aggression; however, findings have been mixed (Coleman et al., 2023). To address this gap, this study examined the role of social and peer support as a protective factor for the association between community violence and aggression among African American adolescents. The sample included 221 African American adolescents (ages 12-17, 51% female) living in three urban low-income communities. Regression analysis indicated that: (1) violence victimization was significantly associated with high frequency of physical aggression ($\beta = 0.57$, $SE = 0.06$, $p < .001$), (2) witnessing violence was significantly associated with higher levels of physical aggression ($\beta = 0.54$, $SE = 0.04$, $p < .001$), (3) neither social support measure (i.e., adult role model or community support) showed a significant protective effect. These findings indicate that there is a positive association between both victimization and witnessing community violence and physical aggression among African American adolescents. Further research is needed to identify protective factors that can mitigate this relationship and better support youth exposed to community violence.

Sam Willis

Discipline: Engineering

Authors:
#1 Weiming Hu

Abstract Name: Simulating Power Production for JMU East Campus Solar Facility

Solar photovoltaic (PV) energy production has seen rapid development in Virginia. However, unlike traditional fossil fuel-based energy sources, solar PV energy production is heavily impacted by weather conditions and the efficiency of the energy system. As a result, solar PV energy production is typically associated with a higher volatility and the production peak might not overlap with the peak of consumption. It's important to understand the energy production of a system and how well it is performing under constantly changing conditions. In this project, we ask the question: How closely can we simulate solar PV energy production? We are interested in studying the predictability of solar photovoltaic energy production using the on-site solar array system at JMU's East Campus solar facility. We used an industrial standard software to study how well we can simulate solar photovoltaic energy production and then compared it to the collected data. To simulate power production from the solar facility at JMU, we used a cloud-based system developed by Terabase called PlantPredict. PlantPredict allowed us to run a Block-by-Block simulation where we first, create our solar facility with precision by constructing each array, inverter, and DC Field following JMU's blueprints. Lastly, we used Solcast API to acquire Historical Time Series weather data across the year. With this information we can run a simulation through PlantPredict and then verify with JMU's solar facility. We found that applying a 15% wiring loss to the simulation brought our Bias close to zero while lowering our RMSE. This indicates that PlantPredict approximates a 15% loss of energy due to the wiring design in JMU's solar facility.

Tara Wills

Discipline: Health and Human Development

Authors:

#1 Lauren Sugden

Briana Folino

Abstract Name: Using User-Collected Hormone Data to Model Luteal Phase Progesterone Dynamics

Understanding hormone patterns during the luteal phase of the menstrual cycle is necessary for determining normal menstrual physiology and identifying symptoms that may point to polycystic ovary syndrome (PCOS). Most studies on PCOS focus on single-day measurements or broad cycle length statistics. New cycle tracking technologies allow for daily hormone sampling across different populations. This project uses user-collected hormone data from the fertility app Mira to evaluate whether machine-learning can provide a more accurate way to study progesterone (PDG) rise. I analyzed three linked datasets: a hormone-level dataset containing daily estrogen (E3G), luteinizing hormone (LH), and progesterone (PDG), a cycle-level dataset containing cycle length, and derived summary hormone features, and an individual-level dataset containing disease status (PCOS vs. healthy controls), number of cycles recorded, and overall regularity of cycle length. For each cycle, each day is also mapped to one of six defined cycle phases using a hidden Markov model (HMM). For each cycle, I computed the mean PDG in two important windows: cycle days 19-22 which is typically the post-ovulation PDG rise and cycle phase 5, which corresponds to the same window, but allows for variation in cycle timing. I also calculated ratios of PDG levels for these windows compared to a baseline level for each cycle. Preliminary results show PDG levels differ by cycle regularity and PCOS status. Boxplots suggest that phase 5 shows a stronger PDG rise than days 19-22 across most groups. This shows that only using cycle days may miss individualized hormone rises. I also used a paired t-test comparing days 19-22 vs. phase 5. This also showed that the HMM model may reveal more accurate hormone transitions. Additionally, normal length cycles (24-33 days) show tighter ratio distributions, whereas irregular cycles exhibit broader variability.

Sarah Wilson

Discipline: Gender, Ethnicity, Diversity, or Cultural Studies

Authors:

#1 Sarah Wilson

Abstract Name: From Pocahontas to Tiger Lilly: The Role of Colonial Sexual Propaganda in Contemporary Native American Exploitation.

Sexual conquest and colonization performed in the name of Christianity have continually exploited Native American women. Continuously, European colonial powers have been used to create forms of inequity that have affected Indigenous women. From as early as the 16th century, images of "The New World" were produced. One would either see the "evil" Indigenous woman naked holding the head of a white settler, or an attractive woman sitting on top of food and gold. The former image represented a woman in desperate need of Christianity, while the latter represented the fertility of the land, its resources, and the women themselves. Both of these images were used as strategic tools in sexual conquest and colonization. In addition, the 1605 English Comedy "Eastward Ho!" depicts a fantasy of sexually colonizing Native American women and producing "English faced children." This colonial rhetoric was carefully constructed propaganda to sexualize

Native Women to encourage settlers to come to “The New World.” In the present day, Native American women experience the highest levels of sexual violence of any racial group in The United States. This interpretive work examines Christian colonial ideas and how such ideas contributed to the exploitation of Native women. This research uses comparative work of both primary and secondary sources through a feminist and queer studies research approach that considers intersectionality and cultural constructions. The results of this research reinterpret Christian colonial rhetoric that allow for a clearer understanding of the modern view of Native American women and the inequities they face.

Sidney Wilson

Discipline: Sociology

Authors:
#1 Ellis Logan

Abstract Name: Growing up Working: Impression Management and Motivation in High-Achieving Generation Z Students

The aim of this research is to investigate the motivations for self-defined achievement among Generation Z college students and how they are socialized to portray the image of hegemonic success. Prior scholarship on this topic has applied Goffman’s impression management, Cooley’s looking glass self, and social identity theory to frame and interpret the ways college students develop and express work habits as they transition into their careers. In previously conducted research, we found that high achieving students in college internalize many external pressures while upholding individually imposed standards of self-representation. For “traditional” full-time students who are also employed, this may result in imposter syndrome, burnout, and in some cases, dissociation and detachment from their own work behaviors and attitudes. By conducting open-ended, semi-structured interviews with full-time college students who are also working, we aim to understand and conceptualize their “working selves”, their work routines, and the extent to which failure and/or achievement motivates both. Using a thematic approach focused on categories such as school, work, wellbeing/happiness, and the social lives of the participants, we investigate the catalysts for the routines and actions expressed in this group. Through understanding their backstage habits and contexts, we also look for underlying mechanisms and embedded practices stemming from the influence of the individual students’ various social networks. We aim to address the following questions in this study: First, what strategies do students use to stay “productive” in their work according to their own standards? Second, how do these practices affect college students’ sense of wellbeing and achievement? Third, which social factors and contextual aspects are most crucial in determining each individual’s work ethic?

Mya Wilson

Discipline: History

Authors:
#1 Alexander Haskell

Abstract Name: Calculated Negotiations: Fray Motolinía’s Capitalization of Tetzcocan Authority and Customs

The first friars sent to New Spain had royal orders to evangelize the “infidels” of the territory in order to prepare for the Second Coming of Christ. Accomplishing this mass conversion required Spanish missionaries, such as Franciscan friar Toribio de Benavente Motolinía, to depend on previously established native systems

of governance. Yet, Motolinía did not regard the strength of native governments as a hindrance to King Charles V's authority over the Americas. On the contrary, Motolinía viewed these systems as a key aspect in facilitating the Spanish conquest, and he even regarded the sophistication of Tetzcoacan institutions as a divine portent. Scholars such as Sanjay Subrahmanyam and Geoffrey Parker have demonstrated how apocalyptic optimism was a fundamental underpinning of arguments of Spanish claim over the Americas, while Nicole T. Hughes has emphasized that the early Franciscans, including Motolinía, viewed Indigenous institutions positively and even believed they provided a superior basis for a future Christian state that would usher in the End Time. This essay analyzes Motolinía's 1555 Letter to Charles V as well as his Memoriales to show the significance he attached to the Acolhua nobility of Tetzcoaco in reinforcing the Spanish king's authority and contributing to the "consummation of the world" through Charles's divinely ordained kingship. By upholding Tetzcoacan customs, at times in opposition to other clerics like Bartolomé de las Casas, Motolinía crafted a view of America as a land that was superior to Spain and a more dependable instrument for upholding the king's power.

Taylor Wilson

Discipline: Psychology

Authors:

#1 Erin Koterba

Abstract Name: Parental attitudes toward child therapy: Factors influencing opinions on art therapy versus traditional talk therapy

Art therapy has gained recognition as a powerful tool for helping children express and process emotions. Even though research has shown its benefits, less is known about how parents perceive art therapy compared to more conventional approaches, such as talk therapy, for their children. Parents play a central role in choosing the type of therapy their children receive, and their attitudes, past experiences, and beliefs can significantly shape these decisions (Nevás & Farber, 2001). The current study is exploratory in nature and examines parental perceptions of art therapy and traditional talk therapy, and investigates factors influencing these attitudes. Specifically, the goal of the present study is to determine how parents' experiences with therapy, opinions about therapy, and engagement with art relate to their openness to seeking therapy for their children and to alternative therapeutic approaches. We hypothesize that parents will view traditional talk therapy as more effective, that prior therapy experience and higher personal art engagement will increase openness to therapy and alternative approaches, and that parents willing to seek help for themselves will be more likely to support their children undergoing therapy. Participants are parents aged 18+ with at least one child aged 4-17. Data is being collected through a 20-minute online anonymous survey, including questions on demographics, past therapeutic experiences, attitudes toward seeking mental health support, engagement with art, perceived effectiveness of art and talk therapy, and willingness to have their child participate in either therapy. Results are expected by January 1, 2026. Findings may inform strategies for increasing engagement with both traditional and nontraditional mental health interventions and support parents in making informed decisions that benefit their children's emotional and behavioral well-being.

Claire Wilson-Black

Discipline: Geography/Geology

Authors:

Abstract Name: In Lieu of a Plaza: Exploring Urban Vitality on Sidewalks in the Northeast Los Angeles

Neighborhood of Highland Park

The issue of public space has been long discussed and debated in Los Angeles. Across cultures and continents, plazas and other such central public spaces, have historically served as meeting points for public, urban life (Wagner et al., 2013). But because of L.A.'s unique history of development—Los Angeles developed as a sprawling city without a walkable urban core—and because of increasing pressures of privatization, Los Angeles has not been conducive to public, open spaces such as these (Scott & Soja, 1996; Davis, 1990). This has made sidewalks incredibly important public spaces for urban life in Los Angeles. In this case study, I examine two streets in the Highland Park neighborhood of Los Angeles to explore if, where, and how urban vitality—which I assert includes both commercial activity and human interaction—shows up on sidewalks. Through a combination of participant observation and surveys at my two sites, my research reveals that most activity on the sidewalk is directly or indirectly related to businesses on the street, essentially privatizing the public right-of-way that is the sidewalk. Despite the privatization of this public space—a long-standing tradition in Los Angeles—I find that people still manage to bring activity and vibrance to the sidewalk through street vending, creation and use of informal seating, and use of open space for events like farmers markets and concerts. These findings have implications for the City of Los Angeles, as they emphasize the importance of infrastructure and policies around sidewalk seating, street vending and the pedestrian experience. More widely, this study aims to illuminate the value of accessible, truly public space in urban landscapes—with or without traditional plazas.

Alicia Wiltshire

Discipline: Interdisciplinary

Authors:

Abstract Name: The Graduate Divide: Gender and Socioeconomic

This study examines how socioeconomic status (SES) influences high school students' expectations of completing a graduate degree, with particular attention to gender differences. Building on existing research showing that both SES and gender shape educational trajectories, this project analyzes patterns in academic aspirations among 9th graders using data from the High School Longitudinal Study of 2009 (HSL:09). Educational expectations vary significantly by both gender and SES, and a chi-square test confirms this relationship is statistically significant for males and females. Higher-SES students are substantially more likely to expect to pursue advanced degrees, while lower-SES students more often anticipate completing only a high school diploma. Gender differences also emerge that female students in upper SES groups report stronger expectations for earning graduate degrees, whereas males in the highest SES group are more likely to anticipate pursuing a Ph.D. These findings reinforce prior evidence that SES, gender, and related factors such as self-efficacy and mentoring shape long-term educational goals. Overall, this research highlights persistent inequities in graduate-level aspirations and underscores the importance of targeted supports and equitable resources to expand pathways to advanced education.

Oliver Winkler

Discipline: Engineering

Authors:

#1 Dayakar Penumadu

#2 Eric Lass

#3 Stephen Pupilampu

#4 Vivek Chawla
#5 Carla Nocheseda

Abstract Name: Effect of Tuning Chemical Composition on Tensile Strength of Refractory Multi-Component Alloys

Refractory multi-component alloys exhibit high strength, heat resistance, corrosion resistance and can find applications in aerospace, energy production, and security industries. Investigation of multi-component alloys typically relies on equiatomic compositions leaving vast unexplored chemical spaces. Equiatomic alloys have roughly equal atomic concentrations which promote stable configurations. This study is part of a broader project that uses thermodynamic principles to explore behavior of non equiatomic, refractory compositionally complex alloys. Starting from a Hafnium, Niobium, Tantalum, Titanium, and Zirconium palette, a series of non-equiatomic, multi-component alloys is developed. Variations in chemical composition can affect phase type, phase stability and in turn mechanical properties. Understanding of mechanical response is important for structural applications; additionally, costs can be cut down by reducing the ratio of expensive elements while maintaining good structural performance. In this study, the effect of changing chemical composition is investigated, focusing on effects of hafnium depletion on phase stability and mechanical performance. Tensile specimens, manufactured by vacuum arc casting, are axially loaded using a tabletop mechanical testing system until rupture. Strains are measured using a Digital Image Correlation system (DIC). The non-contact technique involves a calibrated, stereoscopic two-camera setup for measurement of full field, three-dimensional displacements. A proprietary software subsequently computes strains across the sample surface. Matching DIC and tensile loading data, mechanical properties such as Young's modulus, yield stress, ultimate tensile strength, and failure strain are determined for complete elastic and plastic characterization. Crystal structure, investigated by x-ray diffraction, revealed all alloys consisted of a single BCC phase. Mechanical testing revealed that reduced niobium content and increased hafnium content leads to a reduction in strength.

Owen Wise

Discipline: Engineering

Authors:

#1 J. Alfredo Ocegueda
#2 Ramses V. Martinez

Abstract Name: A Soft Robotic Fish for Mobile Detection of Aquatic Contaminants

Aquatic ecosystems are increasingly contaminated by endocrine-disrupting chemicals such as bisphenol-A (BPA), yet water-quality monitoring still relies largely on static sensors and periodic sampling that fail to capture spatial and temporal variability or locate contamination sources. To address this limitation, we developed a small, magnetically actuated, soft-bodied robotic fish for low-noise propulsion, in situ chemical sensing, and autonomous source seeking. The robot employs an electromagnetic tail-fin actuator composed of a solenoid, an oscillating drive signal, and two opposing permanent magnets embedded within a molded silicone body, producing an ostraciiform-like swimming gait similar to that of boxfish. Building on this platform, we integrated a plasmonic BPA sensor within the biomimetic body and tail and a micro-pump buoyancy control system based on a bio-inspired elastic bladder, all coordinated by an onboard microcontroller. Experimental tests in controlled aquatic environments demonstrated stable, low-noise oscillatory tail motion, efficient propulsion, and flow fields comparable to those generated by real fish, while enabling real-time plasmonic detection of BPA. By coupling the plasmonic sensor output to onboard control, the robotic fish successfully followed increasing BPA concentration gradients and localized point sources of contamination in test tanks, demonstrating a form of environmental chemotaxis. Because the plasmonic sensing elements can be functionalized for different analytes, the same architecture is adaptable to other pollutants, including heavy metals and additional endocrine disruptors. These results highlight magnetically

actuated soft robotic fish as a versatile, minimally invasive platform for mobile environmental monitoring, chemical plume tracking, and source localization in contaminated aquatic ecosystems.

Cody Witt

Discipline: Visual Arts

Authors:

#1 Nathaniel Stern

Ava Schultz

Kristin Klapperich

Abstract Name: Generation to Generation: Conversing with Kindred Technologies

Generation to Generation: Conversing with Kindred Technologies explores how humans and technology have always evolved together. This immersive, traveling art exhibition blends the past, present, and future of technology and language through physical, digital, and written media. Inviting viewers to consider their relationships and attitudes towards current and emerging technologies, this show and catalog act as both an action and a call to action. Generation to Generation provokes a reflection on how technology both enhances and evolves our understandings of politics and society, matter and nature, and our world and ourselves. New technologies - with Artificial Intelligence being the latest and most rapid form - should induce neither blind optimism, nor crippling fear. AI, for example, continues to rapidly progress and improve, and Generation 2 Generation encourages discourse about its place in our personal lives, relationships, and broader society. The unifying element of a font created by AI creates an aesthetic that challenges technology itself. Asking and answering these questions has seen the production of a monumental, poetic landscape of reclaimed electronic waste; an interactive mirror that “reads” human movement and translates it into dynamic code; a print- and image-based installation, featuring a custom AI font that evolves past human understanding, beyond the limits of the screen or page; play-based installation of stencils, coloring books, and paint; concrete poetry made of precious metals recovered from mining slag and computer waste — alchemized artifacts of digital communication; and, media-rich (generative/oral/aural/digital) performances of AI-powered poetry, updating an ancient art form for the approaching posthuman age. Neural Networks, as well as novel understandings of natural networks, are enabling and enhancing unique forms of creative exploration in and with various matter and materials, life and non-life. Generation to Generation hopes to open up those spaces for even greater exploration.

Addison Witucki

Discipline: Health and Human Development

Authors:

#1 Winston Zhuang

#2 Sidney Rippey

#3 Alyson Galvan-Lara

#4 Hayden Arnold

#5 Madison Mitchell

#6 Hiroshi Saito

Abstract Name: Mitochondrial Dysfunction and Cognitive Impairment in Sepsis Survivor Mice

Sepsis is a potentially fatal systemic response to infection in the body. A majority of sepsis survivors

experience a condition known as post-sepsis syndrome (PSS) including physical and cognitive impairment. Previously we developed a mouse PSS model in which sepsis surviving mice demonstrate long-term muscle weakness accompanied with mitochondrial dysfunction. The objectives of the current study were to 1) examine whether our PSS model also exhibits cognitive impairment and 2) identify potential causes of cognitive impairment after sepsis. Sepsis was induced by abdominal infection followed by repeated antibiotics treatment and fluid resuscitation beginning 12 hours later. Fear conditioning memory tests were performed on both sepsis survivor and control mice three to four weeks after sepsis induction. Five weeks after sepsis induction, hippocampus tissues were collected for gene expression profiling by bulk RNA sequencing analysis. Results of the fear conditioning tests showed significant memory impairment in sepsis survivor mice. RNA sequencing analysis followed by Gene Ontology (GO) pathway analyses revealed significant differences between sepsis survivor and control mice. The top five most up-regulated gene pathways in sepsis survivors were all related to neuronal cell growth while the top five most down-regulated gene pathways included four mitochondrial respiration related pathways and one ribosomal translation pathway. Five out of 13 mitochondria-encoded protein-coding genes were also down-regulated suggesting mitochondrial damage and dysfunction. These ongoing analyses suggest that sepsis survivor mice have long-term cognitive impairment which involves reduced mitochondrial and ribosomal functions with altered synaptic cell growth in the hippocampus.

Beata Wolak

Discipline: Engineering

Authors:

#1 Sarah Leary

#2 Katya Arquilla

Abstract Name: Enabling Health Monitoring in Extreme Environments: A Low-Power Electrocardiogram System for Wearable Applications

Wearable physiological sensors are increasingly used to monitor health and performance in extreme environments, such as spaceflight or the Arctic. Electrocardiogram (ECG), which measures electrical activity of the heart, is one of the most prominent physiological sensors due to its well-characterized dynamics and broad diagnostic utility. However, reliably acquiring and storing high-quality ECG signals in these environments remains challenging due to strict power constraints. This project investigates the design and evaluation of a low-power, microcontroller-based ECG acquisition and data-logging system suitable for integration into wearable systems used in extreme environments. The first phase of development focused on characterizing ECG signal amplification using the INA333 instrumentation amplifier, a device previously implemented in similar environments. A test setup consisting of an Arduino Uno R3, solderless breadboard, and 4-GB microSD card interface was used to evaluate analog signal integrity, supported by firmware that logged raw ECG data for offline analysis. Although the INA333 is extremely low power (50 μ A), its sole function is signal amplification, making it poorly suited for ECG acquisition. In contrast, the MAX30003 biopotential chip draws similar power (85 μ A) while integrating noise-reduction circuitry, digital filtering, and an architecture optimized for ECG acquisition. Thus, it was selected for continued development. Open-source pinouts and logging software were adapted into the existing system architecture, and the breadboard prototype is currently being translated into an Electronic-CAD design to enable the fabrication of a printed circuit board (PCB). This PCB will later be integrated into a chest strap form factor for ECG data collection. Future work will focus on software enhancements, including an on-device data compression algorithm to extend storage capacity, and a machine learning-based ECG analysis tool for improved denoising and analysis. Together, these developments aim to advance high quality, user-friendly, and low-power wearable ECG systems capable of reliable operation in extreme environments.

Rodi Woldeyesus

Discipline: Computer Science

Authors:

#1 Sam Henry

Abstract Name: Developing a Self-driving RC Car

This project develops a self-driving remote-controlled (RC) car as an affordable and accessible educational tool for learning about autonomous vehicle technology. While self-driving cars are becoming increasingly important in modern transportation, opportunities for students to gain hands-on experience in this field are still limited. While development platforms such as DonkeyCar and Robot Operating System (ROS) exist, these are generalized tools that work with many hardware platforms and can be difficult for beginners. We created a detailed guide and code base to help new users get started with self-driving cars. We utilized DonkeyCar, an open-source platform that supports both traditional computer vision and deep learning-based driving methods. It also includes a simulated environment to train and test models independently of hardware. Our key challenges using DonkeyCar were hardware compatibility, software configuration, and sensor calibration. Our guide addresses these issues and provides a single source to get new users started with self-driving cars. Beyond the creation of a guide, we developed a self-driving car ourselves. Our approach included training driving models in a simulated environment before applying them to physical hardware. We selected and configured a Waveshare PiRacer Pro, which is a Raspberry Pi-based RC car. We trained a neural network to imitate human driving by learning from camera images and corresponding steering inputs. This method can successfully navigate a simple track, and we expect that, given additional and varied data, it can navigate more complex environments. We also implemented a simpler, rule-based system that uses color and edge detection to follow lines on a track. Future work will focus on improving adaptability by combining multiple control methods and integrating additional sensors. This project provides a practical, scalable foundation for students and educators interested in robotics, artificial intelligence, and autonomous systems.

Sabrina Wolf

Discipline: Geography/Geology

Authors:

#1 Sabrina Wolf

Abstract Name: An Analysis of Various Storm Environments during a Field Course in Extreme Weather, Summer 2025

This study examines the environmental characteristics and atmospheric dynamics associated with various thunderstorm morphologies observed during the Forecasting and Verification of Extreme Weather field course. The course took place in the summer of 2025 across the Great Plains region of the United States. Thunderstorms and their associated hazards, including hail, straight-line winds, tornadoes, flooding, and derechos, arise from a combination of atmospheric ingredients present at the right time. The objective of this research is to identify the specific combinations of moisture, lift, instability, and shear that differentiate storm types and influence associated hazards. Data was collected through a combination of in situ observations, radar, satellite imagery, and archived datasets from the National Weather Service and the Storm Prediction Center. In-depth discussion surrounds three events that produced significant severe hazards: 5-inch hail, 13 landspout tornadoes, and a large wedge tornado. By comparing the atmospheric environments associated with each storm type, this research contributes to a deeper understanding of convective processes and the predictability of severe weather within the mid-latitude continental United States.

Discipline: Biology

Authors:

- #1 Christopher Allovio
- #2 Hannah Dawson
- #3 Zoe Hilliard
- #4 Traesha Robertson
- #5 Anne Mowry
- #6 Ashlyn Kennedy
- #7 Jacqueline Dove
- #8 Stephanie Lockwood

Abstract Name: The Diversity of West Caribbean Octocorals in Roatán, Honduras

Sea fans, rods, and whips, known as octocorals, serve vital functions in tropical marine ecosystems, providing habitats and supporting biodiversity. Current research regarding Caribbean octocorals is limited as research in the tropics has primarily focused on the threatened scleractinian coral populations. A renewed interest in octocoral research has been stimulated by anthropogenic needs, as Octocorallia exhibits promising results for new natural marine products. Ecological surveys suggest octocorals provide necessary insight into the health of the reefs in response to environmental disruptions from climate change, industry, and disease. This study was conducted to assess the diversity and health of octocoral communities in Western Caribbean shallow reefs in Roatán, Honduras. Divers conducted belt transects at four established dive sites along the Mesoamerican Barrier Reef and enumerated specimens by species. At each site: species were evaluated for density per meter squared and sites analyzed through Gini-Simpson's Diversity Indices, and Simpson's Evenness. This study identified 19 species across 9 genera: Antillogorgia, Briareum, Eunicea, Gorgonia, Muricea, Muriceopsis, Plexaura, Plexaurella, Pseudoplexaura, and Pterogorgia. The most common species identified in order of prevalence were: Antillogorgia americana, A. bipinnata, Briareum asbestinum, Gorgonia flabellum, Eunicea calyculata. Researchers noted differential community compositions between spur-and-groove formations and patch reef formations, but Chi-Square Test revealed no statistical significances between site richness, diversity, evenness, or density. Diversity was comparable to surveys conducted on Saba Bank, Nederland Antilles. Low disease incidence along transects prevented any analyses regarding health. Continued and extensive monitoring is recommended. Additional sample sites, genetic and microscopic analyses, and presence/absence surveys are expected to provide the most insight to community composition. Researchers also recommend the modification of the conducted methodology to include analyses by depth and substrate.

Gale Wolfle

Discipline: Chemistry

Authors:

- #1 Danna Sharp

Abstract Name: The Effect of D-Glucose on Solubility and Fluorescence of Riboflavin

The purpose of this research is to determine an effective way to make riboflavin (Rf), also known as vitamin B2, more soluble in water while retaining its important fluorescence activity. Rf is only partially soluble in water, and while it dissolves in bases, this solvent quenches Rf's fluorescence. Current published methods for making Rf more soluble, such as DMSO recrystallization or dissolution in various organic solvents, do not focus on retaining fluorescence. Fluorescence is widely used in medical imaging, and Rf is a safe choice for

fluorescence due to its high safety profile. Rf has been proven to be a superior tracer in aerosol contamination models due to its reliable fluorescence, has been used as a medicine compliance tracker, and has been used in contact contamination trials. Making Rf more water soluble will expand its medical uses to allow it to be used in place of more hazardous substances such as Fluorescein. In order to create more soluble Rf, we tested suspension solutions, and determined that they were effective for retaining fluorescence until the suspensions dried or the Rf precipitates over time. We then tested various saturated sugar solutions due to saccharides' high solubility in water and the idea that saturated sugar solutions increase viscosity of water. We found sugars increased solubility of Rf water based solutions without quenching fluorescence. Furthermore, we found that D-glucose significantly enhanced fluorescence when measured with a fluorometer. To determine molecular interactions between the D-glucose, Rf, and water solutions, we measured the D-glucose sample with common analytical techniques, such as IR spectroscopy. We also investigated recrystallization using different solvents to attempt to improve solubility while retaining Rf's fluorescence while in solution.

Avi Wolnek

Discipline: Engineering

Authors:

#1 Samuel Hatton

#2 Ankita Gupta

#3 Jacob Tersigni

#4 David Marshall

#5 Francisco López Jiménez

Abstract Name: Rapid Fatigue Categorization of Metal Alloys

The advent of additive manufacturing (AM) processes for metals and alloys has opened up a new field of material research and alloy composition optimization. In particular, it has enabled the production of multimaterial parts by mixing metallic powders during the printing process. While material manufacturing capabilities have advanced, material testing capabilities have not caught up. An essential requirement of categorizing these AM materials is predicting their fatigue behavior. Fatigue is the result of the repeated cyclic loading of a material over time. Failure due to fatigue has been estimated as the most common failure mode in mechanical components. The traditional, time intensive method of fatigue categorization requires multiple dogbone specimens to be cyclically loaded to develop a stress-life design curve (S-N Curve). Modern methods such as Digital Image Correlation (DIC), an optical method for measuring full field strains, has grown in popularity for fatigue categorization of metals. Utilizing DIC our team has developed an expedited process for stress-life categorization, compatible with industry standard test and manufacturing equipment. A novel test coupon designed with six potential failure points was cyclically loaded in an MTS test frame, with local strains measured via a Correlated Solutions stereo DIC system. Alloys of known material properties were tested and compared to published handbook data. The fatigue curve developed via the novel geometry, exhibits consistency with literature data, with as little as three test coupons, over six days of testing. We plan to turn this method into a material standard for fatigue categorization of metals. Future areas of testing this coupon geometry include high temperature fatigue, creep, and crack growth categorization.

TaTyanna Womack

Discipline: Psychology

Authors:

#1 Sydney Sumrall

#2 Elizabeth Taylor

#3 Marcia Winter

Abstract Name: Family Functioning and Children's Appraisals of Threat and Security Amidst the COVID-19 Pandemic

Children's interpretations of stressful events play a role in shaping their emotional and behavioral adjustment, making it essential to understand the factors that influence how children evaluate danger and safety. Previous research identified associations between family processes and child adjustment (Zhang et al., 2025), and between family functioning and children's sense of safety (Berger & Font, 2019), yet it is unclear how dimensions of the family environment relate to children's threat and security appraisals (i.e., cognitive evaluations of danger, safety, and security). This study focuses on whether aspects of family functioning are associated with how threatened or secure children felt regarding the COVID-19 pandemic. I hypothesized

that higher cohesion, collective efficacy, and problem solving in the family would be associated with lower perceived threat and higher perceived security in children. Cross-sectional data were collected from 89 U.S. parent-child dyads in 2021, during the COVID-19 pandemic. The study was approved by the IRB. Following consent and assent, children reported their threat and security appraisals (Child Threat Appraisals COVID-19 Scale) and parents reported family group cohesion (COVID-19 Household Environment Scale), collective efficacy (Family Collective Efficacy Scale), and problem solving (Family Problem Solving Communication Scale). Correlations will be conducted to evaluate associations between each family environment subscale and threat and security appraisal. Analyses are ongoing, but preliminary results show statistically significant associations between aspects of family functioning and children's appraisals ($p < .05$). Results align with family stress perspectives (e.g., Zhang et al., 2025) which suggest that children in more supportive and connected family systems interpret stressful events as less threatening. Results could help clarify which specific family components shape children's perceptions of safety. Such work has implications for prevention/ intervention programs aimed at assisting children and families facing stressful events and circumstances.

Grace Wood

Discipline: Linguistics and World Languages

Authors:

#1 Ricardo Vivancos-Pérez

Abstract Name: Translating María Zambrano's *The Tomb of Antigone*

As an exploration into the art of literary translation, this project endeavors to create the first complete English translation of María Zambrano's play *The Tomb of Antigone* (*La tumba de Antígona*, 1967). In this play-essay hybrid, Zambrano opens a philosophical dialogue with Sophocles to offer a new interpretation of his Greek tragedy while simultaneously illustrating her own experiences and ideas surrounding the Spanish Civil War. Using her philosophical construct of delirium, Zambrano creates Antigone's stream of consciousness as she waits for her inevitable death. As the text demonstrates originality in its interweaving of genres to discuss the issues of Zambrano's time, a translation of this work would foster new interpretations and discussions about Zambrano and Spanish culture with English-speaking scholars in both the philosophical and literary disciplines. To achieve this end, the mentor and student consulted various texts to understand the cultural, historical, and literary traditions of Spain during the time Zambrano was writing, as well as the author herself, which led to the translation of the play's prologue. The twelve-part play was then split into four sections that will be translated over the course of two weeks, after which the mentor and student will convene to discuss the draft. Once the rough draft is complete, both the student and mentor will review and revise to create a more polished version. This project will result in a polished draft of the translation that will be sent to the María Zambrano Foundation in Vélez-Málaga to obtain permission to seek an academic publisher.

Ashley Wood

Discipline: Gender, Ethnicity, Diversity, or Cultural Studies

Authors:

#1 Lindsey Churchill

#2 Erik Huneke

Abstract Name: *Creating a Predator: Intersectional Paradoxes of Oppression Within Trans-Exclusive Lesbian Feminisms*

In the 1970s, lesbian-feminist communities in the United States of America struggled to integrate the complexities of the intersectionality of gender and sexuality. The nature of this relationship is inextricably interlinked with the search for a nonmedicalized and empowering lesbian identity, which was a prevalent topic during the peak of lesbian-feminism in response to centuries of lesbian erasure and criminalized homosexuality. Rather than focusing all efforts on confronting oppressive institutional and social structures that rendered them psychologically perverse, extremist lesbian feminists created a new enemy, popularizing a demonized representation of transgender women as “aggressive sexual predators” that infiltrated national discourse. In part, transphobic lesbian-identified individuals collectively heightened their social standing through further oppressing transgender individuals, reproducing the same systems that once rendered them marginalized through the othering of individuals whom they once shared oppressive status with. However, the majority of lesbian organizations with transgender exclusive policies inspired division between marginalized groups, empowered anti-LGBTQ+ rhetoric further, and cultivated their own downfall. The attempted methods of liberation used by these extremist groups perpetuate a one-dimensional understanding of multiple systems of domination that have historically impacted all LGBTQ+ individuals. I argue that this single-axis framework contributed to the foundation of contemporary transphobic policies, conversations, and ideologies that label transgender women as sexual predators and aided in the empowerment of anti-LGBTQ+ structures. This research employs an intersectional analysis of trans-exclusionary lesbian-feminist involvement in framing contemporary depictions of transgender women as predatory, which ultimately further disempowers the entirety of the LGBTQ+ community. Research methods utilize an intersectional framework in integrating comparative historiographical analyses of secondary and primary literature reviews and oral history. This research contributes to broader discussions of intersectional theory, transgender and lesbian history, and studies on the paradox of oppression

Dylan Wood

Discipline: Psychology

Authors:

#1 Olufemi Oluyedun

Abstract Name: Reported Experiences in Collegiate Track and Field and Cross Country Athletes

Athletes who reach the collegiate level face a wide range of sporting experiences. Track & field and cross-country athletes in particular have unique qualities given the unique practice style and independent nature of competition. In addition to the nature of these sports, the different team atmospheres and the fact that athletes perform individually are important aspects to consider when doing research in this area. To date, limited work has examined the potential differences in motivation between track & field and cross-country athletes who score and those who do not score— we completed this research to help address this gap. In addition, we were interested in mirroring previous research by examining the predictive value of accountability (Witvliet et al., 2019) on flourishing (Keyes et al., 2002). We addressed the gaps in the literature by having collegiate track & field and cross-country athletes across a range of divisions and schools complete established measures of burnout, athlete orientation (Task, Ego), accountability, flourishing, and sport competence. The purpose of our study was two-fold: 1) To provide a descriptive account of how scoring status links to accountability, and 2) to identify whether accountability can predict flourishing above and beyond self-reported burnout and athlete orientation scores. 101 collegiate athletes completed a 10-minute survey assessing the variables of interest. An Independent T-test showed scores ($M = 66.15$, $SD = 8.17$) and non-scorers ($M = 63.57$, $SD = 8.84$) did not differ in reported Flourishing scores ($t(99) = 1.52$, $p > .05$). Hierarchical regressions were run to examine whether the Accountability scale predicts Flourishing. Accountability scores (Step 3) did not go beyond Athlete Orientation (Step 2: Task & Ego) and Burnout scores (Step 1: Exhaustion, Devaluation, & Reduced Accomplishment) to account for significant additional variance in Flourishing. Future work should examine the relevance of sport type.

Badyn Woodford

Discipline: Music

Authors:

Abstract Name: Sacred, Secular, and the Sounds of Conflict: A Comparative Study of Leonard Bernstein's Mass and Benjamin Britten's War Requiem

Leonard Bernstein's Mass (1971) and Benjamin Britten's War Requiem (1962) are two of the twentieth century's most profound musical meditations on faith, conscience, and the moral responsibilities of art. Both composers turned to the Latin Mass not as a static form of inherited devotion but as a flexible framework through which to explore the intersections of ritual, belief, and modern ethical awareness. Britten's requiem intertwines sacred liturgy with the war poetry of Wilfred Owen to mourn the devastation of conflict, while Bernstein's Mass stages a celebrant's unraveling faith as an emblem of spiritual crisis amid post-Vietnam disillusionment. This study draws on a diverse range of sources, including contemporaneous press clippings, composer correspondence and performance documents, FBI surveillance records, and critical scholarship in musicology, theology, and cultural history. Together, these materials situate both works within debates on pacifism, moral authority, and the composers' capacity to bear witness. Through comparative analysis of text, music, theatrical design, and reception, the paper examines how each composer transforms the Mass into a site of confrontation: Britten through the fusion of prayer and protest, Bernstein through the collision of liturgy and popular idiom. Ultimately, this study argues that the American reception of these works—rooted in pacifist conviction and ecumenical aspiration—reveals how both blurred the boundary between the sacred and the secular. By unsettling liturgical expectation and creating spaces of shared reflection, they emerged as cultural signposts through which mid-century audiences grappled with faith, modernity, and the search for moral meaning.

Emily Woodland

PA - Drexel University

Discipline: Engineering

Authors:

- #1 Giselle Matlis
- #2 Preetha Chatterjee
- #3 Thomas Palazzolo
- #4 Vakhtang Tchantchaleishvili
- #5 Marvin Slepian
- #6 Amy Throckmorton

Abstract Name: Artificial Intelligence in the Advancement of Mechanical Circulatory Support: A Systematic Review of its Role and Potential

In recent years, there has been a notable surge in the ability of machines to perform complex and intelligent human-centered tasks, particularly within the domain of cardiovascular health. Transformative advancements in artificial intelligence (AI) and machine learning (ML) algorithms reflect the tremendous potential for such analyses to meaningfully extend into design, translational development, and clinical usage of medical devices, especially mechanical circulatory support (MCS) therapies. Here, we investigate and report the applications, limitations, and strategies in which AI is currently being employed in MCS and the potential opportunities of AI approaches to transform the field of MCS. To effectively assess the scope and impact of AI in MCS, we conducted a systematic literature review. A comprehensive search of 4 recognized research databases (PubMed, Google Scholar, Ovid MEDLINE, and ProQuest) was performed using this Boolean

string: “(Artificial Intelligence) AND (AI) AND (Mechanical Circulatory Support) AND (MCS) NOT (Heart Transplant) NOT (Cardiogenic Shock) NOT (Critical Care).” Most relevant publications covered the prediction and management of postoperative outcomes, and the development of personalized device-patient matching and timing. AI modeling has been instrumental in successful predictions of complications, recovery trajectories, and long-term survival. It has also been employed to inform clinical decision-making. Barriers to broad implementation of AI include the need for sizable, high-quality datasets to achieve algorithm training benchmarks, the lack of organized and incomplete databases, and limited computational resources. Emerging frontiers of MCS recognize the potential for AI and ML techniques to refine and improve image recognition capabilities, diagnostic assessment, device placement, and post-implantation monitoring approaches in the future. AI-driven advancements demonstrate a promising convergence of computational power and clinical expertise, offering personalized, efficient, and informed clinical management of MCS patients.

Sierra Woods

Discipline: Education

Authors:

Abstract Name: Impact of Digital Reading Tools on Phonemic Awareness and Decoding Skills Among African American Students

Generation Alpha is the most exposed generation to technology, with digital tools deeply integrated into their everyday lives and learning experiences. Reading is the most fundamental skill for students' academic success, yet the ways in which students learn to read are rapidly changing. As the educational landscape increases its reliance on Digital Reading Tools (DRT), we must investigate how these tools influence the phonemic awareness and decoding skills of students. DRT, such as I-Ready, are platforms that are heavily used to support students' reading instruction. Research has proven that early and excessive exposure to digital educational tools can have lasting cognitive and developmental effects on children. Through a mixed-method approach, this research aims to explore how exposure to DRT influences phonemic awareness and decoding skills among African American kindergarten students. To examine the impact of digital reading tools, quantitatively I will collect student I-Ready assessment data from the beginning of the grading period and end of grading period. Qualitatively, I will observe students to examine if they display accurate phonemic awareness and decoding skills independent of the DRT. Through this data, I hope to find patterns regarding the impact of digital reading tools in the classroom.

Mackenzie Woodward

Discipline: Exercise Science and Nutrition

Authors:

#1 Mario Munoz

Mario Munoz

Abstract Name: Developing an AI Prompt Library for Evidence-Based Exercise Prescription: A Microsoft Copilot Agent Evaluation Study

Artificial intelligence is increasingly prevalent in healthcare and fitness settings, yet lacks validated frameworks for safe, evidence-based exercise prescription. This gap poses risks when individuals rely on AI without professional oversight or proper prompting strategies. This study develops and validates a comprehensive AI prompt library enabling kinesiology professionals to prescribe evidence-based exercise

programs with AI assistance. Target populations include healthy adults, older adults, youth, and individuals with chronic conditions, incorporating FITT-VP principles and ACSM/CDC guidelines. We developed a Microsoft Copilot agent embedded with evidence-based exercise prescription knowledge. Undergraduate kinesiology students (n=15-20) evaluate the agent's recommendations across 12 structured scenarios using a validated assessment instrument measuring safety, accuracy, specificity, and professional appropriateness. Each scenario presents different populations and fitness goals, requiring students to interact with the agent and rate responses on 5-point Likert scales. Faculty experts independently assess identical AI-generated recommendations to establish inter-rater reliability. Student feedback and expert evaluations inform iterative prompt database improvements. We anticipate identifying specific gaps in AI exercise prescription capabilities, including inadequate safety screening, insufficient progression guidelines, and limited population-specific modifications. The validated prompt library will contain 25-30 evidence-based prompts organized by population and context, with effectiveness ratings above 4.0/5.0 for safety and accuracy. This research provides the first validated AI prompt library for exercise prescription, enabling kinesiology professionals to safely integrate AI technology while maintaining evidence-based practice standards. The framework can be adapted for other health professions incorporating AI into clinical practice.

Paige Wooten

Discipline: Biochemistry

Authors:

#1 Paige Wooten

#2 Gina MacDonald

Abstract Name: Spectroscopic Studies of Environmental Influences on Protein Structure and Stability

Different environmental influences are known to alter protein structure and stability. Molecules that destabilize protein structure could ultimately lead to increased protein aggregation and promote disease. In contrast, molecules that stabilize proteins can provide insight into the complexity of protein stability and opportunities for treatments to slow aggregation. This study investigates how different molecules affect the structure and stability of the model proteins, Myoglobin and α -Chymotrypsin (ACT). Spectroscopic studies of the proteins in the presence of brilliant blue, sunset yellow, glycine, histidine, and caffeine give insight into how these molecules influence protein structure and stability. The food dyes brilliant blue FCF and sunset yellow as well as glycine, histidine, and caffeine have previously been shown to influence protein structure and/or stability of other proteins. The current studies used Fourier-Transformed Infrared (FTIR) and Circular Dichroism (CD) spectroscopies to monitor how the molecules influence protein secondary structure, stability, and aggregation. CD and infrared spectra were obtained on each protein in the presence of each molecule and compared to control samples. In addition, CD spectroscopy was used to monitor how increasing temperature altered protein structures in the presence of each molecule and to determine if the molecules altered protein melting temperatures and aggregation.

Cayden Wootton

Discipline: Economics

Authors:

#1 Jennifer Gnagey

Abstract Name: Bot's Effects in Public Goods Games

Do humans trust bots as much as they do other humans? This paper is a public goods experiment designed to determine whether humans cooperate with artificial intelligence in public goods games. There is a lack of research that studies human-bot interactions within public goods games. According to previous research in economic study, humans are more reluctant to cooperate with bots than with humans within the adjacent field of trust games. If this is true, participants will contribute less on average to groups with bots than groups without them. As humans interact more with AI agents, it becomes increasingly likely that these agents will participate directly in economic activity, making it much more important to study interactions between humans and bots in economic scenarios. Such a scenario that provides a particular interest is the provision of public goods, which require at least some form of cooperation to enable the successful procurement of funds. In this experiment, we examine the effects of such agents participating in 10 rounds of repeated provisioning of public goods with a ratio of 50% humans. Several control groups will be run in a similar manner. In each session, there is always a total of four participants. Depending upon if a group was part of the treatment or control, two bots would occupy two participant slots. We predict that the human participants will not cooperate with such artificial agents at the same level as they cooperate among groups with solely human participants in the provision of public goods. Our results suggest that there is not a difference in contribution between mixed human-bot groups and human-human groups.

Jacob Worriax

Discipline: History

Authors:

Abstract Name: The Racial Limbo of Indigenous Identity

This project examines how and why Carolinian Tribes referred to as “Croatan” were portrayed in contradictory lights across the Federal Writers Project and Farm Security Administration photographs, as well as the modern ramifications for those portrayals. During the first half of the twentieth century, Native Americans in the Carolinas had a unique racial experience, being in a time with little distinction between Black and White. In analyzing their experience, this project will compare Native peoples’ own conceptions of their identities to outsider portrayals, based on photos taken by the Farm Security Administration and life histories recorded by the Federal Writers Project, providing a multi-angled view of the Native American racial experience. Archival photographs in the Library of Congress label individuals that we now understand to be Lumbee as “Indian Mixed-Breeds.” However, in life histories of Natives from the same area, during the same time, narrators clearly identify themselves as “Indian,” not of mixed heritage. These contradictory representations are common for communities referred to as “Croatan” in both North and South Carolina. Such discrepancies left these communities in a form of racial limbo for decades, sticking them somewhere between black and white with an unclear place in society that affects how they are viewed today. This project determines the source of these discrepancies through a comparative analysis of Native Kinship structures compared to Western ideals of lineage utilizing a lens that re-centers Native voices, adding much needed nuance in our understanding of racial history in the Carolinas. The ramifications of this project include supporting tribal sovereignty efforts, particularly for the Lumbee, returning tribal histories, healing racial trauma, and further developing the current understanding of race relations in the southeast. Furthermore, it allows Native voices to be elevated in direct contrast to the colonial ones that have historically silenced them.

Leah Worrill

Discipline: Biology

Authors:

#1 Jaly Chimbo Macancela
#2 Joseph L. Graves Jr.
#3 Misty Thomas

Abstract Name: Evaluating the Potential for Resistance Evolution in *E. coli* Exposed to Silver Nanowires

Silver nanoparticles are potent antimicrobials against Gram-negative and Gram-positive bacteria, making them promising for healthcare use. However, *Escherichia coli* (*E. coli*) can evolve resistance to standard silver nanoparticles after repeated exposure, raising concerns about long-term efficacy. Silver nanowires, with sharp ends that may enhance membrane penetration, could provide both physical and chemical antimicrobial activity, potentially slowing resistance. This study tested whether *E. coli* could evolve resistance to silver nanowires. We hypothesized that their dual mode of action would create an evolutionary trap, preventing adaptation. Using *E. coli* K-12 MG1655, we determined the minimum inhibitory concentration (MIC) of silver nanowires as 10 mg/mL, then conducted a 21-day experimental evolution study at the sub-MIC 8 mg/mL. Cultures were serially passaged daily under this condition. Post- experiment MIC assays showed that *E. coli* evolved increased resistance. Whole-genome sequencing identified mutations in *cusS*, a histidine kinase regulating the copper-silver efflux pump. These findings suggest that even nanostructured silver can be overcome by bacterial adaptation. Future work will test additional nanoparticle shapes on high-touch surfaces. If resistance proves less likely in such contexts, silver-coated nanosurfaces may still hold promise for healthcare applications.

Matthew Wren

Discipline: Biology

Authors:

#1 Benjamin Nicholson
#2 Phoenix Miao
#3 Weijue Guo
#4 Sydney Fisher

Abstract Name: Identification of a Cancer-Secreted Immune Regulatory Ligand

Squamous cell carcinoma (SCC) is a diverse group of cancers and amongst the most common types of cancer in the world. Head and neck squamous cell carcinoma (HNSCC), a particularly aggressive subtype, accounts for over 600,000 cases and 330,000 deaths annually. HNSCC typically has high T cell infiltration in their tumors, making these patients promising candidates for immunotherapies. Despite this, immune checkpoint blockade immunotherapies have limited success on patients, with median recurrent HNSCC survival remaining at 10-15 months. Current literature supports that tumor-initiating stem cells (tSCs) play a key role in immunotherapy resistance and relapse in patients. The specific mechanism by which tSCs drive immunotherapy resistance is currently unknown and a source of continuous research. RNA-seq on tSCs have found high levels of expression of certain immunomodulatory genes, such as CD80 and cytotoxic T lymphocyte associated protein 2a (Ctla2a), which may provide mechanistic insights into tumor immune escape. Work done in our lab has found that Ctla2a knock-out reduced tumor growth and mass in immune competent mice. Additionally, we found that secreted Ctla2a in the conditioned media of cultured HNSCCs reduced granzyme B production in Killer (CD8+) T cells. This demonstrates a possible role of Ctla2a in cancer immune regulation. Future proximity labeling experiments will reveal key candidate proteins that interact with Ctla2a, which will begin to shed light on the mechanism by which Ctla2a can drive tSC immune escape and tumor relapse. Understanding how tSCs survive immunotherapy and drive relapse can unlock new avenues for treating patients with HNSCC, minimizing resistance to immunotherapies so as to maximize patient life expectancy and quality of life.

Samuel Wright

Discipline: Health and Human Development

Authors:

#1 Matthew Nicholaou

#2 Chalice Gustaveson

#3 Mckinley Achter

Ethan Hopkin

Joshua Frey

Abstract Name: Genomic and Environmental Influences on the Nasopharyngeal Microbiome and Respiratory Allergen Sensitivity

This study is focused on providing evidence for the claim that nasal bacterial population and the environmental factors that influence it predispose individuals to respiratory allergies. This study will include two groups of twenty-five individuals recruited from two geographically distinct areas in Utah with measurably different air qualities. The individuals recruited will be people who have only respiratory allergies or control individuals who have no allergies. Blood samples and nasopharyngeal swabs will be collected in order to assess nasopharyngeal microbiome (bacterial species in the nose and throat), genetic risk factors, and allergic response. The environmental air quality will be measured in PM2.5 in the two geographical locations of differing air qualities to evaluate deviations in allergic disease and nasal microbiome. The nasal microbiome will be evaluated by amplifying genes specific for the five most prominent phyla in the nasal cavity to assess deviations in relative populations of those phyla between groups living in various air qualities with varying levels of allergic response. Total IgE antibody levels will be measured by immunofluorescence to establish the degree to which an individual is reacting to their allergens. Genetic alleles for Class II Human Leukocyte Antigens will be amplified and sequenced to identify and control for genetic risk factors.

William Wright

Discipline: Engineering

Authors:

#1 Stephen Young

#2 Zach Arwood

#3 Jack Davis

#4 Carleton O'Neil

#5 Dayakar Penumadu

Abstract Name: Fracture Mechanics and High-Resolution X-ray Imaging of Fused Deposition Model Based Carbon Fiber Composites

Discontinuous carbon fiber reinforced composites are attractive to manufacturers in automotive and aerospace industries due to their high specific strength, low density, corrosion resistance in harsh environments, and ease of near-net shape manufacturing. Fused deposition-based 3D printing is a routine manufacturing technique now affording the capability to print layer-by-layer complex geometries for rapid prototyping and low-cost tooling. Critical factors associated with composite material quality, including fiber orientation, fiber volume fraction, and undesirable defects such as porosity can significantly influence the mechanical performance of the 3D printed load bearing part. Furthermore, processing parameters such as orientation of fibers, in-fill densities, volume fraction, and aspect ratio affect the structural integrity of the as-built part. However, a comprehensive evaluation of fracture mechanics, structure-property relationships for chopped fiber reinforced composites is not well understood. In this study, a 3D printed chopped carbon

reinforced acrylonitrile butadiene styrene-based material system is evaluated for interlaminar and fracture toughness properties. This work aims to discuss the mechanical characterization of Fused Deposition Modeled when printed with Big Area Additive Manufacturing equipment suitable for larger load-bearing components. Mechanical testing of the parts is performed coupled with digital image correlation, a non-contact full-field strain measurement technique, using high-resolution cameras to measure local strain variations along the composite parts and identify stress concentrations on the parts subjected to mechanical loading. Additionally, high-resolution X-ray computed tomography of the composite was used to obtain qualitative information, including fiber volume fractions of the fibers and porosity. High-resolution optical microscope and laser confocal imaging are used to evaluate the surface roughness of the as-built parts. Initial results for these characterizations show promise for further development of structure-property relationships for 3D printed fiber reinforced composites.

Emily Wright

Discipline: Political Science

Authors:

Abstract Name: The Effect of County Law Enforcement Characteristics on Crime Rates in Georgia: Evidence Using a Panel Regression Model

While law enforcement agency structure and institutional deployment strategies have been well-documented, their direct impacts on crime outcomes have not been explored in detail. The current study seeks to address this gap, exploring the impact of county-level law enforcement characteristics on crime rates in Georgia using data from the Georgia Bureau of Investigation's Uniform Crime Reporting Program, for years 2019-2023. I employ a panel regression model to explore the impact of dual-agency enforcement, vehicle deployment, and patrol hours on crime rates over time. Results indicate that despite evidence of reverse causality for dual agency enforcement, special tactics vehicle stock in rural areas, government provision of handguns in sheriff's departments specifically, and the implementation of a one-car-one-driver rule proved significant in decreasing crime rates. This suggests that while organizational features may appear secondary to broader socioeconomic drivers of crime, they offer an avenue for local governments to make tangible progress in enhancing public safety.

Blakely Wright

Discipline: Anthropology and Archaeology

Authors:

Abstract Name: Digital Digs: An Analysis of Archaeogaming

My research will analyze the representation of archaeology in various video games, beginning with how, at a young age, I became fascinated with the concept of archaeology through gaming. Video games such as Tomb Raider portray simplified archaeological methods, such as digging and artifact collection; however, are these methods misinterpretations of looting or rather a gateway into educating (or even misguiding) young minds about the field of archaeology? Are there video games that accurately portray archaeological practices, and where do these depictions deviate from real-world methods? Furthermore, can archaeogaming inspire a new generation of archaeologists in the digital age we live in? Ultimately, I aim to explore how digital representations of archaeology influence the public's understanding of the field, both positively and

negatively. I will examine the overlapping themes of gaming, history, cultural heritage, and anthropology, and assess whether gaming can be an effective educational tool for future archaeologists of all ages.

Jessica Wu

Discipline: Psychology

Authors:

Abstract Name: Relationship Between Social Media And Pressure To Change One's Body, Relating To Gender Identity

College students have proven to be the most active users on social media. With the rise of social media's influence on the pressure to modify one's appearance, past research has extensively examined this correlation among cisgender females and less extensively among cisgender males. This study examines how individuals experience the correlation between social media usage and the pressure to change one's body to fit societal ideals while also highlighting the experiences of gender-nonconforming individuals (GNIs). Through the hypothesis that exposure to body-related content on social media increases the pressure of appearance change, and that this correlation is stronger for GNIs compared to cisgender individuals, this study utilized 114 college students' completed survey responses measuring average daily social media use and perceived media pressure. Ultimately, there was no significant correlation between social media use and pressure to change one's appearance, $r(112) = .15$, $p = .11$. A multiple regression was conducted showing that gender identity did not moderate this relation $R^2 = .03$, $F(3, 110) = 1.98$, $p = .122$; no main effects or interaction variables were significant. These null results suggest social media pressure could be experienced similarly across genders. Limitations for this study include grouping a wide range of gender nonconforming identities into one single survey category and social media reports lower than the average national (3 hours vs 8 hours a day), which could potentially be because of social desirability. Future research should focus on performing longitudinal designs to capture effects that could be seen over time and not in a cross-sectional survey.

Maximilian Wu

Discipline: Engineering

Authors:

#1 Drew Velkey

#2 Emma Pyron

#3 Caiden Pleis

Lila Harmon

Jacob Maurer

Abstract Name: Free-moving Input to Spatial Hybrid Tracked Automation for Navigation & Kinetics: Alpha Prototype

Domain Transfer Methodology is a method used to better understand animal behavior by observing how animals respond in unfamiliar environments, particularly environments to which the animal is not adapted. Previous investigators explored this capacity in Goldfish (*Carassius auratus*) trained to maneuver a wheel-driven Fish-Operated Vehicle (FOV) to navigate a terrestrial environment inside a laboratory. The current project involves the design and construction of a FOV that will improve these capabilities to accommodate the solitary territorial Siamese fighting fish (*Betta splendens*) and enhance operational platform stability and maneuverability. Digital video motion capture of the subject's movements, which has less than 40ms of

latency in the current application, is used to provide navigational input to a Raspberry Pi-based platform which computes the output trajectory for direction and speed control of the device. We further improve on the initial FOV design by using tank treads instead of axial wheels to allow for greater maneuverability over a wider variety of terrain, including outdoor settings. Further improvement is made by utilizing a sonar system instead of LIDAR for collision avoidance that reduces operational platform cost. Final refinement of this device and deployment of FishTank Mark I will allow future researchers to investigate aquatic-terrestrial navigation and explore how *B. splendens* respond and engage in spatial navigation of unfamiliar contexts.

Elizabeth Wunderlich

Discipline: Biology

Authors:

#1 Astha Tuladhar

#2 Evan Zeka

#3 Brooklyn Boren

#4 Shawn Slaymaker

Abstract Name: Following Collagen Deposition During Zebrafish Development Using CRISPR-Mediated Integration

Collagen IV (Col4a1) is a key extracellular matrix protein whose localization informs its role during vascular development and function. Using CRISPR/Cas9-mediated fluorescent protein tagging in zebrafish (*Danio rerio*), the Venus reporter was integrated into the Col4a1 locus via plasmid injection at the single-cell stage. Embryos were then screened at 48 hours post-fertilization using fluorescent microscopy in order to observe the expression of Col4a1-Venus fusion. Col4a1-Venus deposition was observed around muscle cells and blood vessels during early development, highlighting the Col4a1 gene's contribution to extracellular matrix organization. Current efforts focus on isolating a stable transgenic line to track Col4a1 dynamics during cardiovascular development and regeneration. This approach establishes a platform for visualizing Col4a1 in vivo and advancing scientific understanding of its role in development and regeneration.

Charles Wurster

Discipline: Interdisciplinary

Authors:

Abstract Name: Source and Solution to Suburban Sprawl: An Analysis of Potential Alternatives to Suburban Style Development

Over the past one hundred and fifty years cities across America have shifted their development focus from a traditional pedestrian centric model to a car dependent suburban model. The far reaching consequences are poor economic returns for municipal development, reduced quality of life, and negative effects on our environment. Despite these far reaching consequences, few cities are addressing the root cause of these issues and most instead focus on cheaper short term solutions (Farrell, 2002; Fischel, 2004; Stewart, 2016; Norman et al, 2006; Bird et al, 2018; Marohn, 2020; Marohn 2025). This paper aims to address these issues on the local level, using the city of Frederick, MD as a template for other cities to follow. To show some of the consequences of ignoring these issues, the cities of Salisbury, MD and Houston, TX will be used as examples of what happens when these systemic issues are ignored. To provide guidance for the template, the city of Nanaimo, BC will be used as an example of a city successfully instituting many of the recommendations of

this paper (City of Nanaimo, 2022; Traffic Calming Tools, 2025; Wurster, 2025b; Wurster, 2025c; Wurster, 2025d). Findings from this study suggest that changes can be implemented in the short and long term across cities. First, there is a need to replace harmful regulations such as minimum parking requirements, restrictive zoning requirements, and poor road hierarchies. Second, infrastructure changes like walkable districts in city centers, micro-mobility as well as public transit infrastructure between these districts, and traffic calming on local roads reduce dependency on cars (City of Nanaimo, 2022; Traffic calming tools, 2025; Williams, 2023).

Leah Wynn

Discipline: Nursing and Public Health

Authors:

Abstract Name: The Cost of a Lost Haven: When Policy Undermines Public Health Efforts and Its Implications for Black Maternal Health Outcomes in the United States

The alarming rise in maternal mortality rates among African American women since the 1990s highlights a critical public health issue in the U.S. Black women, are four times more likely to die during childbirth compared to their counterparts revealing a profound racial disparity. This inequality is rooted in interconnected systemic issues: institutional racism, geographical disparities in healthcare access, and medical biases. The Supreme Court's decision to overturn Roe v. Wade, endangers vulnerable populations through restricting access to essential reproductive health services. Protecting these services is vital for ensuring maternal well-being and reducing the current disproportionate health burden. This project uses a comprehensive analysis of scholarly data and existing literature to examine how recent policy changes are likely to exacerbate maternal health outcomes for a population riddled with socioeconomic and health inequities. The Journal of Racial and Ethnic Health Disparities states that low-income Black women are projected to be the most negatively impacted following the Supreme Court's decision. This is due to high rates of unmet needs for contraception, unintended pregnancies, poverty, and barriers to legal abortion access. Historical evidence indicates that the legalization of abortion in 1973, has previously enhanced educational and employment opportunities for Black women. In stark contrast, the current policy landscape jeopardizes these gains, particularly for low-income individuals facing barriers to comprehensive reproductive healthcare. The audience will gain insight into the relationship between public policy and health outcomes, particularly the ways systemic oppression intensifies maternal mortality rates among minority women. Discussion will surround the repercussions of restricted reproductive access, the pervasive impact of medical mistrust, and the overarching need for policies that prioritize public health. Ultimately, this presentation will underscore the urgent need to reevaluate public policy initiatives to ensure they align with the needs of vulnerable populations and advocate for structural changes that promote equity in maternal healthcare.

Kinga Wysocka

Discipline: Engineering

Authors:

Abstract Name: Magnesium-Enhanced Methane: A New Metalized Fuel Concept for Mars Return Missions and Next-Generation Propulsion Systems

Liquid methane stands out as an option for in-situ resource utilization (ISRU) on Mars although its relatively substantial activation energy required for bond breaking restricts its effectiveness as a propellant for return missions. Recent experimental studies indicate that metal nanoparticles could improve methane's reactivity.

The fundamental surface-reaction mechanisms are not well comprehended. This research explores whether magnesium, a light metal plentiful, in soil can reduce methane's dissociation energy barrier via catalytic surface interactions. By employing density theory (DFT) alongside a Mg(0001) 3×3×4 slab configuration I determined adsorption energies, refined reaction geometries and traced the $\text{CH}_4 \rightarrow \text{CH}_3 + \text{H}$ dissociation route through a nudged elastic band (NEB) method. Methane exhibits adsorption, on Mg(0001) with an energy of -0.18 eV, indicative of physisorption yet surface-driven polarization notably reduces the strength of the specific C–H bond. The NEB calculations show an activation energy barrier of 0.52 significantly less than the dissociation energies in the gas phase demonstrating that magnesium surfaces can effectively facilitate the initial stage of methane combustion. This discovery is crucial, for propulsion: a lowered activation barrier implies that dispersing Mg nanoparticles within methane may speed up ignition reactions and enhance the total energy output. To link atom-scale findings with engine-scale outcomes the subsequent stage of this study incorporates the DFT-calculated barrier into a reacting-flow fluid dynamics (CFD) simulation to assess combustion rates and thermal characteristics in a metalized methane fuel blend. Ultimately this investigation offers a physics-grounded basis, for an ISRU-compatible propellant concept where methane generated on Mars is improved with magnesium extracted from local regolith. Such a system could enable more efficient Mars-to-Earth return missions by improving the reactivity of methane without requiring imported oxidizers or catalysts. This study demonstrates how fundamental surface-reaction modeling can guide the design of next-generation space propulsion technologies.

Zoe Xanthos

Discipline: Biology

Authors:

#1 David Baltrus

Abstract Name: Demonstrating ComEA Protein Assists DNA Uptake in *Pseudomonas stutzeri*

Natural transformation, the ability to uptake foreign DNA, is a mechanism possessed by many bacterium species, providing biotechnological advancements in research and aiding in the species' evolution, though natural transformation is only present within a small group of subspecies in the *Pseudomonas* genus. One mechanism of DNA uptake utilizes a gene called *comEA*, translating protein ComEA which binds and guides exogenous DNA into the periplasm. Although numerous species of bacteria are known to utilize the *comEA* gene, it is currently unknown if *Pseudomonas stutzeri* requires this gene to accomplish natural transformation. Our study utilizes standard DNA editing techniques to delete the *comEA* gene from *P. stutzeri* and determine if it is capable of DNA uptake in the absence of the gene. However, we hypothesize that *P. stutzeri* will not be able to uptake DNA with the *comEA* gene deletion. We will then knock in the gene to confirm that the ComEA protein is truly necessary for *P. stutzeri* to undergo natural transformation. This study addresses an existing gap in knowledge by confirming the natural competence protein mechanism in *P. stutzeri*. Investigating how *P. stutzeri*, a soil-dwelling bacterium found across the globe, incorporates new DNA into its genome points to its robust evolution and survivability.

Andrew Xing

Discipline: Biology

Authors:

#1 Victoria Riley

#2 Steve Danzer

Abstract Name: Neurovascular Architecture in a Tuberous Sclerosis Complex Model

Tuberous Sclerosis Complex (TSC) is a neurodevelopmental disorder caused by inactivating mutations in the TSC1 or TSC2 tumor suppressor genes. TSC1 and TSC2 encode a protein complex that serves as an upstream negative regulator mTORC1. In its absence, the upregulated expression of mTORC1 facilitates development of lesions throughout multiple organ systems. Within the brain, growths appear in the form of Subependymal Giant Cell Astrocytomas (SEGAs), Subependymal Nodules (SENs), and cortical tubers. Cortical tubers and affected cells are believed to promote hyperexcitability of their respective networks, reflecting a pro-epileptogenic shift in the brain. As a result, seizure generation remains one of the hallmark phenotypes of TSC. Recent studies in full knockout mouse models have shown that seizures generate compensatory changes in more than just neural networks. Often accompanied with increased angiogenic activity, TSC-induced epilepsy has been linked to vascular abnormalities. However, it remains unclear if TSC2 affects neurovasculature in the absence of epilepsy. To address this question, a transgenic mouse model was employed to examine the impact of haplosufficiency on vascular characteristics. Germline heterozygous and wild-type mice were cryosectioned and subject to immunohistochemical staining (IHC) to compare vascular structure. Confocal z-stack imaging revealed no differences in the overall structure and density of veins within the prefrontal cortex. These findings suggest that a single copy of the TSC2 allele provides enough regulation of mTORC1 to prevent the angiogenic changes present in full knockout models.

Yiting Xu

WI - University of Wisconsin-Eau Claire

Discipline: Business

Authors:

#1 Longzhu Dong

Abstract Name: Communication Tool Preferences in Global Virtual Teams: Beyond Conflict Management
“The single biggest problem in communication is the illusion that it has taken place.” — George Bernard Shaw

This research investigates how multilingual identity influences communication tool preferences and self-efficacy in global virtual teams, examining the mediating role of conflicts. Drawing on Media Richness Theory, Social Identity Theory, and Conflict Management Theory, we hypothesized that (H1) individuals speaking more languages prefer richer communication tools (video calls) over leaner channels (email); (H2) richer tool preferences reduce both task and relationship conflict; (H3) task conflict is positively related to self-efficacy while relationship conflict is negatively related to self-efficacy; and (H4) tool selection and conflicts sequentially mediate outcomes. Analyzing data from 2,823 students across 629 teams in the 2022 Spring X-Culture project using SPSS PROCESS, we examined ten communication scenarios. Our findings challenge the hypothesized conflict-centered framework: the direct way (multilingual identity → tool preferences → self-efficacy) proved significantly stronger than the conflict-mediated pathway. In "introduction" and "member missing" scenarios, multilingual identity increased preference for high-richness tools, enhancing self-efficacy directly, with conflict playing minor mediating roles. The relationship between multilingual identity and tool preferences proved context-dependent: significant positive correlations in three scenarios, non-significant correlations in five routine scenarios, and slight negative correlations in two explanatory contexts. While information-rich tool preferences consistently correlated negatively with both conflict types (especially relationship conflict), these reductions played surprisingly modest mediating roles. Both conflict types negatively impacted self-efficacy (especially task conflict), contradicting H3. This reversal occurs because virtual environments lack the non-verbal cues that help teams navigate disagreements productively. The critical exception emerged when addressing the "member missing" question: language member significantly predicted tool preferences ($\beta=0.0530$, $p<0.001$), which reduced both conflict types, and task conflict powerfully mediated self-efficacy ($\beta=-2.6564$, $p<0.001$). These findings reveal that conflict mechanisms activate specifically during communication crises, while normally, tool preferences

enhance capability through direct pathways—reduced cognitive load, enhanced coordination, and psychological safety—rather than primarily through conflict reduction.

Erin Yager

Discipline: Biology

Authors:

#1 Erin Yager

#2 Bridget McMivern

Abstract Name: Gas and the Gut: Cattle Rumen Microbiomes and Methane Emissions

Cattle that eat the same feed and come from the same environment can emit methane (CH₄), a potent greenhouse gas, at vastly different levels. An estimated 32% of anthropogenic CH₄ can be traced to ‘enteric fermentation’ in livestock production. During enteric fermentation, specialized microorganisms will digest complex plant fiber to create compounds like acetate and hydrogen (H₂). Some of these organisms, called methanogens, will consume and use these products to produce CH₄. Emerging data suggests natural inter-animal variation in CH₄ emissions could derive from host genetics or differences in rumen microbial digestion. Here, we analyze 16S rRNA gene amplicon sequencing from the rumen of twenty beef cattle of varying CH₄ emission levels to look for differences in the structure and composition of their microbial communities. There was no significant difference in microbial community diversity by host CH₄ emission level. Association tests at the genus and ASV levels revealed relationships between low residual CH₄ emissions and the genera *Megasphaera*, *Prevotellaceae*, *Ruminococcus*, and *Gastranaerophilales*. Network analysis of the high and low CH₄ communities revealed disrupted relationships between methanogens and other members of the community. The methanogens *Methanobrevibacter* and *Candidatus Methanomethylophilus* were significantly associated with *Gastranaerophilales* and *Prevotellaceae*, respectively in the low CH₄ network. These interactions were absent in the high CH₄ network. This suggests that the interactions of the low CH₄-associated microbiome members and methanogens contributes to the reduced CH₄ emissions. The findings of our work begin to explain why some cattle emit higher methane levels compared to others, and may aid in finding solutions to reduce methane emissions in cattle while keeping their feeding efficiency and meat production high.

Rebekah Yager

Discipline: Education

Authors:

#1 Rey Yager

Abstract Name: Bridging the Gap In Quantum Education from Beginner to Advanced Resources

The rapid expansion of the quantum technology sector has intensified the need for a well-prepared workforce capable of engaging with quantum concepts at multiple levels of expertise. Yet, despite a growing number of introductory outreach activities and freely available advanced university materials, a substantial educational gap persists between beginner-friendly explanations and mathematically rigorous quantum computing resources. This project addresses that gap by developing an accessible, structured, self-paced online course designed for learners—particularly high school students, early undergraduates, and teachers—who lack the mathematical background typically assumed in quantum education. Building on findings from the 2025 Science Math Resource Center (SMRC) Quantum Summer Academy and informed by direct student

feedback, the project translates complex quantum ideas into scaffolded lessons that gradually build conceptual fluency. Using a custom website built with Java, React, and HTML, the course introduces classical computing foundations, core quantum principles, qubits and hardware, quantum gates, and simplified algorithms, paired with interactive simulations and introductory Python exercises. Pilot testing with college and high school participants will guide iterative refinement of content clarity, usability, and pedagogical effectiveness. By creating an approachable yet rigorous pathway into quantum computing, this work aims to reduce barriers to entry, strengthen Montana's developing quantum workforce pipeline, and contribute scalable educational models for national quantum outreach initiatives.

Madison Yahn

Discipline: Biology

Authors:

Abstract Name: Bioinformatic Characterization of Mutations Associated with Enhanced Acetate Metabolism in *Escherichia coli*

The conversion of non-food lignocellulosic biomass, such as from trees or grasses, into sugars that can be converted into ethanol by fermentation is key to the future U.S. energy infrastructure. The accumulation of acetate during lignocellulosic biomass pretreatment inhibits microbial fermentation and limits bioethanol yields. This study aimed to characterize *Escherichia coli* strains engineered to efficiently utilize acetate as a sole carbon source to support acetate detoxification prior to yeast fermentation. Eight mutant strains were generated using either spontaneous or ethyl methanesulfonate (EMS) mutagenesis, then characterized using whole-genome sequencing and comparative bioinformatic analysis. Variant detection was performed using two pipelines, Bowtie2 + bcftools and Bowtie2 + DeepVariant, to evaluate differences in sensitivity and precision. The mutants exhibited enhanced growth on acetate despite lacking mutations in acetate metabolism genes (*acs*, *pta*, *ackA*). Instead, changes occurred in genes associated with replication and potentially global regulation of gene expression (*dnaA*), acid resistance (*gadX*), glycogen metabolism (*glgX*), membrane stability (*ytcA*), and proton export (*ECOLC_RS20895*). These mutations collectively improved stress tolerance, pH homeostasis, and metabolic efficiency. The results suggest that global physiological remodeling, rather than direct enzymatic modification, underlies enhanced acetate assimilation in *E. coli*, providing a genetic foundation for designing robust microbial strains for bioethanol production.

Dhanvin Yajaman

Discipline: Biology

Authors:

#1 Joshua Harrell

Abstract Name: ROBO1 Targeting and Payload Selection Reveal a Preclinical Framework for Antibody–Drug Conjugates in Pancreatic Cancer

Pancreatic cancer has a high mortality, with a 5-year survival rate of 13%. Each year, more than 67,000 new pancreatic adenocarcinoma (PDAC) cases are diagnosed. Systemic chemotherapy provides only a modest survival benefit and is often accompanied by significant toxicity. With limited treatment options and poor prognosis, antibody-drug conjugates (ADCs) have emerged as a promising modality for targeted cancer therapy. This study aims to identify PDAC-enriched cell-surface proteins and potential payloads to develop an ADC. Expression profiling of Mia PaCa-2 and PANC-1 cell lines, as well as PDAC patient-derived

xenografts (PDXs) was done along with proteomic analysis of patient tumor models. Based on these analyses, 19 membrane proteins were identified as viable targets, of which ROBO1, CD109, and PIK3C3 were selected for further evaluation. Internalization assays of PDXs showed ROBO1 having the most favorable internalization kinetics. Immunofluorescence staining of six PDAC PDX models confirmed strong, predominantly plasma-membrane ROBO1 localization, supporting its suitability as an ADC target. To find a suitable payload, Mia PaCa-2, PANC-1, and multiple PDX lines were exposed to commonly used classes of ADC payloads, narrowing the field to a subset of microtubule- and DNA-targeting agents. Specifically, duocarmycin and PNU-159682 were identified as the best payloads for an ADC. Collectively, these findings nominate ROBO1 as a compelling PDAC ADC target and duocarmycin and PNU-159682 as compelling PDAC ADC payloads with intrinsic efficacy in PDAC, providing a preclinical foundation for the development of a ROBO1-directed ADC for pancreatic cancer.

Mahima Yalavarthy

Discipline: Social Work and Human Services

Authors:

Abstract Name: METHODS OF ENGAGING MALE ADOLESCENTS WITH AUTISM

Current methods used by teachers and school administrators in order to interact with male adolescents ages 14-18 with level 1 autism spectrum disorder (ASD) in educational environments, such as the use of antipsychotics to treat aggression and directly addressing negative behaviors, cannot be generalized to all male adolescents ages 14-18 with level 1 ASD. This is because of the variance in ASD adolescents' reactions and responses to social interactions and cues. Anxiety in male adolescents ages 14-18 with level 1 ASD is a common cause for negative behaviors, such as aggression and verbal disruption, which may hinder cognitive development appropriate for an adolescent in high school. Without sufficient cognitive development, male adolescents ages 14-18 with level 1 ASD may struggle with verbal communication and interactions in higher levels of education and professional careers. This comprehensive literature review explores how treatments such as cognitive behavioral therapy and mindfulness-based therapy have shown significant impacts on decreasing negative behavioral patterns and increasing social participation for male adolescents ages 14-18 with level 1 ASD. These may be feasible options for teachers and school administrators to use to effectively engage with male adolescents ages 14-18 with level 1 ASD. By implementing these therapies into educational settings, educators can better communicate with the adolescents, ultimately fostering the cognitive skills of male adolescents ages 14-18 with level 1 ASD as the adolescents enter higher levels of education and begin professional careers.

Malavika Yama

Discipline: Nursing and Public Health

Authors:

#1 Susan Bodnar-Deren

Abstract Name: Primary Care Access and the Social Determinants of Health in Richmond, Virginia: A Neighborhood-Level Assessment

Access to continuous and comprehensive primary care is essential for improving health outcomes and meeting individual and community needs, yet structural inequities and social determinants of health (SDOH) limit access in marginalized communities. At a state level, Richmond ranks highly in terms of primary care

provider (PCP) supply, but low in primary care utilization, patient outcomes, and expenditures. This suggests local disparities in provider distribution and access to care. While this issue is shown at a city level, no research has examined this issue at a neighborhood scale. This research investigated how SDOH characteristics are associated with primary care availability in low-income neighborhoods across Richmond. A secondary descriptive data analysis was conducted at national, state, and city levels to identify gaps in provider distribution and barriers to care. Community access mapping was conducted in Richmond's under-resourced communities to ascertain primary care access and SDOH. Researchers individually scored each neighborhood's SDOH data and healthcare indicators, followed by consensus coding to create indicator ratios. Analysis revealed that neighborhoods with higher poverty, food deserts, low educational attainment, and shorter life expectancy had less access to primary care and healthcare facilities. Public housing communities had consistently low SDOH scores and inadequate primary care services, suggesting that systemic inequities correlate with access to care. Only 12 PCPs were identified for an estimated 64,222 residents in the East End and Northside. Housing instability, socioeconomic status, and food access were the strongest predictors of gaps in primary care availability. These findings imply that improving primary care access in under-resourced communities requires addressing underlying social and structural inequities, not just expanding clinical services. Future work will include IRB-approved community focus groups with public housing residents, free clinic patients, and health leaders, expanded community access mapping across Richmond, and an executive summary to inform citywide primary care planning.

Madhumita Yamuzala

Discipline: Psychology

Authors:

#1 Deborah DiazGranados

Abstract Name: Perceptions of AI in Mental Health and Therapy: A Cross-Sectional Study

Artificial Intelligence (AI) is becoming increasingly integrated into the workforce, raising important questions about how the public will respond to its implementation in sensitive fields, especially as many industries report rapid growth in the use of automated and AI-assisted tasks. As discussions about the adoption of AI continue to expand, mental health care represents one of the clearest examples of a setting where public reaction may significantly influence implementation, given its reliance on interpersonal connection and trust. The attitudes and perceptions of service users are crucial, especially as relational dynamics and user comfort are particularly fundamental for successful outcomes and patient care. Despite the rapid rise of AI-mediated emotional support and companionship, limited research has examined how young adults, the demographic most likely to seek counseling, perceive the use of AI in these settings and in relation to sensitive emotional or interpersonal concerns. Therefore, the purpose of this study is to explore and characterize the perceptions of 18-24-year-old university students in the Mid-Atlantic United States toward AI-based mental health support and therapy. Using a two-part online survey instrument, this study aims to determine how young adults evaluate AI on core non-clinical therapist characteristics such as empathy, trust and confidentiality, communication, working alliance, self-disclosure, confidence, and openness, and which types of responses (AI-generated or human-generated) participants perceive as most supportive when presented with scenario-based prompts involving negative emotional experiences. The insights gained from this research may help identify factors that influence the acceptance of artificial intelligence in therapeutic contexts and guide the development of tools that better align with user expectations. These findings may also support future research on optimizing AI communication strategies, understanding how user characteristics shape responses to AI-based support, and determining where AI can appropriately supplement or enhance traditional mental health services.

Keyao Yan

Discipline: Business

Authors:

#1 Longzhu Dong

Dantong Zhang

Wenxi Zhang

Abstract Name: The Influence of Cultural Distance, Technological Readiness, and Reciprocal Investment Patterns on U.S. Bilateral FDI Flows.

This study explores how the interaction between cultural distance, technological readiness, and reciprocal investment patterns influences bilateral Foreign Direct Investment (FDI) flows between the United States and its partner countries. To conduct this study, we utilize an extensive dataset of 83 countries compiled from various World Bank sources, Hofstede's cultural indices, and other measures of technological readiness to create a bilateral investment framework to analyze both U.S. outbound and inbound foreign direct investment. We employ fixed effects regression analyses to evaluate the multidimensional impacts of culture, technology, and economic ties on investment behavior. The results show that technological readiness is strongly associated with higher levels of bilateral FDI flows. Additionally, the findings reveal an important moderating effect: cultural distance makes the positive influence of technological readiness weaker on FDI flows, indicating that cultural compatibility is essential for countries to fully leverage technological advantages in international investment. The results of this research indicate that countries wishing to invest more heavily in each other's markets do so by first establishing a strong technological base, then building strong cultural relationships.

Melinda Yang

Discipline:

Authors:

#1 Wilson Leung

#2 Logan Cohen

#3 David Lopatto

#4 Laura Reed

Natasha Minkovsky

Abstract Name: The Genomics Education Partnership (GEP) — Supporting Course-based Undergraduate Research Experiences in Genomics Across Higher Education Institutions Nationwide

The Genomics Education Partnership (GEP) is a nationwide Community of Practice with 260 faculty from 209 institutions that aims to provide authentic research experiences in genomics and bioinformatics to undergraduate students in the classroom. In 2024–2025, >1,500 students participated in courses that utilize GEP materials. Under a distributed leadership model, GEP faculty develop and update curriculum materials, host training workshops, and develop assessment instruments to enable the implementation of Course-based Undergraduate Research Experiences (CUREs). Through mentorship and professional development programming, faculty support each other in implementing CUREs. Current GEP research projects investigate genes involved in specific pathways in *Drosophila* (e.g., insulin signaling, oxidative stress, sexual development), venom production in parasitoid wasps, and eggshell formation in the critically endangered Puerto Rican Parrot. The GEP has developed a web-based platform (thegep.org) which hosts curriculum materials and custom bioinformatics tools that enable students to participate in these research projects. Students learn to use multiple bioinformatics tools (e.g., BLAST, UCSC Genome Browser), and integrate multiple sources of experimental (e.g., RNA-Seq data) and computational evidence (e.g., sequence

alignments, gene predictions) to construct gene models. GEP Virtual TAs provide additional real-time support to students. For quality control, reconcilers reconcile two independent annotations of each gene. Finalized gene models with students as lead authors (e.g., microPublications), and larger studies using student research from multiple annotations have been published. Regional Node Meetings provide students professional development opportunities to present their work, and to interact with GEP faculty, and other scientists and student researchers. The GEP is currently supported by NIH IPERT-R25GM160660 to Laura K. Reed (LKR) and has started a 501(c)(3) nonprofit wing. The data presented here was generated in part with support from NIH IPERT-R25GM130517 and NSF IUSE-1915544 to LKR.

Elaine Yang

Discipline: Art History

Authors:

Abstract Name: Alan Chan and the Commodification of Nostalgia in Post-Handover Hong Kong

This paper examines the influence of Hong Kong designer Alan Chan on the city's design identity through a critical lens. While widely celebrated for blending Eastern heritage with Western modernism, Chan's work reveals a complex relationship between cultural authenticity and commercial globalization. Drawing from the historical background before the beginning of Alan Chan's career, we can see the origin of design in Hong Kong as a whole. Through a small biography, analyzing his technique of drawing from nostalgia, and collecting inspiration from Eastern manufactured markets made for the Western consumer, we can see the problematic ways his work presents Hong Kong in the international spotlight. This paper argues that Chan's use of nostalgia and "Chineseness" transforms cultural heritage into a marketable aesthetic, reflecting Hong Kong's postcolonial tension between identity and global branding.

Austin Yang

Discipline: Computer Science

Authors:

#1 Austin Yang

#2 Xiang Ma

Abstract Name: Deep Learning-Based Cheese Classification

With the rapid development of artificial intelligence and computer vision, image-based recognition has become a promising research direction with applications in agriculture and industrial manufacturing. To reduce development costs, pre-trained deep learning models can be leveraged through transfer learning. This project investigates whether deep learning can reliably classify types of cheese, aiming to support the cheese industry through automated recognition. A publicly available dataset from Kaggle, All The Cheese, was utilized. However, the original dataset contained mislabeled, duplicate, and low-quality images. To address this, we developed a multi-stage cleaning pipeline leveraging the PIL library, the CleanVision toolkit, and the Gemini semantic filter. The resulting dataset consisted of 1,733 high-quality samples across six categories: Bloomy, Blue, Fresh, Hard, Semi-Soft, and Washed-Rind. The data were then split into 80% for training and 20% for validation, with data augmentation applied to increase diversity. Five models, ConvNeXt-Tiny, ResNet-18, DenseNet-121, EfficientNet-B0, and Vision Transformer (ViT), were implemented in PyTorch. All models were initialized with ImageNet pretrained weights and fine-tuned on the cleaned dataset. Evaluation metrics included accuracy, precision, recall, and F1-score. Among the models, EfficientNet-B0

achieved the highest validation accuracy of 90.85%, outperforming the others while maintaining a compact architecture with only 5.3 million parameters. DenseNet-121 showed balanced performance, while ViT underperformed, likely due to the relatively small dataset size. Confusion matrix analysis revealed that most misclassifications occurred between washed-rind and semi-soft cheeses due to visual similarity. These results demonstrate that convolutional neural networks achieve stable, efficient performance in fine-grained food image classification. This research demonstrates the feasibility of deep learning for automated cheese recognition and provides a scalable framework for future food-image classification research.

Amie Yansane

Discipline: Biochemistry

Authors:

#1 Stephen Hancock

Abstract Name: Alexphander's Gene 50 is a Molecular Determinant of Prophage Mediated Protection

Mycobacteriophages, also known as phages, are a group of viruses that exploit bacterial hosts as a means of reproduction by infection. These methods of infection that phages utilize are lytic and lysogenic infection. Lytic infection is the process in which a phage binds to the surface of a host cell to release its genomic DNA to encode necessary genes to assemble phage particles, which lyses the cell. Lysogenic growth is a different process in which a phage infects a bacterial cell and integrates its genomic DNA into the DNA of the host. We have found that Alexphander can successfully form a stable lysogen, which is immune to secondary infection from itself, as well as Schoolbus and LilPharaoh. Alexphander encodes an immunity repressor, gene 50, that we hypothesize is sufficient in protecting the Alexphander lysogen by binding to DNA and suppressing lytic genes of an infecting phage. Due to the unrelatedness of phages Schoolbus and Lil Pharaoh to Alexphander, we also hypothesize that gene 50 will be insufficient in protection during the formation of the Alexphander lysogen. In this study, we aimed to provide evidence about gene 50's role as an immunity repressor and the sole mediator of homotypic protection. In previous studies, we have found that when gene 50 is overexpressed by the exogenous plasmid, it is cytotoxic, resulting in cell death. In this study, I describe the assembly of the integrative plasmid that expresses gene 50 at native levels in order to repress overexpression to mitigate cytotoxicity. We have found that when gene 50 is expressed at native levels, Alexphander and Schoolbus are unable to infect, while Lil Pharaoh is sufficient. This reveals that gene 50 is the sole mediator of homotypic immunity and that there is an additional mechanism that promotes heterotypic protection.

An Yao

Discipline: Biology

Authors:

#1 Tania Maldonado

#2 Zakaria Hussain

#3 John Ryan

Abstract Name: IL-33-Mediated Mast Cell Function is Female-Dominant

Asthma affects over 300 million people worldwide, and its severity has continued to increase, especially in women. It is partly driven by IL-33 released from damaged bronchial epithelial cells, which triggers airway inflammation. Although mast cells are known to play a key role in IL-33-mediated responses, it is unclear whether mast cell activation differs between males and females. Therefore, we investigated sex-based

differences in mast cell responses to IL-33, hypothesizing that IL-33-mediated mast cell responses are female-dominant. Using ELISAs, we found that IL-33-induced production of inflammatory cytokines was significantly higher in female bone marrow-derived mast cells (BMMCs) than in those derived from males. We also found that female mast cells secreted greater amounts of inflammatory lipid mediators than males, including LTE4, TXB2, and PGD2. We then studied IL-33-induced cell signaling. This revealed greater IL-33-mediated activation of the kinase JNK in females than in males. In contrast, the related kinases ERK and p38 were more activated in male mast cells. Surprisingly, activation of the transcription factor NFκB, which is critical for IL-33 signaling, displayed no differences between males and females. We found sexual dimorphism in the IL-33 response among mast cells from several strains of mice, including C57BL/6J, C3HeJ, and BALB/cJ. Additionally, these data were consistent when studying peritoneal mast cells that differentiated in vivo. Collectively, the data support the hypothesis that IL-33-mediated mast cell function is female-dominant and linked to cell signaling differences. Given the important role mast cells play in allergic disease, our results suggest fundamental differences in male and female allergic inflammation that may be targeted clinically.

Nicole Yazbeck

Discipline: Computer Science

Authors:

#1 Bridget McInnes

#2 Jannat Lnu

#3 Charlie Dil

#4 James Le

Joanne Varughese

Abstract Name: Knowledge Triple Filtration for Explainable Question-Answering

A significant application of Natural Language Processing (NLP) is the development of question answering (QA) systems, which are instrumental in enabling information retrieval from extensive knowledge bases. This research explores Graph Retrieval-Augmented Generation (GraphRAG) and PathRAG, techniques that enhance data retrieval and processing capabilities in NLP. GraphRAG leverages graph structures to improve data connectivity, while PathRAG optimizes retrieval paths, both aiming to improve the accuracy, transparency, and reliability of Medical QA systems. In a typical QA system, users find it difficult to trace answers back to the source. However, our system can enhance answer traceability, allowing users to query vast collections of medical studies and receive verifiable, evidence-based answers, thereby supporting healthcare professionals to make better-informed decisions and helping patients gain more reliable insights into their health. To address the challenge of balancing retrieval quality with explainability, we developed a novel GraphRAG system. This system employs a graph filtration strategy using the Linking Term Count metrics to reduce noise and redundancy before query-time retrieval. From our preliminary tests, we expect our system to enhance efficiency and explainability compared to traditional RAG systems. To evaluate performance, we measure the accuracy, and efficiency is assessed by comparing the retrieval time between GraphRAG and RAG systems. Our work improves the traceability and accuracy of medical QA systems, this research contributes to developing AI tools that make medical knowledge more transparent, verifiable, and accessible to both healthcare professionals and patients.

Ayla Yeakley

Discipline: English and Literature

Authors:

Abstract Name: Ableism Analyzed

Ableism is prejudice and discrimination against the disabled community. Ableism is frequently left out of discussions about civil rights, human rights, dignity, and social justice, despite the fact that ableism impacts not only the largest minority in the world, but everyone in the world. This project is an analysis of ableism. I began my research in 2022 and have continued for the past three years in the hope of answering this question: How is ableism defined and perpetuated? In other words, what is ableism, how does it manifest itself, and why does it exist? For my research, I read various articles, studies, and historical documents from sources such as the AMA Journal of Ethics, the United States Holocaust Memorial Museum, the World Health Organization, and the American Psychological Association. I included articles from peer-reviewed academic journals as well as articles written by other disabled people. My essay is an explanation of my findings about the impact of ableism and its historical and cultural roots. I also describe and analyze the ableist beliefs, attitudes, and behaviors that are prevalent today, particularly those in scientific and religious communities. Ableism is entrenched in society, the medical field, and theology. It is crucial that people understand ableism and its implications to begin fighting against the harm it causes.

Grace Yearout

Discipline: Interdisciplinary

Authors:

Abstract Name: Femicide Discourse in the 2024 Mexican Presidential Campaign

Despite widespread public concern regarding gender-based violence and rising femicide rates in Mexico, political responses to such issues vary considerably across candidates and parties. This project will examine how the top three candidates in the 2024 Mexican presidential election framed, discussed, and proposed policy plans for femicides in their campaign rhetoric. While separate scholarship on Mexico's election campaigns and femicides exists, the two fields rarely intersect, with little research on how the topic of femicide appears in electoral discourse. Additionally, most research offers explanations for femicide occurrences, such as patriarchal social structures, victim-blaming media narratives, and machismo social discourse, but fails to analyze how politicians and campaign decisions shape public narratives and influence policymaking. The project will rely on campaign speeches, debate transcripts, and social media posts from Claudia Sheinbaum, Xóchitl Gálvez, and Jorge Álvarez Máynez during the 2024 election cycle. I will code each for frequency of mention, rhetorical framing, and any references to combative policy proposals to understand how each candidate constructs narratives around responsibility, urgency, and the need for institutional solutions. The results will likely find that candidates use femicides as a political tool to attract voters, rather than propose actual solutions. By analyzing how candidates discuss femicides, the project aims to help voters better recognize the strategies politicians use, enabling more informed electoral choices and demanding greater accountability for candidates' claims.

Maxton Yeast

Discipline: Economics

Authors:

#1 Daniel Siao

#2 Rebecca Baughman

Abstract Name: Economic Development and Air Service Impact: A Global and Regional Perspective

Airlines and commercial air service have connected our world for decades, bringing people from across the globe together, driving international trade, travel, and business development. Readily available air service helps drive business investment and economic growth, which are vital to enhancing a community's GDP. Economic development and external investment are crucial to stimulating growth in any area, especially in rural areas with limited connectivity and access to capital. Feeder air service and programs like the Essential Air Service (EAS) help bring in connectivity and prosperity to these underserved rural areas and regions. In this study, Class D Airports in Alabama, Georgia, Tennessee, and Kentucky with commercial air service will be researched to find the economic impact of the air service. Class D airports are categorized as those with an active air traffic control tower, and pilots must establish two-way radio communication within the Class D airspace. Specifically, the GDPs of communities with Class D airports that have commercial air service will be compared with those without commercial air service. Quantitative GDP data collected from the U.S. Bureau of Economic Analysis will serve as the primary research method. To complement the primary process, qualitative data collected from interviews with airport managers within the sample will serve as the secondary research method. The primary objective is to assess the role that regional air service plays in driving economic development in these communities.

Jairo Yepes Mujica

Discipline: Biology

Authors:

Abstract Name: Environmental Drivers of Telomere Length Variation in Migratory Songbirds

Telomeres, non-coding DNA sequences located at the ends of chromosomes, are essential for protecting genetic material and are closely associated with key cellular processes such as senescence. In birds and other taxa, relative telomere length (RTL) is positively associated with an individual's physiological condition and lifespan. Evidence suggests that oxidative stress can accelerate telomere degradation, including environmental stressors such as high temperatures, UV radiation, and variable weather. Shorter telomeres, particularly during an organism's early developmental stages, are associated with reduced lifespan and fecundity. Increasing evidence suggests that telomere degradation, combined with environmental stress, contributes to declines in wildlife populations. Understanding how environmental change affects organismal physiology and the extent to which these effects scale up to adaptive behaviors remains a key knowledge gap. We examined variation in RTL among nestlings of two migratory bird species, the Common Yellowthroat and Dickcissel, to evaluate how early-life environmental conditions influence physiological condition. We tested whether RTL differed between these species in relation to various environmental and ecological conditions during their developmental period (e.g., UV radiation exposure, temperature, precipitation, nest microhabitat). Telomere length was quantified using quantitative PCR, comparing the ratio of telomeric repeat sequences to an amplified single-copy reference gene (GAPDH). We hypothesize that nestlings raised in nests with greater environmental exposure will exhibit shorter RTL, reflecting elevated physiological stress. Additionally, we predict seasonal patterns in telomere dynamics, with nestlings developing later in the breeding period showing reduced RTL. By analyzing species-specific patterns in telomere dynamics, this study provides insight into how microhabitat structure and environmental conditions influence the early-life physiological state of migratory songbirds.

Paige Yetzer

Discipline: Engineering

Authors:

Rosana Fernandez Vila

Abstract Name: Development of a Polytetrafluoroethylene (PTFE) Pelletizer and Extruder with Optimized Processing Conditions to Improve Expanded PTFE Graft Performance

Expanded polytetrafluoroethylene (ePTFE) grafts are commonly used in vascular bypass surgeries and peripheral arterial reconstructions to repair and reconstruct blood vessels. However, current ePTFE grafts often cause scar tissue formation due to their dense structure, contributing to compliance mismatch and limiting their long-term effectiveness and integration with the host. The goal of this research project was to utilize multiple characterization techniques to determine the melting point, crystallinity, and microstructure of raw PTFE resin, heat-treated resin, and extruded and expanded PTFE tubing. Characterization techniques included the determination of the melting point using Differential Scanning Calorimetry (DSC), analysis of the surface morphology using scanning electron microscopy (SEM) images, and calculation of crystallinity percentages from Raman spectroscopy data. A PTFE pelletizer was designed to be compatible with a mechanical tensile tester and optimized to remove air and compress the PTFE resin and lubricant mixture to create a condensed pellet prior to extrusion. This will allow for student-led ePTFE production to reduce overall costs and the tunability of tubing production factors to optimize tubing thickness, mechanical properties, and compliance. These techniques aim to guide the fabrication of ePTFE grafts created by student researchers to enhance biological integration with vasculature and long-term clinical performance.

Woojung Yi

Discipline: Biology

Authors:

#1 Woojung Yi

#2 Elliot Delroba

#3 Beth Zizzamia

#4 Stephanie Spera

#5 Melinda A. Yang

Abstract Name: Visualization of ancient humans from the Allen Ancient DNA Resource using ArcGIS: applications of interactive web maps for ancient DNA studies

The Allen Ancient DNA Resource (AADR) is a widely used resource that collects ancient DNA from humans across the globe. With over 10,000 published ancient humans included to date, the AADR has greatly facilitated the study of human population history and adaptation. However, one barrier to effectively utilizing this resource is the lack of a graphic user interface to assess the availability of ancient human samples for a region or time period of interest. Here, we developed a web-based interactive map to visualize ancient humans from the AADR. With this freely available, public-facing, constantly-updated, AADR visualizer, researchers are now able to quickly and easily explore the available ancient human DNA for subsequent population genetic analyses. Moreover, this tool is ideal for educational purposes, reducing the barriers to entry for researchers new to human evolutionary genomics.

Grace Yi

Discipline: History

Authors:
#1 Grace Yi

Abstract Name: Lexington's CORE Beliefs: How Local Kentucky Civil Rights Activists Considered Rises in Black Power and Radicalism, 1959-1970

Following the death of Martin Luther King Jr., civil rights organizations in the late 1960s faced pressure to debate the merits of non-violent strategies. This included the Congress of Racial Equality (CORE) which helped organize the 1963 March on Washington and other largely successful civil rights movements. Even its local chapters, such as Kentucky's oldest CORE chapter in Lexington, made huge strides in city desegregation, Black voter registration, and equal job opportunities. An interracial organization composed of professors, clergyman, and Black community leaders, Lexington CORE was initially dedicated to integration and nonviolence. Yet, by 1966, it can be seen that CORE was evolving into a Black Power organization, and Lexington was following. After the death of MLK Jr. in 1968, National CORE first championed 'Black Nationalism,' before unexpectedly slipping into conservatism and corruption. In the midst of this, individual CORE chapters were disrupted or even fell into infighting. This project seeks to better understand how local CORE chapters reacted to shifting consensus on Civil Rights, Black Power, and how to best combat racial discrimination. The study will analyze primary sources about Lexington, Kentucky's CORE Chapter using the Abby Marlatt Papers, 1945-2007, at the University of Kentucky Special Collections Research Center; oral histories interviewing former CORE members; and photos of protests organized by Lexington CORE. These sources will be put in dialogue with articles on Kentucky activism, civil rights, and how the National CORE evolved throughout the 1960s. The result will unravel how Lexington Civil Rights activists maintained their smaller-scale work given changes in national organization policies. Their efforts reveal the ways that local activists consider national issues and higher-ranked leaders when examining their own racial ideologies and communities.

Sarah Yim

NC - Duke University

Discipline: Biology

Authors:
#1 Sarah Yim

Abstract Name: LRRK2-Mediated Phosphorylation of Rab12 Links Lysosomal Dysfunction to Early Tau Pathology

Leucine-rich repeat kinase 2 (LRRK2) mutations are the most common genetic cause of Parkinson's disease (PD). These mutations enhance its kinase activity, leading to hyperphosphorylation of Rab12, which may disrupt its role in coordinating lysosomal trafficking central to cellular clearance and protein degradation. Lysosomes contribute to protein aggregate degradation and are associated with the formation of granulovacuolar degeneration bodies (GVBs)—proteolytically active lysosomal vesicles that accumulate dense-core cargo and accompany early tau pathology. This study characterized phosphorylated Rab12 (pRab12) localization and its relationship to lysosomal GVBs and tau pathology using immunohistochemistry (IHC) and immunofluorescence (IF) in human post-mortem tissues and a tauopathy mouse model. In human samples, pRab12 labeling was analyzed across the hippocampus, temporal cortex, and frontal cortex of Alzheimer's disease (AD), dementia with Lewy bodies (DLB), LRRK2 G2019S Parkinson's disease (LRRK2-GS PD), and sporadic PD (sPD) cases. pRab12 labeled cytoplasmic puncta morphologically consistent with GVBs that colocalized with the GVB marker Casein kinase 1d (CK1d), demonstrating that phosphorylated Rab12 accumulates within GVBs. These pRab12-positive GVBs were significantly increased in all disease groups compared with controls and were most abundant at higher Braak stages (>3), particularly in the hippocampus. Beyond GVBs, pRab12 also labeled neurofibrillary tangles and dystrophic

neurites positive for AT8 in AD and DLB cases, suggesting a close association between Rab12 phosphorylation and tau pathology across both genetic and sporadic PD and other non-PD neurodegenerative diseases. In the PS19 tauopathy mouse model, pRab12-positive GVBs similarly increased with age and tau pathology. These puncta colocalized with CK1d and the lysosomal marker LAMP1, with significant triple-labeling for pRab12, CK1d, and LAMP1. GVBs were more abundant in the entorhinal cortex compared to the hippocampus, which paralleled regional patterns for AT8-positive tau accumulation. Together, these findings link LRRK2-mediated Rab12 phosphorylation to lysosomal dysfunction and early tau pathology across distinct neurodegenerative diseases.

Emily Yimer

Discipline: Anthropology and Archaeology

Authors:

#1 Bernard Means

Abstract Name: Gunshot wounds and Skeletal Impact; A case study from the American Civil War

Gunshot wounds have a devastating impact on bone health and structure. This research project aims to look at gunshot wounds and the impact they have on the skeleton and surrounding tissue. It's important to explore the implications of war and the long lasting effects of it. The methods aim to explore initial bullet impact, exit wounds, anatomical deformities and healing processes that take place. I also aim to look at wound impact and how the wound would have impacted/imposed function after injury. I am using 3-D scans by the Virtual Curation Lab of American Civil War-era pathological remains from the National Museum of Health and Medicine.

Rick Yoon

Discipline: Physics and Astronomy

Authors:

#1 Wilbur Shirley

Abstract Name: Developing a Systematic Framework for the Entanglement Renormalization of Fractal Spin Liquids

Quantum systems composed of many interacting particles can exhibit emergent phenomena that defy properties of their individual constituents. When these interactions occur through quantum entanglement, they can give rise to exotic quantum phases of matter with remarkable properties. One such phase is fracton order, a recently discovered class of quantum matter that differs sharply from conventional topological order. Specifically, they host quasiparticle excitations with constrained mobility. Some can move only along lower-dimensional submanifolds; others are completely immobile. These highly unusual behaviors make fracton phases both conceptually rich and potentially useful for robust quantum information storage. Despite growing interest, fracton order remains poorly understood. A hallmark of these systems is their bifurcating entanglement renormalization group (RG) flows, where the system effectively splits into multiple copies under coarse-graining, contrasting with the stable RG flows typical of other quantum phases. Here, we systematically study the entanglement renormalization of a class of (fracton) fractal spin liquids known as three-dimensional lineon codes. Our goal is to identify entanglement entropic signatures that characterize their distinct renormalization behavior. To this end, we compute key properties such as ground state degeneracy as a function of system size, providing insight into the structure and scaling of fracton entanglement.

Jenna Young

Discipline: Gender, Ethnicity, Diversity, or Cultural Studies

Authors:

Julia Trabucco

Abstract Name: A Longitudinal Study of Black Student Experiences at SMU, 1950s-2020s

This project examines the history of inclusion and institutional support for the Black students at Southern Methodist University (SMU) from the 1950s to the present. Oral histories collected through the Voices of SMU project oral history project (VOSMU) contain the experiences of some of the university's earliest Black students and recent alumni to trace how opportunities and campus culture evolved over time. Early interviewees describe navigating racial isolation and challenges of integrating into a predominantly white institution. More contemporary interviewees show that increased diversity does not eliminate structural and cultural imbalances. This study is a thematic analysis of oral histories we gathered across multiple generations of Black students. The oral histories we conducted reveal that inclusion opportunities expanded significantly over time through the creation of Black student organizations, targeted scholarship initiatives, increased mentorship opportunities, and the development of more visible social spaces for Black students. Yet, these developments are unevenly matched by lasting cultural isolation. This study argues that Black student narratives capture forms of institutional change that official university records overlook. Their stories suggest that institutional inclusion has improved in structure but remains incomplete in practice because of the deeper cultural and historical dynamics that have shifted slower than institutional policy.

Ian Youngblood

Discipline: Engineering

Authors:

Abstract Name: Necessity and Application of Ion Gun Emissions on an Electrostatic Tractor Spacecraft

Because Geosynchronous Earth Orbit (GEO) represents a single altitude and inclination and is becoming saturated with noncompliant defunct satellites, it is imperative to implement debris remediation practices to avoid cascading collisions. Active debris removal from GEO can be achieved using the electrostatic tractor, where a servicer spacecraft aims an electron beam at a target debris object, charging the servicer positive and the debris negative, creating an attractive electrostatic force. This allows large spacecraft to be re-orbited to a disposal orbit. This research will expand on work done in the AVS Lab simulating the practicality of this concept. One challenge presented in previous work is that the size of the target can be significantly larger than the servicer. Due to this difference in capacitance, the servicer charges to its equilibrium potential before the target, resulting in a non-optimal electrostatic force. This work investigates how simultaneous ion gun emission from the servicer can mitigate this effect by counteracting the electron gun. The ion emission from the servicer causes a negative current, neutralizing the positive current from electron beam emission. The ion gun is used to maintain the servicer's potential while the target reaches its maximum potential. Simulations in MATLAB and SIMION will be central to completing this project. A search function is developed to find the ion gun current that coincides with a desired servicer potential. To determine whether each ion is able to leave the servicer without returning, a model of the electric potential field is created. The forces on the ion at each timestep are calculated. Based on preliminary results, the ion gun is expected to be an effective solution to the spacecraft capacitance issue when implemented alongside the electron gun for efficient electrostatic tractor interactions.

Nora Youngelson

Discipline: English and Literature

Authors:

Abstract Name: 'Battle Against Time': Mortality and Memory in Proust's Photographic Collection

My research investigates how Marcel Proust's personal collection of photographs informs his literary construction of memory and time, specifically in relation to death, in *À la Recherche du Temps Perdu* (In Search of Lost Time). While scholars have long examined Proust's engagement with photography as a tool for memory, my project illuminates how photography is equally significant for his meditation on mortality, capturing the tension between obsessive preservation and inevitable loss. Observing that photographic imagery appears most prominently at moments of disappearance in the text, this study approaches Proust's work from both a visual and philosophical perspective. The research builds on existing scholarship on Proust's sensory and narrative techniques, as well as theoretical frameworks from Walter Benjamin and Bernard Stiegler that further examine Proust's relationship to death and the importance of technological memory. To deepen this analysis, I am conducting archival research in France, studying original photographs from Proust's collection held at the Bibliothèque nationale de France. This combination of a visual analysis of the archival photographs and close readings of key passages from *À la Recherche du Temps Perdu* engages with concepts from media philosophy to understand how photography operates as both evidence and elegy. I will demonstrate that Proust used photography not only to retrieve memory but to confront the impossibility of fully recovering what has been lost. The findings will contribute to the evolving, recent readings of Proust and will be discussed in the context of modernist studies, visual culture, and contemporary reflections on the role of technology in remembrance.

shrouk younis

Discipline: Physics and Astronomy

Authors:

#1 Shrouk Younis

#2 Brandon Daul

#3 Ryan Martin

#4 Daeha Joung

Abstract Name: Geometry-Driven Fibroblast Organization in 3D Bioprinted Microchannels

Three-dimensional (3D) bioprinting provides a versatile platform for studying how physical constraints influence collective cellular behavior. Scaffold architecture, particularly microchannel geometry and dimensions, governs group behavior by modulating cell-cell and cell-matrix interactions. In this study, we investigated the effect of microchannel width on NIH/3T3 fibroblast organization and maturation stages within biocompatible silicone scaffolds. Using a custom extrusion-based 3D printing platform, scaffolds with parallel channels of 300, 600, or 900 μm width are pre-fabricated. Fibroblasts suspended in Geltrex are then seeded into the channels and cultured for fourteen days under standard conditions. Cell group dynamics, alignment, and maturation stages are quantified using fluorescence imaging and live/dead assays on days 1, 4, 7, 10, and 14. Data analysis reveals that narrower channels (300 μm) promote strong alignment along the channel axis and dynamic temporo-spatial group/cluster behavior within the confinement. In contrast, wider channels (900 μm) allow lateral spreading and cluster formation. Intermediate channels (600 μm) have balanced alignment and spatial distribution, supporting both organized structure and uniform growth. We used machine learning algorithms based on the Kadomtsev-Petviashvili (KP) equation to analyze and predict how cells align and progress through maturation stages in different channel geometries (physical cues). Our results show that microscale confinement alone can guide group behavior and cellular development, even in the absence of biochemical cues. By adjusting channel geometry, this platform provides a controllable, physics-driven approach to studying how physical cues influence collective and dynamic cellular behavior. Overall, this approach not only offers a quantitative understanding of how spatial constraints shape tissue organization but also enables predictions that can inform the design of scaffolds for tissue engineering and regenerative medicine.

Veby Youssef

Discipline: Engineering

Authors:

#1 Eli Owens

#2 Hunter Satterfield

#3 Mackenzie Partsch

Abstract Name: A Granular-Based, Magnetically Controlled, Soft Robotic Gripper

Soft robotics is an ever-expanding field due to the technology's versatile and adaptable nature, with applications across wide-ranging sectors. Furthermore, the fusion of soft robotics with hard robotics has produced hybrid systems that have additional adaptability and durability. For our project, we have developed a hybrid soft/hard robotic gripper that utilizes a granular material for the gripping action. Granular materials, which are collections of athermal particles, exhibit a solid-liquid phase transition known as the jamming

transition. For example, sand can act like a liquid moving through an hourglass, but it can also act like a solid on the beach as it supports our weight. With this in mind, we developed a gripper that uses the granular jamming transition to grip objects when the granular material is jammed (solid-like) and release objects when the granular material is unjammed (liquid-like). The body was fabricated using 3D printing and is driven by the meshing of three 120° bevel gears. The gripper consists of three-prong style fingers, the ends of which have a flexible membrane filled with granular iron particles. Electro-permanent magnets were used to control the jamming of the fine iron particles entrapped in a flexible membrane. In the gripper, the magnets' constant field will jam the particle so as to be in a gripping state; once the field is turned off, the granular particles will be in the unjammed state. To date, we have designed and manufactured a working prototype. Our soft robotic gripper, with its adaptive and precise object-handling capabilities, holds significant promise for modernizing various sectors by enhancing machinery efficiency, streamlining operations, and minimizing spatial and cost requirements.

Yeyoun Yu

Discipline: Biology

Authors:

Abstract Name: Investigating the Interaction between Cortisol and the Phosphatidylinositol Pathway in Bipolar Disorder

Bipolar disorder (BD) is a debilitating psychiatric disorder characterized by recurring episodes of mania and depression. The cause of BD remains uncertain, however, the phosphatidylinositol signalling pathway is one of several pathways implicated in its pathophysiology. Specifically, myo-inositol levels differ in the manic and depressive phases, and myo-inositol depletion is proposed as a common mechanism for conventional mood stabilizers. Individuals with bipolar disorder often have dysregulated hypothalamus-pituitary-adrenal (HPA) axis activity resulting in elevated cortisol levels particularly during manic and depressive episodes. Additionally, myo-inositol has been shown to lower cortisol levels. This study explored a potential interaction between the phosphatidylinositol pathway and HPA axis dysregulation by examining the effects of cortisol on intracellular myo-inositol levels. Lymphoblastoid cell lines derived from individuals with BD were cultured in media containing varying concentrations of cortisol and myo-inositol levels were quantified in the cell extracts. Statistical analysis showed no significant differences in myo-inositol levels across the different cortisol treatments, indicating that variation in cortisol concentration did not produce measurable changes under these conditions. Overall, these findings suggest that while myo-inositol may influence cortisol levels, the reverse was not detectable in this experimental model.

Ha Young Yun

Discipline: Political Science

Authors:

#1 Boyoung Kim

Abstract Name: Borders in the Algorithm: A Comparative Study of U.S., Chinese, and French Large Language Models

This project investigates a central question at the intersection of technology and global politics: Do large language models (LLMs) reflect the geopolitical worldviews of the countries that develop them, and does a user's location influence what these systems say? Although LLMs are increasingly used in education,

journalism, and policy discussions, little is known about how they frame sensitive international issues or whether those framings vary across national contexts. Prior research has shown that U.S.- and Chinese-developed models sometimes encode differing ideological assumptions, but European systems and cross-regional testing remain understudied. To address this gap, this project extends an existing 50-question benchmarking method by examining three models—ChatGPT (United States), DeepSeek (China), and Mistral AI (France)—and by conducting the study from South Korea rather than the previously used location of Brazil. Using twelve geopolitically sensitive prompts, each model was first asked to predict how strongly the United States and China would disagree on a given topic, and then asked to produce full answers. These answers were anonymized and resubmitted to the models to evaluate how different the responses were from one another. This method captures both anticipated ideological conflict and actual differences in political framing. Preliminary results show that while most model responses appear similar on the surface, questions involving China consistently produced the highest levels of divergence and disagreement. DeepSeek's behavior changed most noticeably over time, shifting from refusing to answer certain questions to providing full responses, suggesting rapidly evolving moderation policies. Mistral AI often offered a broader historical context but did not fully avoid alignment with Western framings. These findings highlight the potential for LLMs to subtly shape global discourse and underscore the need for ongoing evaluation, transparency, and cross-national comparisons as these systems increasingly mediate public understanding of international issues.

Catarina Zabot Pasini

Discipline: Health and Human Development

Authors:

#1 Catarina Zabot Pasini

#2 Calvin Thompson

#3 Nipun Chopra

#4 Ayusha Pokharel

#5 Anya Melson

Calvin Thompson

Abstract Name: MicroRNA-Mediated Suppression of S100 β Expression in a C6 Neuronal Cell Model

S100 calcium-binding protein B (S100 β) is a member of the Calcium and Zinc binding family of proteins, and it is a crucial component of pro-apoptotic pathways that follow from traumatic brain injury (TBI), neurodegenerative diseases—such as Alzheimer's disease, Parkinson's disease, multiple sclerosis, and amyotrophic lateral sclerosis—, and even some psychiatric disorders. When activated, by either internal or external factors, it interacts with the RAGE receptor, a membrane-bound protein that, as a result of this interaction, releases reactive oxygen species (ROS), which themselves induce cascades of processes that result in neuronal death. One very promising approach to stopping this overt S100 β upregulation is through microRNA (miRNA) intervention. MiRNA is a small, endogenous molecule, usually varying between 19-25 nucleotides in length, that is essential for the regulation of protein expression; when produced, miRNA binds to either the 3'- or 5'-UTR of the target mRNA, and usually promotes the formation of a complex that cleaves the coding sequence so that the genetic code cannot be properly translated. Previous research has identified a number of possible S100 β mRNA binding sites for miRNA, but little has been done to test the effectiveness of these targets for future clinical applications. In this research, we aim at answering the question of whether the selected miRNA successfully binds S100 β mRNA to prevent the expression of the protein in vitro. The C6 rat neuronal cell line, known to express S100 β , will be treated with a miRNA solution that allows the molecule to penetrate the cell and influence its protein production; the effectiveness of the methodology will be assessed using a combination of ELISA and western blot protocols for detection of S100 β , which is expected to be partially or completely eliminated from the cell lysate.

Discipline: Psychology

Authors:

#1 Naaima Zaharah

#2 Severine Lannoy

Abstract Name: The Influence of Genetic and Environmental Risk Factors on Executive and Affective Abilities in Alcohol Use Disorder

Purpose: Alcohol Use Disorder (AUD) is a condition influenced by genetic, environmental, and psychological factors. Executive impairments are a strong marker of AUD severity; however, it remains unclear whether these impairments stem from genetic predisposition, actual alcohol consumption, and/or environmental exposures. Method: This study aims to determine the extent to which familial/genetic and environmental risk factors predict deficits in executive functions in a sample of individuals with severe AUD using polygenic score (PGS) for alcohol problems, family history of AUD (FH), and a sum score of adverse childhood experiences (ACE). Executive functions were indexed by inhibition (emotional Go/No-Go Task), attentional control (Attention Network Task), and shifting (Color-Shape Shifting task). We performed linear regressions with executive function performance as the outcome and PGS, FH, or ACE as main predictors. All models were controlled for sex, age, socioeconomic status, and current alcohol use. Results: Across tasks, better performance was observed among younger participants, females, and those with higher socioeconomic status. The roles of familial/genetic risk factors appeared specific for the inhibition task, while we found no significant associations between PGS/FH and shifting or attentional control. Results indicate that FH was linked to higher false alarm rates, reflecting weaker inhibitory control. Higher PGS was also related to poorer emotional discrimination of fearful, happy, and sad faces in the Go/No-Go Task. These effects were observed after controlling for alcohol consumption. However, we did not find evidence that ACE influenced executive performance in individuals with AUD. Conclusion: Findings suggest that genetic and familial factors contribute uniquely to affective executive dysfunction in individuals with severe AUD, beyond the effects of alcohol consumption. These results emphasize the multidimensional nature of cognitive deficits in AUD, with the roles of genetic/familial factors together with alcohol use patterns and severity.

Faizi Zaidi

Discipline: Physics and Astronomy

Authors:

#1 Faizi Zaidi

#2 Ayati Vyas

Ayati Vyas

Abstract Name: Energy Bandgaps Estimation and Alignment in Compound Semiconductors for Optoelectronic Applications

Bandgap alignment describes how the conduction and valence bands of two different semiconductor materials line up at an interface, determining the mobility of electrons and holes. Proper band alignment is essential for the efficient operation of optoelectronic devices. Compound semiconductors are of significant interest because, unlike silicon, many exhibit direct bandgaps that improve optical performance. In the first part of this research, a model was developed to optimize the bandgap energy of compound semiconductors as a function of the mole fraction of their constituent elements. Materials including InAs, GaAs, InP, GaN, and InGaAsP were modeled to determine the optimum bandgap by varying composition. The influence of the bowing parameter b in Vegard's law was also examined. At $x = 0.3$, the predicted bandgap (E_g) was approximately

1.13 eV, but decreased by $\sim 33\%$ to 0.80 eV when a bowing parameter of $b \approx 0.477$ was included. The second part of the work focused on band alignment in isovalent heterojunctions. ZnSe and CdSe were selected for band offset calculations. Because CdSe has a smaller bandgap, it acts as the quantum well, while ZnSe serves as the barrier material. Using Anderson's rule, the conduction band of CdSe was found to be 0.81 eV lower than that of ZnSe, and the valence band offset for ZnSe was approximately 0.17 eV. A MATLAB program was developed to plot the corresponding band diagrams, confirming that the ZnSe/CdSe heterojunction exhibits a Type-I band alignment. Additional results and discussion will be presented in detail.

Sami Zain

Discipline: Physics and Astronomy

Authors:

#1 Sami Zain

Abstract Name: Revitalizing Observational Astronomy: Mastering Flat Fields

Revitalizing observational astronomy: mastering flat fields Sami Zain¹, Dr. Jennifer Carter¹¹. Susquehanna University, Department of Physics Flat field imaging is a cornerstone of photometry and usually can only be done with professional equipment which is beyond the budget of most. Because of how expensive this professional equipment can be, few may try to find a way around that by creating their own apparatus which can effectively collect flat field images. By applying all the basic principles to successfully obtain a flat field image, one can create a flat field imaging box which can mimic a professional setup, at a fraction of the cost. Comparisons between the apparatus and other methods of flat field imaging can then be done. As well, code can be developed in multiple languages, including Python and MATLAB, to analyze the processed flat field images to draw conclusions about the quality, as well as potential implications of these frames. The results and comparisons of the flat field images will be presented.

Safura Zainab

Discipline: Biology

Authors:

#1 Safura Zainab

Abstract Name: Identifying Diagnostic Delays and Time to Final Diagnosis in Cancer of Unknown Primary

Cancer of Unknown Primary (CUP) is a rare and aggressive metastatic cancer in which the site of origin cannot be identified despite extensive diagnostic investigation. Timely progression through the diagnostic pathway is crucial, as delays can limit treatment decisions and worsen patient outcomes. To identify where these inefficiencies arise, this study reviewed patient records from the Cancer Centre (NHS UK), mapping key milestones from first symptoms to final diagnosis. Time intervals across referral, imaging, specialist evaluation, biopsy, pathology reporting, and MDT discussion were calculated to determine which stages contributed most to overall delays. The analysis found that the longest delays occurred between diagnostic imaging and biopsy, identifying this as the major bottleneck within the CUP pathway. Early delays between symptom onset and initial imaging also emerged, reflecting variability in referral urgency and limited access to early diagnostic services. In contrast, once biopsy samples were obtained, pathology processing and MDT review progressed more consistently and with fewer delays. Overall, these findings highlight the need for improved biopsy scheduling, stronger coordination between radiology and pathology, and expanded early

imaging access. Streamlining these steps may significantly reduce diagnostic lag and support more timely, effective care for patients with CUP.

Raj Zala

Discipline: Engineering

Authors:

#1 Abellah Moussa

#2 Michael Jones

Abstract Name: Design and Manufacturing of a General Purpose Adaptable Ejector Mechanism for the APSX-PIM Injection Molding Machine

Injection Molding (IM) is a cyclic process whereby molten plastic is formed into a desired shape by forcing it into a cavity under pressure. Sizes of molded parts vary from the smallest size components used in medical devices, to entire body panels of cars. IM is recognized as one of the most cost-effective technologies for producing high volumes of parts with consistent quality and intricate detail, making it essential for industries like automotive, medical devices, and consumer products. For rapid and efficient high-volume manufacturing, injection molding machines typically utilize a built-in mechanical, hydraulic, or pneumatic ejection system. This mechanism is designed to automatically and safely release the finished part from the mold, ensuring the process is efficient and the final product is free from defects. The selection of the appropriate ejection mechanism depends heavily on the part design, the required surface finish, the type of plastic material used, and production volume. Proper placement and type are essential to an efficient molding process and final product quality. To the author's knowledge, a single, universal, highly adaptable ejection system that can adapt to various mold geometries is yet to be designed and implemented. Which brings us to the subject of our current research. The main purpose of this study is the design and implementation of a general-purpose, highly adaptable ejection system for the APSX-PIM injection molding machine. The proposed solution employs tapered sleeves with slots to create powerful and precise clamps for the ejector pins precisely distributed over a mechanically operated ejector plate. The newer designs are expected to work with various mold geometries therefore effectively reducing tooling cost.

Shahreen Zaman

Discipline: Computer Science

Authors:

Abstract Name: Benchmarking the Generalization and Robustness of AI Models for Fake News Detection Across Political, Business, and Health Domains

With the widespread circulation of misinformation and deliberate information manipulation in the digital landscape, it has become increasingly challenging to distinguish between authentic material and fabricated content across social media and news platforms, invalidating the credibility of public knowledge. This research presents a principled benchmark comparing the performance of three advanced machine learning models and a combination ensemble model, in detecting fake news in Politics, Business, Health. This study provides an analysis in terms of overall accuracy, domain-specific versus cross-domain performances, and model robustness when exposed to new unseen contexts and subjected to controlled text modifications. Using a curated, balanced corpus of 20,000–30,000 fact-checked news articles sourced from public datasets from Politics, Business, and Health, multiple AI models – two discriminative transformative models (DeBERTa,

ELECTRA), a generative LLM model (Falcon-7B), and a combination of the transformative-LLM architectures – will be trained to detect heterogeneous misinformation patterns. To compare their strengths and weaknesses, model performances will be assessed in terms of Accuracy, Macro-Precision, Macro-Recall, Macro-F1, ROC-AUC, PR-AUC, and MCC, and ECE under three evaluation criteria: in-domain accuracy, reliability in cross-domain shifts, and adaptability when input text is modified. By means of rigorous statistical evaluation and testing, this research aims to report label distribution within the curated corpus while providing a comprehensive quantitative benchmark of performance under different evaluation criteria. This study seeks to contribute to the development of more reliable, socially responsible and transparent AI-driven misinformation detection mechanisms for maintaining the integrity of information ecosystems.

Niamh Marie Zanghi

Discipline: Philosophy, Ethics, and Religious Studies

Authors:

#1 Rhea Rahman

Abstract Name: Damned for All Time: Exploring the Relationship Between Queerness and Christianity Through Artistic Depictions of Judas Iscariot

Judas Iscariot is primarily remembered for his betrayal of Jesus. For centuries, depictions of Judas in art portrayed him as a traitor. Then, in the mid-twentieth century, when homosexuality became relevant in American Christianity, queer Christians used the arts to reclaim Judas as one of their own and to argue for a more accepting church. This paper explores queer Christianity as a lived experience by analyzing depictions of Judas in art. Texts from the early Christian church depicting Judas are analyzed to situate the author's perspectives in historical context. Artworks from Christian, queer, and non-affiliated creators from the mid-twentieth century onwards are then analyzed to explore the relationship between the American church and the queer community at the time. Depictions of Judas are sorted into four categories: empathetic, reject, sympathetic, and avoidant. Each category considers Judas' agency, religious context, fate, the work's overall thesis, and reception from the queer community and American church. Finally, a survey of queer Christians asking their perspectives on Judas is included. Samples of the artworks are expected to show a positive correlation between the rise of queer rights and empathetic depictions of Judas. Historically situated political and social sentiments on queerness are reflected in these Judas depictions. The survey of queer Christians are expected to show favorable views on Judas and people relating to him in creative ways. Judas reflects the lived experiences of queer Christians. Since the mid twentieth century, Christianity has been used to justify widespread bigotry. Judas spent nearly two millennia as a scapegoat, traitor, and villain. But his legacy has been redeemed with each work of queer art depicting him otherwise. My research encourages the American Christian church to redeem queer Christians the same way queer Christians reclaimed Judas: with re-examination, reflection, and a willingness to try again.

Jane Zanni

Discipline: Visual Arts

Authors:

Abstract Name: Pecan Pie

Pecan Pie is an experimental short film in which a young woman scours her grandmother's house in search of the fairies that have sabotaged her Thanksgiving dinner. She is then given the unpleasant task of having to eat

the fairies in order to get rid of them. Made with a combination of video and animated illustrations woven together to create the air that fantasy is bleeding into reality. The imagery mimics first person puzzle games with the audience situated directly into the scene and treated as the protagonist: becoming the young woman and sometimes even the fairies. The narrative structure is inspired by Shakespearean comedies like *The Tempest* and *A Midsummer's Night Dream*, flipping between comedy and an uncomfortable tension. For as long as I can remember my family has gathered at my grandparent's house for Thanksgiving. They are however aging; footage used in *Pecan Pie* was taken at what was likely my last Thanksgiving there. Who will be hosting holidays next and carrying on the tradition was the topic we were all avoiding, but sat in our minds regardless throughout dinner. *Pecan Pie* engages both with the obligation to appease by carrying on family traditions as well as the responsibility someone might feel to leave convention behind if there is an underlying violence. Who is allowed to exist within a space is a common theme across my work. Mixed media collage and video are my mediums of choice. *Pecan Pie* is a culmination of the art I create. For the future of the project I plan to build upon what is already present to include oil painting illustrations and wooden sculptures as sets.

Austin Zehring

Discipline: Engineering

Authors:

#1 Austin Zehring

#2 Tanjina Afrin

Abstract Name: Adapting the EPA SWMM Framework for Stormwater Simulation of a Utility-Scale Solar Farm in Fairfield, Virginia

As utility-scale solar photovoltaic (PV) installations become more common, understanding their effects on watershed hydrology is increasingly important. These systems create hybrid surface conditions in which impervious panels are elevated above pervious ground, producing runoff behavior not captured by traditional land-use categories. This study uses the EPA Storm Water Management Model (SWMM) to simulate surface runoff from a 50-acre solar farm in Virginia. To represent the hydrologic complexity of PV systems, each row of panels is divided into four sub-catchments: the panel surface, the dripline where concentrated flow occurs, the under-panel ground surface, and the vegetated spacer between rows. The model simulates both slope configurations within the same simulation. In the first case, the panel slope matches the ground slope, causing runoff to move downslope from both surfaces. In the second case, the panel slope opposes the ground slope, redirecting initial flow and altering infiltration patterns. The ground slope is held constant to isolate the influence of panel orientation, and hydrologic parameters, including soil characteristics, vegetation roughness, and rainfall inputs, are assigned using standardized regional data. Model results show that post-development peak flows are consistently higher than pre-development conditions, reflecting increased flow concentration at driplines and reduced infiltration beneath panel surfaces. Dense vegetation planted beneath and between solar arrays helps moderate these increases by adding surface roughness that slows overland flow. The outcomes highlight how vegetation type, panel configuration, and slope alignment can meaningfully shape hydrologic responses. Overall, the study demonstrates that SWMM can effectively represent runoff processes at solar PV sites by resolving microscale surfaces, simulating outfall volumes, and analyzing dual slope alignment scenarios within a unified model structure. Future work should incorporate field-measured slopes, conduit lengths, and dynamic panel angle adjustments to improve representation of tracking systems and enhance hydrologic realism.

keytlin zelaya edwards

Discipline: Health and Human Development

Authors:

Abstract Name: Quantifying Acrolein Levels in E-Cigarettes to Assess Rising Non-Cancer Risk

Acrolein is an aldehyde that is produced through thermal decomposition (pyrolysis) of components such as propylene glycol and vegetable glycerin, the main components of E-Cigarettes. This substance contributes to respiratory and cardiovascular toxicity. With the rapid increase in the consumption of E-Cigarettes, health alerts have been generated regarding exposure to acrolein. For this reason, this study is based on analyzing previously published data on acrolein emissions from commercial electronic cigarette products (Ogunwale et al., ACS Omega, 2017) to quantify exposure levels and evaluate the Non-Cancer Risk Index (NCRI) at 10, 20, 30, and 40 inhalations per hour. The NCRI was calculated by dividing the acrolein yield per inhalation by the Non-Cancer Reference Exposure Level (REL) for acrolein (0.00002 mg/m^3), multiplying by the reciprocal of the daily breathing rate ($1/20 \text{ m}^3/\text{day}$), and adjusting per inhalation. This formula was based on the toxicological evaluation framework described by Fowles and Dybing (2003). As a result, many of the products exceeded the NCRI threshold of 1.0, with values increasing as inhalations per hour increased. Notably, the products Halo Cafe Mocha and Halo South Classic reached NCRI values far above the threshold, which emphasizes a greater risk of non-cancer effects, such as respiratory or cardiovascular problems over a lifetime. The data demonstrate that the daily use of E-Cigarettes can generate a concerning exposure to acrolein and highlight the need for regulatory oversight to reduce possible non-cancer health risks.

Jenna Zendron

Discipline: Biology

Authors:

Abstract Name: The effects of delta-9-tetrahydrocannabinol on a methicillin resistant strain of staphylococcus aureus

Methicillin resistant *Staphylococcus aureus* (MRSA) is a bacterium that possesses a penicillin binding protein with a weak affinity for beta-lactam antibiotics. MRSA is a major contributor to hospital-acquired infections and has a high mortality rate. While β -lactam antibiotics have served as a primary treatment, MRSA's growing resistance has prompted the search for alternative antimicrobial agents. One emerging candidate is delta-9-tetrahydrocannabinol (THC), the primary psychoactive compound in *Cannabis sativa*, which has gained research attention due to its potential therapeutic properties. In this study, the MRSA strain ATCC 43300 was exposed to varying concentrations of THC in combination with the antibiotics cefoxitin and oxacillin. The aim was to evaluate potential synergistic effects between THC and standard antibiotic treatments. The results indicated no significant synergistic interaction between THC and the tested antibiotics, but there was a strong dose-dependent antimicrobial effect of THC. Notably, the minimum inhibitory concentration (MIC) of THC required to achieve inhibition of MRSA growth was comparable to the MICs of many standard antibiotics. These findings suggest that THC has direct antimicrobial activity, highlighting the clinical potential of cannabinoids for treating infectious diseases. This prompts further investigation into the pathways and implications of cannabinoid use in treating antibiotic-resistant bacterial infections.

Maxwell Zengel

Discipline: Political Science

Authors:

Abstract Name: Regulating the Runway: Investigating the Effects of Kentucky Governmental Policies on its Aviation Industry and Projecting Future Outcomes

Despite its small population and rural nature, could Kentucky have been at the forefront of aviation transit in the mid 20th century? States such as Florida and Texas followed Kentucky's policies on tall building regulations around airports in the early 1980s. When Kentucky first created their Department of Aviation in 1948, they organized it to directly report to the governor, but later the department became a division underneath the Department of Transportation and its labor force greatly reduced. This decision created disruption among many within the department, including Edward Lafontaine, who was appointed director of the Kentucky Office of Aeronautics in 1975. Lafontaine's accomplishments include opening over 60 municipally-owned airports and establishing the first successful state aviation program in the nation. Utilizing documents from the Edward Lafontaine Papers, 1969-1992, at the University of Kentucky Special Collections Research Center and contemporary Federal Aviation Administration (FAA) data, this study aims to qualitatively and quantitatively determine the effect departmental regulation had on air travel in Kentucky. FAA data such as passenger statistics and economic impact studies, will provide a basis for quantitative analysis. The study aims to assess the extent to which the lack of Kentucky's Department of Aviation affected the state's aviation trajectory. To further expand this research, I will use current data to create a future impact model estimating the effects of current day federal aviation legislation.

Devin Zhang

Discipline: Engineering

Authors:

#1 Jonathan Maerklin

Adin Sacho-Tanzer

Abstract Name: Low-Cost Attitude Determination for CubeSats Using Sensor Fusion

Accurate attitude, or orientation, determination is critical for CubeSat missions, yet high-precision sensors (accuracies $< 0.1^\circ$) cost \$10,000+ while most undergraduate missions only require $< 5^\circ$ accuracy. Low-cost alternatives for this performance tier remain underdeveloped and unvalidated. This research addresses the challenge of achieving reliable attitude estimation using low-cost components: silicon photodiodes as sun sensors, a three-axis magnetometer, and a six-axis inertial measurement unit (IMU). We developed an attitude determination and control system (ADCS) that integrates six photodiodes, one on each face of the CubeSat, with a magnetometer interfaced via I2C protocol to a Raspberry Pi 4B. The photodiodes, coupled with an analog-to-digital converter, detect solar illumination to compute sun vectors in the body frame, while the magnetometer measures the local magnetic field vector, also in the body frame. We implemented the Two-Vector TRIAD algorithm to fuse the body-frame sensor measurements with the inertial-frame reference vectors to estimate the spacecraft's attitude. These estimates are then combined with IMU readings using a Multiplicative Extended Kalman Filter (MEKF), providing continuous attitude estimation while accounting for sensor uncertainties and measurement noise. Key challenges included fusing measurements from the sensors with varying noise characteristics and update rates (ranging from 1-1000 Hz), validating accuracy without expensive equipment (e.g., Helmholtz cages, air-bearing platforms, or rate tables costing \$10,000+), and establishing repeatable testing procedures for performance characterization. An Ossila solar simulator provided realistic illumination while static and dynamic testing protocols were developed using a stepper motor setup to quantify the system's measurement accuracy. Preliminary tests show attitude estimates within the target $< 5^\circ$ accuracy range during static tests. Further results will benchmark the performance of this affordable sensor configuration and demonstrate its potential for future CubeSat missions. This work enables future integration with control algorithms and provides a testing framework for low-cost ADCS development in undergraduate research programs.

Daniel Zhang

Discipline: Engineering

Authors:

#1 Kolade Adebawale

Abstract Name: Modeling Mechanical Stimulation of Cancer in High Sugar Tissue

Throughout 2025, 30,000 people died of liver cancer in the U.S. Furthermore, liver cancer incidence around the world is projected to increase, and type 2 diabetes is partially implicated. A potential reason is that excessive sugar in tissue, a symptom of type 2 diabetes, can react with proteins to form advanced glycation end products (AGEs). These AGEs crosslink collagen to modulate the tissue's viscoelasticity, or its balance between being a viscous fluid and elastic solid. Recent findings suggest such viscoelastic modulation then alters cancer and immune cell behavior in the tumor microenvironment, but the responsible mechanisms are underexplored - especially in the context of type 2 diabetes. Hence, there is a crucial need for quick-to-produce experimental models to study cell behavior in high-sugar, viscoelastic environments. Ultimately, the objective of this project is to develop said model as a collagen hydrogel. Collagen is first tested with treatments of prepared AGEs, or methylglyoxal, glucose, or ribose to induce glycation. Following collagen gelation, two methods monitor hydrogel crosslinking: SDS-PAGE monitors molecular weight for fiber aggregation, and HPLC monitors amino acid composition for reacted groups. The viscoelastic properties of the hydrogels are measured via shear rheology. After the optimal treatment is determined, cancer cells and macrophages are seeded into the finalized hydrogel, and confocal imaging tracks migration. Machine learning algorithms analyze this data for how viscoelastic manipulation affects seeded cells. Based on literature, sugar crosslinking treatment is expected to maintain stiffness while accelerating the hydrogel stress relaxation rate, or the rate which resistance to deformation decreases over time. Cancer and pro-cancer immune cells are expected to become more motile in this fast-stress-relaxing context, reflecting a dangerous tumor microenvironment. Overall, this investigation will produce a hydrogel model relevant to liver cancer and elucidate the impact of viscoelasticity on cancer in high sugar tissue.

Wenxi Zhang

Discipline: Business

Authors:

#1 Longzhu Dong

Yuqing Su

Abstract Name: Proactive Personality, Reciprocal Dynamics, and Creative Performance in Global Virtual Teams: An RI-CLPM Study

In global virtual teams, creative performance is influenced by both stable individual traits and dynamic moment-to-moment behaviors. Guided by Social Cognitive Theory and Conservation of Resources Theory, this study examines how proactive personality predicts stable engagement and creativity, and how within-person fluctuations in effort and creative idea quality influence one another across time. Utilizing a four-wave longitudinal design and RI – CLPM framework, we successfully distinguished stable between – person tendencies from momentary within-person changes. This analysis yielded a discernible reciprocal effort–creativity cycle: when individuals engaged more intensely than usual at time t , they produced higher-quality creative ideas at time $t+1$ ($\beta = 0.180$, $p < .001$). Conversely, periods of heightened creativity contributed to

increased engagement in subsequent phases ($\beta = 0.078$, $p < .001$). Despite its bidirectional nature, the effect from effort to creativity was found to be notably stronger, suggesting that effort functions as a primary resource that initiates a Creative Resource Gain Spiral across time. At the between-person level, individuals with more stable proactive tendencies consistently exhibited higher levels of average engagement ($\beta = 0.119$, $p < .001$). The accumulation of engagement resources resulted in significant cross-level consequences, with stable effort exhibiting a strong prediction of distal team creative performance ($\beta = 0.816$, $p = .029$). This underscores the role of enduring individual resource investment in shaping collective creative outcomes within global virtual teams. This study is among the first to use an RI-CLPM framework to demonstrate a bidirectional effort - creativity cycle within global virtual teams and provides new evidence for dynamic resource processes in distributed collaboration. At the team level, contextual characteristics such as average team age and time zone dispersion also emerged as significant predictors of creative outcomes. These findings highlight the significance of demographic composition and temporal structure in fostering creativity within virtual team environments.

Yaotian Zhang

Discipline: Business

Authors:

#1 Yaotian Zhang

#2 Longzhu Dong

Abstract Name: Stepping Up or Staying Silent: Language Barrier Effects on Leadership-Communication Dynamics in Global Virtual Teams

This study aimed to investigate the longitudinal associations between perceived internal and external language barriers and leadership and communication perceptions in global virtual teams. We analyzed multi-wave longitudinal data from 1,520 students (in 324 teams) participating in an 8-week global business competition (X-Culture, 2022 Fall). To disentangle stable (i.e., between-person) differences from dynamic (i.e., within-person) relationships, we employed the Random-Intercept Cross-Lagged Panel Model (RI-CLPM). At the between-person level, results revealed that internal language barriers (i.e., self-perceived expressive difficulties) were significantly negatively associated with both stable leadership ($\beta = -0.130$) and communication traits ($\beta = -0.101$). Conversely, external language barriers (i.e., perceiving difficulties in others' communication) were significantly positively associated with stable leadership traits ($\beta = 0.058$) but showed no significant association with stable communication traits. At the within-person level, we examined the reciprocal dynamic relationships, revealing an evolutionary pattern. The path from communication state to the subsequent leadership state emerged mid-project ($\beta = 0.106$) and was sustained. The reverse path—from leadership state to communication state—was initially non-significant, but emerged strongly in the later stage ($\beta = 0.196$), indicating a shift from a unidirectional to a reciprocal dynamic. These findings suggest that team-level communication challenges (external barriers) may create a leadership vacuum, which individuals fill by “stepping up,” thereby earning higher stable leadership ratings. However, within the dynamic weekly interactions, communication acts as the initial driver for leadership, which later evolves into a reciprocal loop where both processes mutually strengthen each other over time.

Yaotian Zhang

Discipline: Business

Authors:

#1 Yaotian Zhang

#2 Longzhu Dong

Abstract Name: A Tale of Two Motivations: How Goal Orientations Shape Language Barrier Effects in Global Virtual Teams

This study aimed to investigate why the effects of language barriers on communication quality vary across individuals. We examined whether two distinct motivational dispositions – Learning Goal Orientation (L-GO) and Performance Goal Orientation (P-GO) – act as moderators for the relationship between language barriers and communication quality. We analyzed data from 1,520 students (in 324 teams) participating in an 8-week global business competition (X-Culture, 2022 Fall) using a multilevel moderation model. Results revealed a “tale of two motivations”: Learning Goal Orientation (L-GO) did not emerge as a significant moderator, suggesting that communication behavior for high-L-GO individuals remains stable regardless of contextual barriers. Conversely, Performance Goal Orientation (P-GO) acted as a powerful moderator, revealing a “double-edged sword” effect. First, P-GO significantly amplified the negative impact of internal barriers on communication ($B = -0.075$); for high-P-GO individuals, self-perceived expressive difficulties (internal barriers) appear to trigger a “fear of looking incompetent,” causing communication quality to deteriorate sharply. Second, P-GO also moderated the effect of external barriers, but in the opposite direction ($B = 0.050$); high-P-GO individuals seem to frame team-level communication challenges (external barriers) as a “legitimate challenge,” motivating them to compensate and improve their communication. These findings indicate that the impact of language barriers is not universal but is contingent upon an individual’s motivational framework.

Fatima Zhantibiyeva

Discipline: Interdisciplinary

Authors:

#1 Blesson Paul

#2 Benedict Kolber

#3 Rachael Neilan

Megan Kwiatkowski

Abstract Name: Left vs. Right: Computational Insights into Neuron Asymmetries and Impact on Bladder Pain

The brain region known as the central nucleus of the amygdala (CeA) plays a crucial role in modulating bladder pain. Research has shown that in the context of bladder injury, the left CeA is generally anti-nociceptive, meaning it decreases pain, while the right CeA is generally pro-nociceptive, meaning it increases pain. CeA neuron populations that express protein kinase c-delta (PKC- δ), calcitonin gene-related peptide receptor (CGRPR), and phosphorylated extracellular signal-regulated kinase (pERK) contribute to pain signaling within both left and right hemispheres through their distinct asymmetric firing properties and specific responses to injury. This raises a central question for our work: Can these asymmetries in neuron-level properties drive the progression of bladder-pain output from the CeA? We developed a 3-D agent-based computational model of the left and right CeA to investigate how hemispheric asymmetries in these neuron populations influence emergent pain output during bladder injury. Our agent-based model simulates the location, connectivity, and firing rates of more than 24,000 PKC- δ , CGRPR, and pERK co-expressing neurons with detailed spatial and functional properties. Simulation of the model yields an emergent measure of pain-related output from the left and right CeA in response to bladder injury. Model parameters were estimated from wet-lab data showing clear left-right differences in neuron firing rates and pERK expression in the CeA, allowing the model to reflect experimentally observed neuron activity patterns across hemispheres. The model uses neuron data from eight mice to capture natural variability. Simulations from the model show how left-right differences in neuron-level properties can impact system-level pain output from the CeA. Mice with higher initial pERK expression exhibit greater pain responses, with firing-rate

asymmetries emerging as the primary contributor to pain and with pERK asymmetries further amplifying pain following injury.

Enson Zheng

Discipline: Engineering

Authors:

#1 Amy Koike

#2 Bilge Mutlu

#3 Arissa Sato

#4 Jianhua Zhang

#5 Timothy Kamp

Vivian Trach

Abstract Name: SteMy: Designing Robotic Assistants to Support Stem-Cell Research

The use of social companion robots has been explored in a variety of settings, but their application in stem cell research for conducting differentiation of human pluripotent stem cells has not been explored. Although stem cell research offers great promise for advancement regarding human health, the culture and differentiation of stem cells remains highly variable and technically complex. Researchers face persistent challenges such as workflow inefficiencies and cognitive fatigue, potentially creating a bottleneck in the research process. These complexities present an opportunity for a robotic assistant to support laboratories that work with stem cells. To address this challenge, we conceptualized SteMy, a social companion robot designed to address the challenges of stem cell research. This study explores the design of a robotic assistant to support stem cell researchers without replacing human agency. Using participatory design methods, we engaged stem cell researchers, particularly those of human pluripotent stem cell-derived cardiomyocytes (hPSC-CM), in (1) an introduction to SteMy, a social companion robot tailored to hPSC-CM research, (2) a participatory session to identify design implications for robot assistants, and (3) a survey to capture researchers' perceptions of the integration of SteMy into their lab environment. Our findings contribute to HRI by highlighting design implications for a robotic assistant that support stem cell researchers.

Lillian Zhi

Discipline: Engineering

Authors:

#1 Daniel Dailey

Abstract Name: Adaptive Laboratory Evolution of *Acidithiobacillus ferrooxidans* for Vanadium Oxidation to Understand Genomic Determinants of Metal Selectivity

Metals bind to metalloproteins for diverse functions, including electron transfer, structural stability, and catalysis. However, the molecular basis of metal selectivity is often unclear. Here we attempt to evolve Af variants capable of oxidizing V³⁺ in place of Fe²⁺ using adaptive laboratory evolution for genomic analysis of mutations in Cyc2 and genes that influence metal selectivity. The outer-membrane c-type cytochrome Cyc2 recognizes Fe²⁺ in *Acidithiobacillus ferrooxidans* (Af), a chemolithoautotrophic acidophile that oxidizes Fe²⁺ and sulfur for energy under aerobic conditions. Cyc2 is the proposed first electron acceptor in the aerobic Fe²⁺ oxidation, but it remains unknown whether Fe²⁺ specificity is encoded solely by Cyc2 or from

interactions with other proteins. We hypothesized that adaptive laboratory evolution could yield Af variants capable of V³⁺ oxidation. We chose V as the alternative donor due to its chemical similarity to Fe and ability to sustain Af growth in Fe²⁺/V³⁺ mixed media via indirect redox cycling. Genetic diversity was generated by exposing Af to UV irradiation for one minute, followed by selection in media containing V³⁺ as the only available electron donor under aerobic conditions. Because V³⁺ is unstable in aerobic conditions, we also evaluated selection anaerobically to minimize abiotic oxidation. Together these experiments aim to test whether an Af variant that oxidizes V³⁺ can be developed for genomic analysis. This can provide insights into whether mutations in Cyc2 alone broadens donor usage or whether changes elsewhere are required, informing pathway-level constraints on engineering metal-specific oxidoreductases for biotechnological applications, including mining or electrofuel generation.

Elizabeth Zhou

Discipline: Interdisciplinary

Authors:

#1 Jennifer Bay

Abstract Name: Is ChatGPT a fanfiction author? Literary analysis of AI chatbot-generated fanfiction

Since the rise in accessibility of generative AI chatbots, the use of applications like ChatGPT has skyrocketed, particularly for writing. Numerous studies have been conducted to examine the implications of these AI chatbots, examining the efficacy of these programs, the experience of co-writing with AI, and the structural and societal changes AI may bring to the craft of writing. While studies have considered generative AI chatbots in the context of creative and scientific writing, there are few studies that focus on the genre of fanfiction, a unique form of creative writing that draws upon media (literature, film, TV shows, etc.) or real life people. This research project examines the quality, content, and features of four fanfiction stories generated from prompts varying in detail and length. The subsequent analysis focuses on the stories' literary elements of plot, setting, and character, as well as features such as faithfulness to the original medium and execution of the fanfiction writing style. Findings show that while AI chatbots can successfully generate fanfiction based off of an existing medium, the stories are short, often lacking in detail and character development, and contain inconsistencies. With the current limitations of AI chatbots, it is unlikely these applications will be able to produce fanfictions that match the quality and literary levels of human writers. However, chatbots' capability to generate passable fanfiction—as well as its unethical data scraping of existing fanfiction works—may cause concerns and tension in fan communities. These communities should be prepared for generative AI to change the landscape of fanfiction in the coming years.

Kallen Zhou

Discipline: Computer Science

Authors:

#1 Kallen Zhou

#2 Isabella Garrard

#3 Manning Littlejohn

Manning Littlejohn

Isabella Garrard

Abstract Name: The Moral Cost of Agreement: A Quantitative Benchmark of Sycophancy in Large Language Models' Moral Reasoning

Large language models (LLMs) are increasingly being utilized in high-stakes domains such as healthcare, defense, and education. However, these models exhibit “sycophancy,” the tendency to generate biased outputs that align with a user’s desires. As LLMs increasingly participate in decision-making that affects lives, understanding how they align with user biases has become critical to ensuring ethical artificial intelligence (AI) behavior. Current literature has quantified sycophancy in objective areas such as mathematics and healthcare, but there is a lack of research analyzing this phenomenon in subjective moral decision-making. This study seeks to establish a quantitative benchmark for measuring sycophancy across varying levels of user bias. Moral scenarios across different ethical domains are generated using a human-in-the-loop workflow with reliability assessed using Fleiss’ Kappa. Using a bipolar Likert scale (-5 to +5), we quantify the magnitude of moral sycophancy in Gemini and GPT models by analyzing the difference in moral ratings between neutral baselines and user-biased prompts. Using a paired sample t-test approach on the difference scores, we identify which models and scenarios are most susceptible to shifts in moral judgment toward user bias. These results are reported with statistical confidence intervals (95%) and visualized using Box-and-Whisker plots to display the distribution and skew of model responses. We expect a consistent vulnerability in current models to prioritize user validation over ethical consistency. By illustrating sycophancy across ethical domains, this study reveals where current AI parameters fail and proposes a framework for benchmarking moral consistency in LLMs. This is critical for policymakers and developers in creating standardized safety benchmarks that evaluate moral consistency.

Yi Zhu

Discipline: Business

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#2 Xin Liu

Abstract Name: Optimal Ordering Decisions in a Two-Period Newsvendor Problem with Partial Backorders

This project examines how a company should decide how much to order when selling a seasonal product over two periods with uncertain demand. The study builds on the classic newsvendor problem, which determines the optimal order quantity when demand is unknown, and extends it to a two-period setting. In this version, demand is uncertain in both periods, and if some customers cannot purchase the product in the first period, a portion of them may return in the second—a situation known as partial backordering. The central research question is how firms can determine the optimal ordering strategy that maximizes profit while balancing the risks of overstocking and understocking. To address this question, we develop a mathematical model that incorporates key factors such as demand uncertainty, inventory holding costs, and the probability that unsatisfied customers from the first period return to buy in the second. The model allows the firm to determine how much to order before each selling period and how to respond to leftover inventory or unmet demand. We then conduct sensitivity analyses to examine how profit and ordering decisions change under different market conditions, including variations in demand variability, customer return rate, and product holding cost. Preliminary results indicate that the optimal ordering policy is highly sensitive to the fraction of customers who return in the second period. When even a modest proportion of customers come back, expected profit can increase substantially compared to assuming no backorders. These findings suggest that firms can improve profitability by explicitly accounting for customer return behavior in their order decisions. The project demonstrates how mathematical modeling can provide practical insights for inventory management and decision-making in industries dealing with seasonal goods, such as holiday merchandise, and perishable products.

David Zhu

Discipline: Biology

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#1 Olga Zhaxybayeva

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Abstract Name: Comparative Genomic Analysis of Gene Transfer Agents in Methanogenic Archaea and Beyond

Gene transfer agents (GTAs) are virus-derived particles that package random fragments of host DNA and are released through death of producing cells, aiding in horizontal gene transfer and recombination. Their existence poses an evolutionary puzzle: although GTA production is individually detrimental, GTA genes show evidence of long-term purifying selection, suggesting benefits that emerge at the population or lineage level. Voltae Transfer Agents (VTAs), produced by a methanogen *Methanococcus voltae* PS, are the only known archaeal GTAs. Are GTAs more widespread in Archaea than we currently know? My project aims to search for VTA relatives in other methanogenic archaea to examine their origins and evolutionary history. To address this, I investigated the distribution of VTA proteins from *M. voltae* PS across all *M. voltae* strains and the broader class *Methanococci*. First, I assembled a comprehensive genomic dataset of publicly available RefSeq and GenBank assemblies for *Methanococci* and relevant bacteria occupying similar environments. Using VTA proteins as queries, BLAST analyses of four *M. voltae* genomes identified clear homologs of all query proteins, each in tight genomic proximity indicative of conserved clustering. Assessing their evolutionary breadth, iterative PSI-BLAST searches against available *Methanococci* found homologs in 35 additional strains, six of which encoded homologs for at least half of the query proteins. In all substantial matches, the recovered homologs formed compact genomic neighborhoods, suggesting strong selective pressure to maintain cluster structure across *Methanococci*. Curiously, homologs of tail proteins were found in distantly related strains belonging to *Firmicutes* and *Cytophaga*, *Fusobacterium*, and *Bacteroides* (CFB) group bacteria. To examine if these proteins were horizontally exchanged, I reconstructed evolutionary histories of VTA and VTA-like genes and compared them to organismal relationships. Together, these analyses aim to clarify how VTA clusters persist despite individual-level costs, providing insights into the evolutionary processes that shape viriform genetic exchange mechanisms in microbial populations.

Alexa Ziff

Discipline: Biology

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Abstract Name: STING Agonists Inhibit Kaposi's Sarcoma-Associated Herpesvirus Pathogenesis

Kaposi's sarcoma-associated herpesvirus (KSHV) is an etiological agent of multiple malignancies associated with compromised immunity, such as Kaposi's sarcoma (KS) and primary effusion lymphoma (PEL). KSHV infection is lifelong and there are currently no specific treatments for KSHV-related diseases, presenting an urgent need for therapeutics. The cGAS-STING DNA-sensing pathway is known to activate the type I interferon response and induce growth inhibition and/or cell death in cancer cells. Therefore, STING agonists, which mimic the enzymatic products of cGAS, have shown potential as effective antivirals and cancer therapeutics and are being tested in nonviral cancer-related clinical trials. This study seeks to expand this approach to viral cancers, which are understudied and make up approximately 15% of all cancers. In this

study, we report that the treatment of KSHV-infected BCBL1-trex-luc primary effusion lymphoma cells with diamidobenzimidazole (diABZI), a potent STING agonist, significantly inhibited KSHV lytic replication, reflected by attenuated viral gene transcription, DNA replication, protein expression, and virion production. Under latent conditions, patient-derived PEL cell lines were treated with diABZI and exhibited decreased cell growth and viability. Our RNA-sequencing revealed an upregulation of interferon-stimulated genes (ISGs) and cell death pathways including apoptosis and autophagy. These results provide a foundation for STING agonists as a potential therapeutic option for KSHV-driven diseases.

Johanna Zimmerli

Discipline: Chemistry

Authors:

Abstract Name: Extraction and Quantification of Fluoxetine (Prozac) in the Aqueous Environment

Fluoxetine, better known as Prozac, is a commonly prescribed antidepressant. It has been known to persist in wastewater systems, meaning that it can potentially enter the aqueous environment and cause harm to aquatic life. The purpose of this project is to develop effective methods to quantify fluoxetine in water samples using liquid chromatography-mass spectrometry (LC-MS), as well as observe partitioning effects onto polyethylene microplastics. Since the concentration of any fluoxetine found in natural water is expected to be below the detection limit of the LC-MS instrument, it is necessary to develop a method to extract Prozac from the aqueous samples and concentrate it for analysis. Initially, aqueous samples were prepared with a known concentration of Prozac. A solid phase extraction (SPE) method has been optimized with Oasis MC-X cartridges that can capture Prozac molecules and concentrate the samples for analysis with LC-MS. Different variables of sample preparation, such as the volume of samples, salinity of water, acidification, and the presence of microplastics have all been taken into account to determine how Prozac behaves in the aqueous environment. For quantification, a six-point calibration curve was created with internal standardization using fluoxetine-d6. The aqueous fluoxetine standard concentrations ranged from 0 mg/L to 12.5 mg/L with concentration of 1 mg/L of deuterated fluoxetine in each standard, giving a 1 to 10 signal ratio of deuterated fluoxetine to fluoxetine.

Charles Zimmerman

Discipline: Engineering

Authors:

#1 Charles Zimmerman

Abstract Name: Artificial Intelligence Based Defect and Quality Detection for Manufacturing Through Depth Perception

Image-based perception has grown to become a cornerstone of modern autonomous systems, and is widely implemented in artificial intelligence models for quality inspection, and object recognition with traditional computer vision methods relying solely on RGB-imagery. While effective for many applications, RGB-based approaches struggle to capture subtle, low-contrast changes in contours and curvature. These limitations can significantly reduce detection accuracy in real-world environments, particularly in low-light conditions such as manufacturing and warehouse automation. To address this societal need, this project investigates how incorporating stereovision depth perception as an additional sensing modality to RGB imagery can enhance the detection of surface deformations that standard vision systems can often miss. The central hypothesis of

this project is that adding depth information to RGB imagery will enable more reliable detection of subtle surface defects than RGB-based methods alone. Although depth sensing is increasingly accessible, a clear technical need remains for vision systems capable of detecting subtle, three-dimensional surface defects that RGB imagery alone often cannot capture. Relatively few defect-detection systems fuse depth and RGB information, and even fewer explore how depth specifically improves sensitivity to minor shape irregularities. This work develops a depth-augmented perception pipeline that first identifies the target object in an RGB image, and then analyzes its corresponding depth geometry to determine whether local deformations are present. The preliminary results from a trained RGB-only model developed in this project depict an average confidence rating of 80%, and early literature review reveals a potential improvement of roughly 10% with F1 scores reported in the range of 0.898-0.914 for multimodal approaches. Further work will involve collecting paired RGB and depth data across five distance bands, multiple object orientations, and slightly varied lighting conditions. Depth gradients and local curvature will be used to identify shape deviations such as dents and bulges.

Lexi Zimmerman

Discipline: Psychology

Authors:

#1 Liz Wallace

Abstract Name: When Caring Hurts: Exploring the Link Between Empathy and Secondary Trauma

Empathy plays a critical role in trauma-related professions, where practitioners are routinely exposed to the emotional suffering of others. The motivation for this study was to explore whether individuals who have experience working or volunteering with trauma-exposed populations report higher levels of empathy compared to those without such experience. This question stems from prior research suggesting that trauma work may enhance empathic sensitivity while simultaneously increasing vulnerability to emotional strain (Figley & Ludick, 2017; Wagaman et al., 2015). Participants (N = 162, ages 18–71) were recruited through outreach to a university community and various trauma-informed agencies across Oklahoma. They completed an online Qualtrics survey that included demographic questions, an empathy scale adapted from the Empathy Quotient (Muncer & Ling, 2006), and items modeled after the Secondary Traumatic Stress Scale (Bride et al., 2004). An independent samples t-test revealed that participants with trauma-related experience reported significantly higher empathy scores ($M = 52.79$, $SD = 6.38$) compared to those without such experience ($M = 50.34$, $SD = 7.35$), $t(160) = 2.015$, $p = .046$. While no significant differences were observed in secondary traumatic stress symptoms, the pattern of results supports previous findings on the emotional impact of trauma exposure. This work highlights the importance of trauma-informed training and supervision and encourages future research on empathy development in high-stakes environments.

Alexis Zimmerman

Discipline: Psychology

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#1 Lexi Zimmerman

#2 Jaclynn Maass

Abstract Name: I Feel You, But Can I Remember? The Impact of Courtroom Environments on Mirror-Touch Synesthetes

Mirror-Touch Synesthesia (MTS) is a rare condition affecting approximately 2% of the population, in which individuals experience vicarious physical sensations when observing touch to others. This study explores how MTS may influence empathy, decision-making, and emotional reactivity, particularly within courtroom environments. Participants (N = 204) were adults recruited via email, SONA, and social media who completed an online Qualtrics survey. The survey included videos depicting human touch, the Facial Expression Recognition Test (36 stimuli), and a shortened version of the Empathy Quotient. Results indicated a significant positive correlation between MTS responses and cognitive empathy ($r = .16$, $p = .02$), but no significant relationships with emotional or social empathy. The second phase of this research involves a mock jury simulation designed to examine whether empathy mediates the relationship between MTS and decision-making and whether this effect is amplified by emotionally charged evidence. Findings aim to shed light on how sensory-empathic experiences may affect judgment processes in legal contexts, offering implications for understanding bias, emotion, and perception within courtroom environments.

Aiden Zingone

Discipline: Criminology/Criminal Justice

Authors:

Abstract Name: Law Enforcement Officers' Perception of the Threshold for Reasonable Suspicion

Since its inception in 1968, reasonable suspicion, defined as a set of circumstances in which a reasonably prudent person would believe that a crime is in the process of, or has been committed, has been a doctrine shrouded by confusion. Over the years, many cases have gone before the Supreme Court, and although the concept of reasonable suspicion has been refined, questions still remain on what constitutes the minimum threshold of reasonable suspicion and even the definition of 'reasonable'. A previous study has found that law enforcement officers do conform to the legal requirements of reasonable suspicion (Mclean Et al, pg. 6), but a hole in the research exists when it comes to law enforcement officers' perception of the doctrine. Therefore, this study asks at what criteria do Law Enforcement Officers perceive that they have crossed the threshold from mere suspicion to reasonable suspicion and if this perception varies among length of experience in law enforcement, gender, education, or agency size. This study aims to address that question via an online survey administered to Texas law enforcement officers. The officers were recruited in a convenience sample via the Sheriffs Association of Texas and the Texas Chiefs Association. The respondents were asked to evaluate several real life scenarios that have gone to appeals courts by rating whether or not reasonable suspicion exists in each case and how likely they would be to prolong the stop. Once the results are compiled the responses will be separated into separate demographic groups and compared. It is anticipated that the results of this study will give a better understanding as to the level of variance in the perception of reasonable suspicion among separate law enforcement demographics which will aid law enforcement agencies in evaluating the consistency in officer behavior when dealing with potentially criminal conduct.